SCHEME AND SYLLABI FOR

EIGHTH SEMESTER

OF

BACHELOR OF

TECHNOLOGY IN

COMPUTER SCIENCE AND ENGINEERING

FROM 2009 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM
<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Marks</th>
<th>Semester-end duration-hours</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CS09 801</td>
<td>Computer Architecture and Parallel Processing</td>
<td>4 1 30 70 3</td>
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<tr>
<td>CS09 802</td>
<td>Data mining and Warehousing</td>
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<td>CS09 803</td>
<td>Elective IV</td>
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<td>CS09 804</td>
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<tr>
<td>CS09 805(P)</td>
<td>Project</td>
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<td>CS09 807(P)</td>
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Total Marks

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<tr>
<th>Code</th>
<th>Elective I</th>
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<tbody>
<tr>
<td>CS09 L01</td>
<td>Information Security</td>
</tr>
<tr>
<td>CS09 L02</td>
<td>Computational Intelligence</td>
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<td>CS09 L03</td>
<td>Queuing Theory</td>
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<td>CS09 L04</td>
<td>Object Oriented Modeling and Design</td>
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<td>CS09 L05</td>
<td>Management Information Systems</td>
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**Electives for 7th and 8th semester**

<table>
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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CS09 L06</td>
<td>Artificial Neural Networks</td>
</tr>
<tr>
<td>CS09 L07</td>
<td>Distributed Systems</td>
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<tr>
<td>CS09 L08</td>
<td>Fuzzy Logic and Applications</td>
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<td>CS09 L09</td>
<td>Speech and Language Processing</td>
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<td>CS09 L10</td>
<td>Advanced Topics in Operating Systems</td>
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<td>CS09 L11</td>
<td>Advanced Database Design</td>
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<td>CS09 L12</td>
<td>Digital Image Processing</td>
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<td>VLSI Design</td>
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<td>CS09 L14</td>
<td>Information Theory and Coding</td>
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<td>CS09 L16</td>
<td>Web Programming</td>
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<td>CS09 L17</td>
<td>Graph Theory and Combinatorics</td>
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<td>CS09 L19</td>
<td>Soft Computing</td>
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<td>CS09 L20</td>
<td>Information Retrieval</td>
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<td>CS09 L21</td>
<td>Digital Design Using VHDL</td>
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<td>CS09 L22</td>
<td>Computational Geometry</td>
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<tr>
<td>CS09 L23</td>
<td>Simulation and Modeling <em>(Global Elective 1 from CSE)</em></td>
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<tr>
<td>CS09 L24</td>
<td>Computer Based Numerical Methods <em>(Global Elective 2 from CSE)</em></td>
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<tr>
<td>CS09 L25</td>
<td>Pattern Recognition <em>(Global Elective 3 from CSE)</em></td>
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<td><strong>Global Electives from other departments</strong></td>
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<tr>
<td>EE09 L23</td>
<td>Process Control and Instrumentation</td>
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<td>EE09 L25</td>
<td>Robotics &amp; Automation</td>
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<td>ME09 L24</td>
<td>Marketing Management</td>
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<td>AN09 L24</td>
<td>Project Management</td>
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<td>EC09 L25</td>
<td>Biomedical Instrumentation</td>
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<td>Bio-Informatics</td>
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<td>PE09 L23</td>
<td>Total Quality Management</td>
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<tr>
<td>CE09 L24</td>
<td>Remote Sensing and GIS</td>
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<td>CE09 L25</td>
<td>Finite Element Methods</td>
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<tr>
<td>BT09 L24</td>
<td>Bio-ethics and Intellectual Property Rights</td>
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</table>
Teaching scheme  
4 hours lecture and 1 hour tutorial per week  

Credits: 5

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 (16 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 (15 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 (17 hours)

Module IV (17 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

Text Books

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

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

University Examination Pattern

**PART A:** Short answer questions *(one/two sentences)*

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

5 x 2 marks = 10 marks

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

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

4 x 5 marks = 20 marks

**PART C:** Descriptive/Analytical/Problem solving questions

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

4 x 10 marks = 40 marks

Maximum Total Marks: 70
Teaching scheme
2 hours lecture and 1 hour tutorial per week

Credits: 3

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 (10 hours)
Introduction: what is Data Mining, which data, what kinds of patterns can be mined-Data Warehouse and OLAP technology for Data Mining, Data Warehouse Architecture.
Data preprocessing: data cleaning, data integration and transformation, data reduction, discretization and concept - hierarchy generation.

Module II (10 hours)
Data Mining Primitives, Languages and System Architectures. - Concept Descriptions: Characteristic and Discriminant rules.
Data Generalization. - Mining Association Rules in Large Databases - Transactional databases.

Module III (10 hours)
Concept Descriptions: Characteristic and Discriminant rules, Data Generalization, Example of decision tables and Rough Sets.
Classification and prediction, Decision Tree Induction (ID3, C4.5), Bayesian Classification.
Cluster Analysis. A Categorization of major Clustering methods

Module IV (9 hours)
Introduction to Data warehousing: Need for warehousing, Data warehouse Architecture and design, Hardware and operational design, Tuning and testing.
Trends, Developments and Applications.

Text Books

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

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

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

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

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

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

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

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

*Maximum Total Marks: 70*
Objectives

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 specialised in computer science and engineering.

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

<table>
<thead>
<tr>
<th>Internal Continuous Assessment</th>
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<tbody>
<tr>
<td>40% - Design and development/Simulation and analysis</td>
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<tr>
<td>30% - Presentation &amp; demonstration of results</td>
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<tr>
<td>20% - Report</td>
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<tr>
<td>10% - Regularity in the class</td>
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</table>
**Teaching scheme**
3 hours practical per week

**Credits:** 2

**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 papers published in reputed journals and conferences. Each student has to submit a seminar report, based on these papers; the report must not be reproduction of any original paper. 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 and discussion
- 20% - Report
- 10% - Regularity in the class and Participation in the seminar
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 project (two interim reports and main report). 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.

<table>
<thead>
<tr>
<th>Assessment in Viva-voce</th>
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<tbody>
<tr>
<td>40% - Subjects</td>
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<tr>
<td>30% - Project and Mini Project</td>
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<tr>
<td>20% - Seminar</td>
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<tr>
<td>10% - Industrial training/industrial visit/educational tour or Paper presented at National-level</td>
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</table>
CS09 L01 : Information Security

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

• To teach the fundamentals of information security which deals with protecting information and information systems from unauthorized access, use, disclosure, disruption, modification or destruction.
• To teach the various threats to storage of secure information.

Module I (15 hours)

Module II (12 hours)

Module III (11 hours)

Module IV (14 hours)

Text Books

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

University Examination Pattern

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

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

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

Maximum Total Marks: 70
Teaching scheme
3 hours lecture and 1 hour tutorial per week

Objectives

• To teach how to create cognitive systems that could compete with humans in large number of areas.
• To teach fundamental heuristic algorithms such as those found in fuzzy systems, neural networks and evolutionary computation

Module I (13 hours)
Recursion and Mathematical Induction - Verification and Limitations - Verification of Logic Programs - Limitations - Applications in Natural Language Processing - Using Definite Clauses for Context-Free Grammars - Augmenting the Grammar - Building Structures for Nonterminals - Canned Text Output - Enforcing Constraints - Building a Natural Language Interface to a Database

Module II (14 hours)

Module III (12 hours)

Module IV (13 hours)

Text Books

Reference Books
### Internal Continuous Assessment (Maximum Marks-30)
- **60%** - Tests (minimum 2)
- **30%** - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
- **10%** - Regularity in the class

### University Examination Pattern

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

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

**PART C:** Descriptive/Analytical/Problem solving questions  \[4 \times 10 \text{ marks} = 40 \text{ marks}\]
Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
Objectives

- To teach the fundamental queueing models and the various parameters involved with performance of the individual disciplines.

Module I (14 hours)
Description of the Queueing problem - Characteristics of Queueing processes - Notation - Measuring System Performance - Some General Results - Simple Bookkeeping for Queues - Poisson process and the Exponential Distribution - Markovian property of the Exponential Distribution - Stochastic Processes and Markov Chains - Steady-state Birth-Death Processes - Simple Markovian Birth-Death Queueing Models -

Module II (15 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, Approximations, Numerical Techniques and Simulation. - Bounds and Inequalitites - Approximations - Numerical Techniques - Discrete-Event Stochastic Simulation Problems.

Text Books

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

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

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**University Examination Pattern**

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

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

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

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

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

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

*Maximum Total Marks: 70*
Objectives

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

Module I (14 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 (13 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
3. Bruegge, Object Oriented Software Engineering using UML patterns and Java, Pearson Education
4. James Rambaugh et. al., Object Oriented Modelling and Design, Prentice Hall India
6. DeLillo, Object Oriented Design in C++, Thomson Learning

Internal Continuous Assessment (Maximum Marks-30)
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class
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*Maximum Total Marks: 70*
CS09 L05 : Management Information Systems

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 Fundamentals, Telecommunication and Networks - Communication, Media, Modems & Channels - LAN, MAN & WAN - Network Topologies, Internet, Intranet and Extranet. Wireless technologies like Wi-Fi, Bluetooth and Wi-Max.

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

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

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

**University Examination Pattern**

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

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

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

*Maximum Total Marks: 70*
CS09 L06 : Artificial Neural Networks

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To teach the fundamental building blocks of Neural networks and to promote their widespread use in the current day scientific research environment.

Module I (14 hours)

Module II (14 hours)

Module III (13 hours)

Module IV (13 hours)

Text Books

Reference Books

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

**PART A:** Short answer questions (one/two sentences)  \[5 \times 2 \text{ marks} = 10 \text{ marks}\]

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

**PART B:** Analytical/Problem solving questions  \[4 \times 5 \text{ marks} = 20 \text{ marks}\]

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

**PART C:** Descriptive/Analytical/Problem solving questions  \[4 \times 10 \text{ marks} = 40 \text{ marks}\]

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

*Maximum Total Marks: 70*
Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

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

Module I (10 hours)
Operating system fundamentals - distributed system concepts and architectures - major design issues - distributed computing environments (DCE).

Module II (13 hours)
Concurrent processes and programming - threads and processes - client server model - time services language mechanisms for synchronization - concurrent programming languages.

Module III (13 hours)
Inter-process communication and coordination - message passing communication - request/reply communication - transaction communication - name and directory services - distributed mutual exclusion - leader election.

Module IV (13 hours)
Distributed process scheduling - static process scheduling, dynamic load sharing and balancing - distributed process implementation - real-time scheduling - concepts of distributed file systems - distributed shared memory - distributed computer security.

Text Books

Reference Books
2. Tanenbaum S., Distributed Operating Systems, Pearson Education.

Internal Continuous Assessment (Maximum Marks-30)
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class
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<td>Two questions from each module with choice to answer one question.</td>
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*Maximum Total Marks: 70*
Objectives

- To impart the basic concepts of fuzzy set theory.
- To understand the applications of fuzzy logic in various fields.

Module I (14 hours)

Module II (14 hours)

Module III (13 hours)
Fuzzy measures – general discussion – belief and plausibility measures – probability measures – possibility and necessity measures – relationships among classes of fuzzy measures.

Module IV (13 hours)

Text Books

Reference Books

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

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

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

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

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

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

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

*Maximum Total Marks: 70*
**Objectives**

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

**Module I (13 hours)**

**Module II (13 hours)**
Speech: Phonetics, Speech Synthesis, Automatic Speech, Recognition, Speech Recognition: Advanced Topics, Computational Phonology

**Module III (13 hours)**

**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**

**Reference Books**

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

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

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

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

*Maximum Total Marks: 70*
Objectives

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

Module I (14 hours)

Module II (14 hours)

Module III (13 hours)

Module IV (13 hours)

Text Books

Reference Books

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

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

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

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

*Maximum Total Marks: 70*
Objectives

- To 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)

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-30)
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
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| **PART B:** Analytical/Problem solving questions | 4 x 5 marks = 20 marks |
| Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module. |

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

*Maximum Total Marks: 70*
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 I (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)

Text Books

Reference Books
1. B. Chanda and D.D. Majumder, Digital Image Processing and Analysis, PHI

Internal Continuous Assessment (Maximum Marks-30)
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
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University Examination Pattern

**PART A:** *Short answer questions (one/two sentences)*

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

5 x 2 marks = 10 marks

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

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

4 x 5 marks = 20 marks

**PART C:** *Descriptive/Analytical/Problem solving questions*

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

4 x 10 marks = 40 marks

*Maximum Total Marks: 70*
Objectives

- To impart the required skills to the students in design of VLSI components.

Module I (14 hours)
Introduction to MOS technology - IC technology - MOS and VLSI - NMOS and "CMOS fabrication - thermal aspects - MOS circuits tub ties and latch up - wire parasitic - design rules and layouts - multilayer CMOS process - layout diagrams - stick diagrams - hierarchical stick diagrams - layout design analysis tools.

Module II (14 hours)

Module III (12 hours)
Sequential machines - latches and flip flops - sequential system design -subsystem design - pipelining - data paths - adders - ALU - ROM - RAM -FPGA - PLA – multipliers.

Module IV (12 hours)
Floor planning - methods - floor plan of a 4 bit processor - off chip connections –architecture design - register transfer design - architecture for low power - architecture testing - cad systems and algorithms - simulation - layout synthesis.

Text Books

Reference Books
1. C. Puck Nell D. A. & Eshraghian K., Basic VLSI Design - Systems and Circuits
2. Mead C, Conway L., Introduction to VLSI System, Addison Wesley

Internal Continuous Assessment (Maximum Marks-30)
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4 x 5 marks = 20 marks

**PART C:**  *Descriptive/Analytical/Problem solving questions*  

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

4 x 10 marks = 40 marks

*Maximum Total Marks: 70*
Objectives

- To teach the fundamentals of information quality, error control in communication process and various systems of coding information for reliable communications.

Module I (14 hours)

Module II (14 hours)
Coding - linear block codes - generator matrices - parity check matrices - encoder-syndrome and error detection - minimum distance - error correction and error detection capabilities - cyclic codes - coding and decoding.

Module III (13 hours)
Introduction to algebra - groups - fields - binary field arithmetic - construction of galois field - basic properties - computations - vector spaces - matrices - BCH codes - description - decoding - reed-55eneral codes

Module IV (13 hours)
Coding - convolutional codes - encoder - generator matrix - transform domain representation - state diagram - distance properties - maximum likelihood decoding - Viterbi decoding - sequential decoding - interleaved convolutional codes.

Text Books
1. Simon Haykin, Communication Systems, John Wiley

Reference Books
2. Sam Shanmugham, Digital and Analog Communications, John Wiley
3. Simon Haykin, Digital Communications, John Wiley
**Internal Continuous Assessment (Maximum Marks-30)**

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*Maximum Total Marks: 70*
Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To impart the fundamental concepts of multimedia.

Module I (13 hours)
Multimedia system organization and architecture - QOS architecture - multimedia distributed processing models - multimedia conferencing model - storage organization.

Module II (13 hours)
Psychoacoustics - digital audio and computer - digital representation of sound - audio signal processing (editing and sampling) - audio production - digital music - musical instrument synthesizer - MIDI protocol

Module III (13 hours)
Raster scanning principle - color fundamental - color video performance measurement - analog audio - stereo effect - MPEG and DVI technology - multimedia applications - toolkit and hyper application.

Module IV (13 hours)
Multimedia information system - operating system support middleware system service architecture - presentation services - user interface - file system and information and information model - presentation and anchoring file - Multimedia standards - role of standards - standardization issues - distributed multimedia systems.

Text Books
1. P. K. Buford, Multimedia Systems, AWL.

Reference Books
4. Rao, Bojkovic and Milovanovic, Multimedia Communication Systems,
5. R. Steinmetz and K. Nahrstedt, Multimedia Computing Communication and Application, Pearson Education

Internal Continuous Assessment (Maximum Marks-30)
60% - Tests (minimum 2)
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Maximum Total Marks: 70
Objectives

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

Module I (14 hours)

Module II (14 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)

Text Books

Reference Books
7. Barry Burd, JSP, IDG Books India.
9. Floyd Marinescu, EJB Design Patterns,
**Internal Continuous Assessment (Maximum Marks-30)**

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- **30% -** Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
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**PART C:** Descriptive/Analytical/Problem solving questions  
4 x 10 marks = 40 marks  
Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
Objectives

- To introduce the basics of graph theory as a modelling and analysis tool in computer science and engineering.
- To introduce 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

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

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
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**PART C:** Descriptive/Analytical/Problem solving questions
4 x 10 marks = 40 marks
Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
CS09 L18 : Machine Learning

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

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)

Text Books


Reference Books

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

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

### University Examination Pattern

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

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

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

*Maximum Total Marks: 70*
Objectives

- To introduce the 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 (14 hours)

Module II (14 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.

Module IV (13 hours)
Advanced Topics: Support Vector Machines, Evolutionary computation (EC)- Evolutionary algorithms, Harmony search, Swarm intelligence

Text Books

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

- **60%** - Tests (minimum 2)  
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### University Examination Pattern

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

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

*Maximum Total Marks: 70*
CS09 L20 : Information Retrieval

**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 (10 hours)**

**Module II (12 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 (12 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 (16 hours)**
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-30)**
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*Maximum Total Marks: 70*
CS09 L21 : Digital Design using VHDL

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To teach the various aspects in the design of digital circuits using VHDL, including the language elements.

Module I (13 hours)

VHDL Design methodology - Requirements analysis and specification - VHDL Design Description - Verification using simulation – Test benches – Functional (Behavioral) Simulation - Logic synthesis for the Target - Place-and-Route and Timing simulation - VHDL Design Methodology advantages - VHDL for synthesis versus VHDL for simulation - Design Units, Library units and Design entities - Entity declaration - VHDL Syntax definitions - Architecture body - Coding styles - Object classes and object types - Signal objects - Scalar types - Type Std_logic - Scalar literals and Scalar constants - Composite types - Arrays - Types unsigned and signed - Composite literals and Composite constants - Integer types - Port Types for Synthesis - Operators and expressions

Module II (13 hours)

Logical operators - Signal assignments in dataflow style architectures - Selected signal assignment - Type Boolean and the Relational operators - Conditional signal assignment - priority encoders - Don't care inputs and outputs - Decoders - Table lookup - Three state buffers - Avoiding conditional loops - Behavioral style architecture - process statement - Sequential statements - Case statement - If statement - Loop statement – Variables - Simulator Approaches - Elaboration - Signal Drivers - Simulator Kernel Process - Simulation Initialization - Simulation Cycles - Signals Versus Variables - Delta Delays - Delta Delays and combinational feedback - Multiple Drivers - Signal Attributes - Design Verification - Single process testbench - Wait statements - Assertion and Report statements - Records and Table lookup test benches - Predefined shift operators - Stimulus order based on UUT functionality

Module III (13 hours)

Latches and Flipflops - D Latch - Detecting clock edges - D Flip-flops - Enabled (Gated) Flip-flop - Other Flip-flop types - PLD Primitive memory elements - Timing requirements and Synchronous input data - Multibit latches and registers - shift registers - Shift register counters - Counters - Detecting non-clock signal edges – Memories - Finite state machines - FSM state diagrams - Three process FSM VHDL template - State diagram development - State encoding and state assignment - supposedly state FSMs - Counters as Moore FSMs - Algorithmic State Machine charts ASM charts to VHDL - System architecture - Successive approximation register design example - Sequential Multiplier Design - Subprograms - Functions - Procedures - Array attributes and unconstrained arrays – Overloading Subprograms and operators – Type conversions

Module IV (13 hours)

Packages and package bodies - Standard and De factor standard packages - Packages for VHDL text output- Simple sequential test benches - Systems clock - System reset - Synchronizing stimulus generation and monitoring – Test bench for successive approximation register - Output verification in stimulus procedures - Bus functional models – Response monitors - Modular design, partitioning and hierarchy - Design units and library units - Design libraries - Direct design entity instantiation - Configuration declarations - Component connections - Parameterized design entities - Library of parameterized modules (LPM) - Generate statement

Text Books


Reference Books

Internal Continuous Assessment (Maximum Marks-30)
60% - Tests (minimum 2)
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University Examination Pattern

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

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

Maximum Total Marks: 70
Objectives

- To teach the algorithms concerned with geometric shapes and figures, particularly related to space manipulation.

Module I (13 hours)
Introduction - An example: convex hull - degeneracies and robustness - application domains - line segment intersection - the doubly-connected edge list - computing the overlay of two subdivisions - boolean operations - guarding and polygon triangulations - partitioning a polygon into monotone pieces - triangulating a monotone polygon - Linear programming - the geometry of casting - half-plane intersection - incremental linear programming - randomized linear programming - unbounded linear programs - linear programming in higher dimensions - smallest enclosing discs

Module II (13 hours)
Orthogonal range searching - 1-dimensional range searching - Kd-Trees - range trees - higher dimensional range trees - general sets of points - fractional cascading - point location and trapezoidal maps - a randomized incremental algorithm - dealing with degenerate cases - a tail estimate - voronoi diagrams - computing the voronoi diagram - voronoi diagrams of line segments - farthest-point voronoi diagrams - arrangements and duality - computing the discrepancy - duality - arrangements of lines - levels and discrepancy

Module III (13 hours)
Delaunay triangulations - triangulations of planar point sets - computing the delaunay triangulation - the analysis - a framework of randomized algorithms - geometric data structures - interval trees - priority search trees - segment trees - convex hulls - complexity in 3-space - computing convex hulls in 3-space - analysis - convex hulls and half-space intersection - binary space partitions - determination of BSP trees - BSP trees and the painter's algorithm - construction of BSP tree - the size of BSP tree in 3-space - BSP trees for low-density scenes

Module IV (13 hours)
Robot motion planning - work space and configuration space - a point robot - minkowski sums - translational motion planning - motion planning with rotations - quadtrees (non-uniform mesh generation) - uniform and non-uniform meshes - quadtrees for point sets - from quadtrees to meshes - visibility graphs - shortest paths for a point robot - computing the visibility graph - shortest paths for a translating polygonal robot - simplex range searching - partition trees - multi-level partition trees - cutting trees

Text Books

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

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

*Maximum Total Marks: 70*
Objectives

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

Module I (10 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 - random samples from continuous distributions - 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 (12 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 - SIMSCRIPT and SIMULA.

Module III (15 hours)

Module IV (15 hours)

Reference Books
1. C. Deo N., System Simulation And Digital Computer, Prentice Hall of India.
**Internal Continuous Assessment** *(Maximum Marks-30)*

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

**Note:** One of the assignments shall be computer based simulation of continuous systems using any technical computing software
One of the tests must be computer based (practical).

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**University Examination Pattern**

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

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

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

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

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

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

*Maximum Total Marks: 70*
CS09 L24 : Computer Based Numerical Methods

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)
Numerical Integration and Differentiation – introduction - numerical differentiation - numerical integration - trapezoidal rule - Simpson 1/3 rule - Simpson 3/8 rule - Boole’s and Weddle’s rules - Euler-MacLariaun formula - Gaussian formula - numerical evaluation of singular integrals.

Module IV (13 hours)
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-30)
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class
**University Examination Pattern**

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

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

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

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

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

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

*Maximum Total Marks: 70*
CS09 L25 : Pattern Recognition

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 (12 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 (16 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-30)*

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

**University Examination Pattern**

**PART A:** Short answer questions *(one/two sentences)*

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

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

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

**PART C:** Descriptive/Analytical/Problem solving questions

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

*Maximum Total Marks: 70*
EE09 L23 PROCESS CONTROL AND INSTRUMENTATION

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To create an awareness of the different transducers used in industry and signal conditioning
- To familiarize the process control elements and their control characteristics

Module I (8 hours)
Signal Conditioning – Analog – Digital - Signal conversions - Process Control Principles - Identification of elements, block diagram, the loop, control system evaluation stability, regulation, evaluation criteria, and cyclic response.

Module II (10 hours)

Module III (12 hours)

Module IV (14 hours)
Control Loop Characteristics: Control system configurations, cascade control, multivariable control, feed forward control, Split range control, inferential control, Adaptive control, control system quality – loop disturbance, optimum control, measure of quality, Stability, process loop tuning

Text Books

Reference Books
2. George Stephanopoulos, *Chemical Process Control*
3. Caugher, *Process Analysis and Control*
4. Deshpande and Ash, *Elements of computer process control of Industrial processes*, ISA
**Internal Continuous Assessment** (*Maximum Marks-30*)

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

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**University Examination Pattern**

**PART A:** *Short answer questions (one/two sentences)*

5 x 2 marks = 10 marks

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

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

4 x 5 marks = 20 marks

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

**PART C:** *Descriptive/Analytical/Problem solving questions*

4 x 10 marks = 40 marks

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

*Maximum Total Marks: 70*
EE09 L 25 ROBOTICS AND AUTOMATION

Objectives

- To give an introduction of industrial robotics and automation

Module I (14 Hours)

Module II (13 Hours)

Module III (14 Hours)

Module IV (13 Hours)
Introduction to robot intelligence and task planning- state space search-problem reduction-use of predicate logic-means -end analysis-problem-solving -robot learning-robot task planning-expert systems and knowledge learning.

Text Books


Internal Continuous Assessment *(Maximum Marks-30)*

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

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

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

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

*Maximum Total Marks: 70*
ME09 L24: Marketing Management

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
• To impart knowledge on fundamentals of marketing, marketing environment market oriented strategic planning, marketing research and marketing communications.

Pre-requisites: Basic knowledge of principles of management

Module I (13 hours)
Introduction to marketing: Defining marketing for the twenty first century, marketing – scope, tasks, concept of market and marketing, company orientations towards the market place – production, product, selling, marketing, customer and societal marketing concepts. Marketing environment: Controllable factors, identifying and responding to the major macro environment – uncontrollable factors – demographic, economic, natural technological, political-legal and social – cultural environment.

Module II (13 hours)

Module III (13 hours)

Module IV (15 hours)
Marketing communications – process – developing effective communications – Identification of the target audience, determination of communication objectives, Designing the message, select the communication channels, establishing the total marketing communications budget – Deciding on the marketing communications mix – promotional tools an over view – advertising, sales promotion, public relations and publicity, sales force and direct marketing- developing and managing an advertising program – setting objectives, deciding budget, choosing message – an overview on measuring effectiveness of a media – sales promotion – purpose, major decisions.

Text Books

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

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

University Examination Pattern

**PART A:** Short answer questions *(one/two sentences)*

5 x 2 marks=10 marks

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

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

4 x 5 marks=20 marks

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

**PART C:** Descriptive/Analytical/Problem solving questions

4 x 10 marks=40 marks

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

*Maximum Total Marks: 70*
AN09 L24 PROJECT MANAGEMENT

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

Objectives:

- To give an exposure to the major aspects of project viz. Project Planning, Analysis, Selection, Implementation and review.

Module I (13 hours)
Planning -Capital Expenditures -Phases of Capital Budgeting -Levels of decision Making -Facets of Project analysis-Feasibility Study -Objectives of Capital Budgeting -Resource Allocation framework Key Criteria-Elementary Investment strategies -Portfolio planning tools -Generation of project Ideas Monitoring the environment -Corporate appraisal -Scouting for project ideas -Preliminary Screening Project rating index -Sources of Positive net present value

Module II (14hours)

Module III (13hours)
Project Cash flows -Basic I single amount -Future value of an annuity -Present value of a single amount -Present Value of an annuity-Cost of capital -Cost of debt capital -cost of preference capital -Rate of return -Cost of external equity and retained earnings -Determination of weights -Appraisal criterion -Net present value Cost benefit ratio-Internal rate of return-Urgency -payback period

Module IV (14hours)
Implementation-Forms of Project organization -Project planning -Project control -Human Aspects of Project management -Network Techniques -Development of Network -Time estimation -Critical path determination -Scheduling under limited resources -PERT Model-CPM Model -Network Cost System -Project review-Initial; review -Performance evaluation-Abandonment analysis
Text Book:

Reference books

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

University Examination Pattern

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

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

PART C: Descriptive/Analytical/Problem solving questions
Two questions from each module with choice to answer one question.

Maximum Total Marks: 70
EC09  L25: Biomedical Instrumentation

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To impart knowledge about the principle and working of different types of bio-medical electronic equipments/devices

Module I (14 hours)
Electrical activity of excitable cells-SD curve-functional organization of the peripheral nervous system-electrocardiogram (in detail with all lead systems)-electroencephalogram-electromyogram – electroneurogram- electrode –electrolyte interface-polarisation-polarisable and non polarisable electrodes- surface electrodes –needle electrodes-micro electrodes- practical hints for using electrodes-‘skin- electrodes’ equivalent circuit-characteristics of ‘bio-amplifiers’

Module II (14 hours)

Module III (13 hours)

Module IV (13 hours)
Physiological effects of electricity-important susceptibility parameters-macro shock hazards-micro shock hazards-protection against shock-electrical isolation- electrical safety analyzers-measurements of pH,pC2, and PO2

Text Books
1. Webster J,’ Medical Instrumentation-Application and Design’, John Wiley
2. Handbook of Biomedical Instrumentation, Tata-Migraw Hill, New Delhi

Reference Books
2. Encyclopedia of Medical Devices and Instumentation Wiley
Internal Continuous Assessment (Maximum Marks-30)

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

University Examination Pattern

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

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

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

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

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

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

*Maximum Total Marks: 70*
IC09 L23 Bioinformatics

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives:
- To get the students acquainted with the interdisciplinary field of bioinformatics
- To expose the students to the biological database resources and tools
- To provide an introduction to the important problems and algorithms in bioinformatics.

Prerequisites

Familiarity with internet resources and an aptitude for learning algorithms along with high school level knowledge in biology.

Module I (14hours)
The biological backdrop:

Cells-Prokaryotes and Eukaryotes-DNA double helix– central dogma – DNA, RNA, aminoacids, Proteins-string representations- different levels of protein structures-DNA cloning- RFLP-SNP-Polymerase chain reaction (PCR)-gel electrophoresis-hybridization-A brief introduction to different mappings techniques of genomes- genome sequencing methods-DNA micro arrays –Human Genome Project-A glossary of biological terms.

Module II (14hours)
Bioinformatics-the big picture and the biological database resources:

Scope of bioinformatics-Genomics and Proteomics- A very brief introduction to major problems in bioinformatics like sequence alignment, phylogeny, gene finding, microarray analysis, secondary structure prediction, protein structure prediction, comparative genomics and drug design.
An introduction to the major re sources at NCBI, EBI and ExPASy- Nucleic acid sequence databases: GenBank, EMBL, DDBJ -Protein sequence databases: SWISS-PROT, TrEMBL, PIR_PSD - Genome Databases at NCBI, EBI, TIGR, SANGER – How to access these databases and to make use of the tools available. Various file formats for bio-molecular sequences like genbank and fasta.
The concept of profiles- The derived databases- Prosite, Pfam, PRINTER, CATH, SCOP

Module III (13 hours)
Sequence alignment algorithms and Tools:

Basic concepts of sequence similarity, identity and homology, definitions of homologues, orthologues, paralogues.
Scoring matrices: basic concept of a scoring matrix, PAM and BLOSUM matrices, differences between distance & similarity matrix.
Pairwise sequence alignments: basic concepts of sequence alignment, Needleman & Wuncsh, Smith & Waterman algorithms for pairwise alignments. BLAST and FASTA and their versions.
Multiple sequence alignments (MSA): the need for MSA, basic concepts of various approaches for MSA (e.g. progressive, hierarchical etc.). Algorithm of CLUSTALW.

Module IV (13 hours)
Phylogeny, gene finding and molecular visualization:

Phylogeny: Basic concepts of phylogeny; molecular evolution; Definition and description of phylogenetic trees. Phylogenetic analysis algorithms - Maximum Parsimony, UPGMA and Neighbour-Joining.
Gene Finding: The six reading frames-Computational gene finding in prokaryotes and eukaryotes Basic signals –start and stop codons, promoters etc- important coding measures- Regular expressions- Introduction to Hidden Markov models- Introduction to genomic signal processing
Molecular visualization: Visualization of protein structures using Rasmol or Rastop
Text Books
1. Dan E. Krane and Michael L. Raymer, *Fundamental concepts of Bioinformatics*, Pearson Education

References
2. Resources at web sites of NCRI, EBI, SANGER, PDB etc.

Internal Continuous Assessment *(Maximum Marks-30)*

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

University Examination Pattern

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

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

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

Maximum Total Marks: 70
PE09 L23: Total Quality Management

**Objectives**
- To impart knowledge on the concept of quality tools for analysing quality statistical tools in quality acceptance sampling life tests

**Module I (14 hours)**
Definition of quality—internal and external customers—vision statement—mission statements—objectives—goals—targets—evolution of TQM—Defining TQM—stages in TQM implementation—TQM models

**Module II (14 hours)**
SWOT analysis—strategic planning—customer focus—quality function deployment—customer satisfaction measurement—seven new management tools—Deming wheel—zero defect concept—b benchmark marking—six sigma concepts—failure mode and effect analysis—poke yoke

**Module III (13 hours)**
Five S for quality assurance—quality circle philosophy—failure rate analysis—mean failure rate—mean time to failure (MTTF)—Mean time between failure (MTBF)—hazard models—system reliability—availability—maintenance

**Module IV (13 hours)**

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**Text Books**

**Reference Books**

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

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

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

**PART C:** Descriptive/Analytical/Problem solving questions \[ 4 \times 10 \text{ marks} = 40 \text{ marks} \]
Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
CE09 L24: REMOTE SENSING AND GIS

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To make the students aware of the technological developments in the geographical database management and its advantages

Module I (14 Hours)


Module II (14 Hours)
Opticaa and Microwave Remote sensing:

Module III (13 Hours)

Module IV (13 Hours)

Text books:
1. Anji Reddy, Remote sensing and Geographical systems, BS Publications
2. M G Srinivas (Edited by), remote sensing applications, Nerusa publishing house
3. Lillesand T M and Kuefer R W., Remote sensing and image interpretation, John Wiley and sons

References:
CE09 L25 FINITE ELEMENT METHODS

Objective:
- To make the background, basic concepts and basic formulation of finite element method clear to the students

Module I (14 hours)


Module II (13 hours)

Module III (13 hours)
Displacement based elements for structural mechanics: formulas for element stiffness matrix and load vector - overview of element stiffness matrices - consistent element nodal vector - equilibrium and compatibility in the solution - convergence requirements - patch test - stress calculation - other formulation methods

Straight sided triangles and tetrahedral: natural coordinates for lines - triangles and tetrahedral - interpolation fields for plane triangles - linear and quadratic triangle - quadratic tetrahedron

Module IV (14 hours)

Coordinate transformation: transformation of vectors - transformation of stress, strain and material properties - transformation of stiffness matrices - transformation of flexibility to stiffness - inclined support - joining dissimilar elements to one another- rigid links - rigid elements

Text books:
1. Bathe K.J., Finite Element Procedures in Engineering Analysis, Prentice Hall of India
2. Cook R.D., Malkus D.S. & Plesha M.F., Concepts & Applications of Finite Element Analysis, John Wiley
Reference books:
1. Desai C.S., Elementary Finite Element Method, Prentice Hall of India

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

University Examination pattern
PART A: Short answer questions 5×2 marks=10 Marks
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.
PART B: Analytical / Problem solving questions 4×5 marks=20 Marks
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.
PART C: Problem solving questions 4×10 marks=40 Marks
Two questions from each module with choice to answer one question.

Maximum Total marks: 70
BT09 L24 BIOETHICS & INTELLECTUAL PROPERTY RIGHTS

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives:
• To impart knowledge on bioethics and intellectual property rights
• To study the various ethical issues in biotechnology

Module I

Module II
Intellectual Property Rights – Development and need for IPR in knowledge based industries. Various types of intellectual Property Rights with examples (Trademarks, copyrights, Industrial Designs, Patents, Geographical Indicators etc) – Objectives of the patent system – Basic Principles and General Requirements of Patents (Novelty, Utility Non obviousness. Etc) and tenets of patent law – Product and process Patents

Module III


Module IV

Text Books
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<td>PART C: Problem solving questions $4 \times 10$ marks= 40 Marks</td>
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*Maximum Total marks: 70*