GOVERNMENT COLLEGE OF ENGINEERING, JALGAON [M.S]

(An Autonomous Institute of Government of Maharashtra)

"Globally Accepted Engineers with Human Skills"

Curriculum for
Final Year B. Tech. Computer
2017-18

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON.
Department of Computer Engineering.
Scheme for B. Tech. (Computer Engineering)
SEM VII (new)

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme						Total	Credits
							Theory				Practical			
			TH	TUT	PR	Total	ISA	ISE1	ISE2	ESE	ICA	ESE		
CO401	Compiler Construction	D	3	---		3	10	15	15	60	---	---	100	3
CO402	Object Oriented Modeling and Design	D	3	---		3	10	15	15	60	---	---	100	3
CO403	Enterprise Resource Planning	C	2	---		2	4	8	8	30	---	---	50	2
CO404	Elective I	E	3	---		3	10	15	15	60	---	---	100	3
CO405	Inter-disciplinary Elective	E	3	---		3	10	15	15	60	---	---	100	3
CO406	Compiler Construction Lab	D	---	---	2	2	---	---	---	---	25	25	50	1
CO407	Object Oriented Modeling and Design Lab	D	---	---	2	2	---	---	---	---	25	25	50	1
CO408	Elective I Lab	E	---	---	2	2	---	---	---	---	25	25	50	1
CO409	Project Phase-I	D	---	---	4	4	---	---	---	---	50	50	100	2
CO410	Seminar	D	---	---	2	2	---	---	---	---	25	25	50	2
CO411	Self Study-III	D	---	---	---	----	---	---	---	---	---	---	50**	2
Total			**14**	**---**	**12**	**26**	**44**	**68**	**68**	**270**	**150**	**150**	**800**	**23**

TH :Theory Lecture,   TUT:Tutorial,   PR:Practical

ISA :Internal Sessional Assessment   ISE: In Semester Examination   ESE: End Semester Examination   ICA : Internal Contineous Accessment

Interdisciplinary Elective		Elective I	
A	Software Engineering	A	Cryptography and Network Security
B	DataBase Management System	B	Software Metrics and Quality Assurance
C	Web Technology	C	Mobile Computing
D	Multimedia Techniques	D	Bio-Informatics
E	Computer Ethics and cyber security		

- ** Marks and hence grade of course Self Study shall be based on one test each conducted on 20% syllabus of Five Subjects- CO401,CO402,CO403,CO404,CO405.One faculty member should be appointed as course coordinator for the course 'self study' to compile the marks of all tests and enter in to MIS.**

- **The 20% syllabus for self - study shall be declared by subject teacher at the beginning of semester and he/she shall conduct the test examination for that corse, assess answer papers of test examination and submit the marks to course coordinator.**

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON.
Department of Computer Engineering.
Scheme for B. Tech. (Computer Engineering)

SEM VIII (new)

| Course Code | Name of the Course | Group | Teaching Scheme Hrs /week | | | | Evaluation Scheme | | | | | | Total | Credits |
| | | | | | | | Theory | | | | Practical | | | |
			TH	TUT	PR	Total	ISA	ISE1	ISE2	ESE	ICA	ESE		
CO451	Distributed Operating System	D	3			3	10	15	15	60			100	3
CO452	Data WareHousing and Data Mining	D	3	---	---	3	10	15	15	60	---	---	100	3
CO453	Elective II	E	3	---	---	3	10	15	15	60	---	---	100	3
CO454	Elective III	E	3	---	---	3	10	15	15	60	---	---	100	3
CO455	Distributed Operating System Lab	D	---	---	2	2	---	---	---	---	25	25	50	1
CO456	Data WareHousing and Data Mining Lab	D	---	---	2	2	---	---	---	---	25	25	50	1
CO457	Elective II Lab	E	---	---	2	2	---	---	---	---	25	25	50	1
CO458	Project Phase II	D	---	---	6	6	---	---	---	---	50	100	150	4
CO459	Industrial Visit\Industrial Training\Special Study	D	---	---	---	---	---	---	---	---	25	---	25	1
CO460	Industrial Lectures	D	1	---		1	---	---	---	---	25	---	25	1
CO461	Self Study-IV	D	---	---	---	---	---	---	---	---	---	---	50**	2
Total			**13**		**12**	**25**	**40**	**60**	**60**	**240**	**175**	**175**	**800**	**23**

TH :Theory Lecture,   **TUT:Tutorial,**   **PR:Practical**

ISA :Internal Sessional Assessment   **ISE: In Semester Examination**   **ESE: End Semester Examination**   **ICA : Internal Contineous Accessment**

	Elective II			Elective III
A	Web Services and SOA	A	Advanced Computer Architecture
B	Embeded System	B	Linear Algebra
C	Advanced Database Management System	C	Fuzzy Logic and Neural Network
D	Advanced Computer Network	D	Professional Ethics andCyber Security

- ** ** Marks and hence grade of course Self Study shall be based on one test each conducted on 20% syllabus of Four Subjects- CO451,CO452,CO453,CO454.One faculty member should be appointed as course coordinator for the course 'self study' to compile the marks of all tests and enter in to MIS.

- The 20% syllabus for self - study shall be declared by subject teacher at the beginning of semester and he/she shall conduct the test examination for that corse, assess answer papers of test examination and submit the marks to course coordinator.

- In the course Industrial Lectures,atleast twelve lectures from industrial expert should be arranged and contineously assessed(Six lectures in VIth and VIIIth semester each).

CO401 COMPILER CONSTRUCTION

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION:

This course gives the introduction to system programming and compiler construction. It also gives the knowledge role of a lexical analyser, specification of tokens, recognition of tokens, Lexical analyser generator LEX, role of parser, context free grammars, eliminating ambiguity, eliminating left recursion, Top-Down parser. This course also gives the idea about Syntax Directed Translation and Intermediate Code Generation using different technique such as DAG, Three address codes, etc. At the end this course gives the information runtime environment and issues in code generation.

DESIRABLE AWARENESS/SKILLS:

Discrete Structure and Graph Theory, Theory of Computation

COURSE OBJECTIVES:

The objectives of offering this course are:
1. Describe the utility of different system programs & system tools.
2. Familiarize with the trade-offs between run-time and compile-time processing (Linking & Loading techniques).
3. Explore the use of compiler with its phases.
4. Use of Syntax directed scheme for intermediate code generation.
5. Construct & use of different compiler tools as LEX, YACC for code generation & optimization.

COURSE OUTCOMES:

On the successful completion of this course, student shall be:
1. Organize the functionalities & components of system software & tools into different layers for efficient code generation.
2. Apply the knowledge & technique to develop solutions to real world problems by compiling application programs.
3. Ability to identify, formulate, and solve computer engineering problems with proper systematic & semantic approach

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No	Program Outcomes	Level of Operation
A	An ability to apply knowledge of mathematics, science, and engineering.	3
B	An ability to identify, formulates, and solves engineering problems.	3
C	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	2

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Introduction: Introduction to compiler, translators, interpreter, single and multi-pass compilers, phases of compilers, compiler construction tools, cross compilers

Lexical Analyzer: Role of lexical analyzer, specification of tokens, recognition of tokens, regular expression, finite automata, regular expression to finite automata transition diagrams, tool for lexical analyzer LEX.

Syntax Analysis and Parsing Techniques: Introduction to parsing techniques, bottom-up parsing and top down parsing. top down parsing , recursive descent parsing, predicative parsing ,bottom up parsing : operator precedence parsing, LR parsers, construction of SLR, canonical LR and LALR parsing tables, construction of SLR parse tables for ambiguous grammar, the parser generator tools – YACC, error recovery in top down and bottom up parsing.

Syntax Directed Translation & Intermediate Code Generation: Syntax directed definitions, synthesized and inherited attributes, dependency graph, construction of syntax trees, bottom up and top down evaluation of attributes, s-attributed and l-attributed definitions ,postfix notation, three address codes, quadruples, triples and indirect triples, translation of assignment statements, control flow, boolean expression, case statements and procedure calls.

Type Checking and Runtime Environments: Introduction, simple type checker, type conversions, overloading of functions and operators, source language issues, storage organization, storage allocation strategies, parameter passing, symbol tables, dynamic storage allocation techniques,

Code Optimization & Code Generation: Basic blocks and flow graphs, optimization of basic blocks, loop optimization, global data flow analysis, loop invariant computations, DAG representation of basic blocks, peephole optimization, issue in the design of code generator, register allocation, the target machine, and simple code generator.

Text Books:
1. Compilers-Principles, Techniques and Tools, Alfred V. Aho, Ravi Sethi and Ullman J.D.,Addison Wesley.
2. Principle of Compiler Design, Alfred V. Aho, and J.D. Ullman, Narosa Publication.
3. K C. Louden "Compiler Construction—Principles and Practice" India Edition, CENGAGE

Reference Books:
1. Compiler design in C, A.C. Holub, PHI.
2. Compiler construction (Theory and Practice), A.Barret William and R.M. Bates, Galgotia Publication.
3. Compiler Design-Principles and Practice by Kenneth C. Louden
4. D. M. Dhamdhere, Compiler Construction—Principles and Practice, (2/e), Macmillan India
5. K. Cooper, L, Torczon, "Engineering a Compiler", Morgan Kaufinann Publishers, ISBN 81- 8147-369-8.
6. S. Chattopadhyay, "Compiler Design", Prentice-Hall of India, 2005, ISBN 81- 203-2725-X.

CO402 OBJECT ORIENTED MODELLING AND DESIGN

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION: This course focuses on the principles and patterns of object oriented design. Each pattern represents a best practice solution to a software problem. Besides, it also covers some basic topics of object oriented software development such as unified process (UP), use cases, and domain modelling. Analysis and design models will be presented using the UML.

DESIRABLE AWARENESS/SKILLS: Knowledge of software engineering and object oriented concepts.

COURSE OBJECTIVES:

The objectives of offering this course are:

1. To learn the importance of following a process that is driven by the requirements of the users of the system.

2. To understand design patterns and their underlying object oriented concepts.

3. To design flexible and reusable software components.

4. To implement design patterns to provide solutions to real world software design problems.

COURSE OUTCOMES:

On the successful completion of this course student shall be:

1. Construct models to Show the importance of systems analysis and design in solving complex problems.

2. Will be able to differentiate how the object oriented approach differs from the traditional approach to systems analysis and design.

3. Explain the importance of modelling and how the Unified Modelling Language (UML) represents an object oriented system using a number of modelling views.

4. Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation.

5. Recognize the difference between various object relationships: inheritance, association, whole part, and dependency relationships.

6. Show the role and function of each UML model in developing object oriented software.

RELEVANCE OF POS AND STRENGTH OF CORELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to identify, formulate, and solve engineering problems	3
B	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	2
C	An ability to design and conduct experiments, as well as to analyze and interpret data	1

1-Weakly correlated   2–Moderately correlated   3–Strongly correlated

COURSE CONTENTS:

Introduction: Object basics, object oriented philosophy, objects, classes, attributes, object behavior and methods, encapsulation and information hiding, class hierarchy, polymorphism, object relationships and associations, aggregations and object containment, object identity, persistence.Use- case driven approach, reusability.

Unified Modeling Language: An overview of the UML, visualizing, specifying, constructing, documenting, background , uml basics, introducing UML2.0, conceptual model of the UML, UML extensibility and uml meta model, class diagram- relationships, advanced relationships, common modeling techniques- modeling simple collaborations, modeling a logical database schema, composite structures diagram: connectors, ports, structured classes and properties.

Use Case Model: Use case model, use case diagram- names, use cases and actors, use cases and flow of events, use cases and scenarios, use cases and collaborations, organizing use cases, common properties, contents, common uses, use case definition, system operation sequence diagram, activity diagram, operation contract with pre and post conditions, and conceptual class diagram.

Dynamic Design Modeling: Design of sequence diagram, activity diagram and state diagram, component and deployment diagrams. behavioral diagrams- sequence diagram, communication diagram, timing diagram, state chart diagram: behavioral state machines, states, composite states, submachine states, transitions, activities, protocol state machines, pseudo states , event processing, activity diagram- common properties, contents, action states and activity states, transitions, branching, forking and joining, swim lanes, object flow, common uses, package diagram, component diagram, deployment diagram.

Package Diagram: names, owned elements, visibility, importing and exporting, common modeling techniques-modeling groups of elements, modeling, architectural views**,** component diagram- common properties, contents, common uses, modeling source code, modeling an executable, release, modeling a physical database, modeling adaptable systems, forward and reverse engineering, deployment- names, nodes and components, connections, deployment diagram: common properties, contents, common uses, common modelingtechniques:modeling an embedded system, modeling a client/server system, modeling a fully distributed system.

 Other Models: Booch‟s Methodology, notations, models, concepts. Jacobson methodology

-architecture, actors and use-cases, requirement model, Analysis Model, Design model, Implementation model

and Test Model-Unified Modeling Language (UML).

Text Books:

1. James Rumbaugh , Michael Blaha , William Premerlani, Frederick Eddy, William
Lorensen ,"Object- Oriented Modeling and Design", Pearson Education.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User
   Guide", Pearson Education.

Reference Books:

1. Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.
2. Mike O'Docherty, "Object-Oriented Analysis & design understanding system development
with UML 2.0", John Wiley and Sons.
3. AtulKahate, "Object Oriented Analysis & Design", The McGraw-Hill Companies.
4. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson
   Education

CO403 ENTERPRISE RESOURCE PLANNING

Teaching Scheme: 02L + 00T, Total: 02   **Credit:** 02
Evaluation Scheme: 04 ISA + 08 ISE1 +08 ISE2 + 30 ESE   **Total Marks:** 50
Duration of ESE: 02 Hrs

COURSE DESCRIPTION: This course is designed to provide the student with a thorough understanding of both the role that Enterprise Resource Planning Systems (ERPs) play in an organization and the challenging task of managing the Information Systems (IS) function.

DESIRABLE AWARENESS/SKILLS:

Introductory knowledge of management information system.

COURSE OBJECTIVES:

This subject provides students with

1. The basic concepts of ERP systems for manufacturing or service companies, and the differences among MRP, MRP II, and ERP systems
2. Thinking in ERP systems: the principles of ERP systems, their major components, and the relationships among these components
3. In-depth knowledge of major ERP components, including material requirements planning, master production scheduling, and capacity requirements planning

COURSE OUTCOMES:

Upon completion of the subject, students will be

1. Able to examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components
2. Able to understand production planning in an ERP system, and systematically develop plans for an enterprise
3. Able to use methods to determine the correct purchasing quantity and right time to buy an item, and apply these methods to material management
4. Able to understand the difficulties of a manufacturing execution system, select a suitable performance measure for different objectives, and apply priority rules to shop floor control.

RELEVANCE OF POS AND STRENGTH OF CORELATION:

Sr. No.		Program Outcomes	Level of Operation
	A	An ability to function upon multi disciplinary teams.	2
	B	An understanding of professional and ethical responsibilities	3
	C	A knowledge of contemporary issues.	2

1-Weakly correlated   2–Moderately correlated   3–Strongly correlated

COURSE CONTENTS:

ERP Introduction: Introduction, Evolution of ERP, What is ERP, Advantages of ERP, ERP: Business standpoint, Why do many ERP implementations fail, Reasons for the growth of the ERP market, Why are ERP packages being used now, Enterprise, Integrated management information, Business modeling, Integrated data model, Benefits of ERP:Reduction of lead-time, On-time shipment, Reduction in cycle time, Improved resource utilisation, Better customer satisfaction, Improved supplier performance, Increased flexibility, Reduced quality costs, Improved information and decision-making capability, Origin of ERP. Evolution and structure:Conceptual model of ERP, The evolution of ERP, The structure of ERP, ERP structure Provider.

ERP And Related Technologies: Business process re-engineering, Management information System(MIS), Decision support system(DSS), Executive information systems(EIS), Data warehouse, Data mining, On-line analytical processing (OLAP), Product life-cycle management, Supply chain Management.

ERP Market & ERP Modules: ERP: A Manufacturing Perspective: ERP, CAD/CAM, technologies in manufacturing. ERP Marketplace and Marketplace Dynamics: Market overview, Marketplace dynamics, the changing ERP market. ERP Functional Modules: Introduction of ERP Modules, Functional modules of ERP software, Integration of ERP, supply chain and customer relationship application. Options of Various Paradigms: Modern enterprise paradigm, Identification of Suitable Platform**:** ERP tools to make the project research compelling, ERP-platforms-windows NT, platforms for today's ERP system, what to look for in an ERP package.

ERP Implementation: ERP Implementation Basics:ERP Implementation guidelines, ERP Implementation steps, ERP Implementation methodologies, Ten things one should know about implementing an ERP system, ERP Integration-the challenge for ERP implementation, Critical successful factors of ERP Implementation, Error in ERP Implementation, significance of ERP Implementation. ERP Implementation lifecycle, Strategies for successful Implementation: Critical successful factor for ERP Implementation, Experts' Advice on successful ERP Implementation, The top 20 ERP Implementation tips, ERP Implementation: Success factors, Strategies for successful Implementation, Guidelines for ERP Implementation, Defining a successful ERP Implementation. Role of SDLC / SAD: System development life cycle (SDLC), Software system analysis and design.

ERP And Future: ERP and E-Commerce: ERP vs E-Commerce, E-Commerce in India, ERP fitness with electronic commerce, the benefits of ERP in E-Commerce. Future Directives in ERP:Future holds for ERP, Open source ERP technologies, Facilities offered by web enabled ERP services, Advancement of wireless technology in ERP, Latest trends in ERP. ERP & Internet: Introduction, Relation of ERP & Internet, Impact of the internet on ERP systems. Using ERP Tools:SAP: History of SAP, SAP AG, SAP ERP, SAP implementation, Critical success factors for implementation of SAP, SAP R/3, Case study.

Text Book:

1. Enterprise Resource Planning Systems(Erp), Second Edition, Deepali Singh, GaganKapur for Dhanpat Rai & Co.(p) Ltd.

Reference books:

1. Concepts in Enterprise Resource Planning, 3rdedn, Course Technology Cengage LearningMonk, E. F., Wagner, B. J. 2009.

2. Enterprise Resource Planning, Sumner, M. 2005, , Pearson Education, Inc.
3. Manufacturing Planning and Control SystemsVollmann, T. E., Berry, W. L. and Whybark, D. C. 1992,, 3rdedn, Irwin
4. Production and Inventory Control: Principles and Techniques Plossl, G. W. 1985,, 2ndedn, Prentice Hall
5. ERP: Making It Happen, John Wiley
6. Enterprise Resource Planning for Global Economics: Managerial Issues and Challenges, Information Science Wallace, T. F., Kremzar, M. H. 2001, Ferran, C., and Salim, R. 2008.
7. Shtub, A. 1999, Enterprise Resource Planning (ERP): the Dynamics of Operations Management, Kluwer Academic Publishers

CO404A CRYPTOGRAPHY AND NETWORK SECURITY

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduces concept of cryptography and security techniques. Provide knowledge of different security algorithms of network. It also provides concept of firewall. Introduces the principles of encryption algorithms; conventional and public key cryptography. To have a detailed knowledge about authentication, hash functions and application level security mechanisms.

DESIRABLE AWARENESS/SKILLS:

Data communication, Data structure, Discrete structure, Computer network technology.

COURSE OBJECTIVES:

The objectives of offering this course are
1. To learn the concept of cryptography and firewalls.
2. To know the methods of conventional encryption.
3. To understand the concepts of public key encryption and number theory
4. To understand authentication and Hash functions.
5. To know the network security tools and applications.
6. To understand the system level security used.

COURSE OUTCOMES:

On the successful completion of this course student shall be
1. Able to understand different cryptographic techniques.
2. Able to design different encryption algorithms.
3. Able to design secure communication over the network.
4. Able to provide in-depth knowledge about authentication, hash functions and application level security mechanisms.

RELEVANCE OF POS AND STRENGTH OF CORELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to design and conduct experiments, as well as to analyze and interpret data.	2
B	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	3
C	An ability to identify, formulates, and solves engineering problems.	1
D	An ability to communicate effectively.	3
E	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	2

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENT:

Introduction:OSI Security architecture-classical encryption techniques- block ciphers and data encryption standard-block cipher principles, data encryption standard, block cipher design principles, advanced encryption standard-evaluation criteria for AES, AES Cipher. multiple encryption and triple des, block cipher modes of operation.

Public Key Cryptographyand RSA: Principles of public key cryptosystem, RSA algorithm, key management-diffie-hellman key exchange - elliptic curve arithmetic, elliptic curve cryptography, introduction to number theory-confidentiality using symmetric encryption

Authentication and Hash Function: Authentication requirements - authentication functions -message authentication codes-hash functions-security of hash functions and MACs- MD5 message digest algorithm-Secure Hash Algorithm--HMAC,CMAC,Digital signatures and authentication protocols-digital signature,authentication protocols, digital signature standard.

Network Security: Authentication applications: kerberos - X.509 authentication service - electronic mail security - PGP - S/MIME - IP Security - web security.

System Level Security:intrusion detection - password management - viruses and related threats - virus countermeasures, firewall -types of firewall, firewall design principles - trusted systems.

Text Books:
1. William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall of India, 5th Edition, 2003,ISBN 10: 0-13-609704-9 ISBN 13:978-0-13-609704-4.
2.Forouzan, "Cryptography and Network Security", TMH, 3rd edition, ISBN-10:9339220943, ISBN-13: 978-9339220945.

Reference Books:

1.AtulKahate, Cryptography and Network Security, Tata McGraw-Hill, 8th edition, 2003, ISBN 0-070049483-5.
2.Bruce Schneier, Applied Cryptography, John Wiley and Sons Inc, 2nd edition, 1996, ISBN: 0471128457.
3.Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Pearson Education,5th Edition, 2003, ISBN 978-0-13-408504-3.
4. Allan Liska and Timothy Gallo,"Ransomware", O'REILLY.
5. Alfred Menezes, Paul van Oorschot, Scott Vanstone, Handbook of Applied Cryptography, CRC Press, 1997, ISBN 9780849385230
6.Wade Trappe and Lawrence C. Washington, Introduction to Cryptography with Coding Theory, Pearson, 2nd edition, ISBN 0-13-1981199-4.
7.Bernard Menezes, Network Security and Cryptography, Cengage Learning India, 1st edition, 2010, ISBN-10: 813151349, ISBN-13: 978-8131513491.
8.Radia Perlman Network Security: Private Communication in a Public World, Prentice Hall, 2 edition, Department of Computer Science and Engineering, 2002 ISBN-10: 0130460192, ISBN-13: 978-0130460196.

CO404B SOFTWARE METRICS AND QUALITY ASSURANCE

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks :**100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION: This course introduces the students about the concepts software measurement and metrics. It includes scope of software metrics, internal product attributes, and external product attributes Software quality and quality assurance techniques. This course also describes about cost estimation, documentation and testing tools, etc.

DESIRABLE AWARENESS/SKILLS: Software Engineering

COURSE OBJECTIVES:

The course objectives are:

1. To learn basics of software measurement
2. To learn cost estimation of software.
3. To learn different quality assurance techniques for software.

COURSE OUTCOMES:

On the successful completion of this course student

1. Understand basics of software measurement.
2. Able to estimate cost of software.
3. Shall have knowledge of different testing tools.

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No	Program Outcomes	Level of Operation
A	An ability to apply knowledge of mathematics, science, and engineering.	2
B	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	2
C	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	1
D	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Introduction to Software Measurement: measurement in everyday life, measurement in Software Engineering,the scope of software metrics, the representational theory of measurement, measurement and Models,measurement scales and scales types, meaningfulness in measurement, classifying software measures

and determining what to measure.

Measuring internal product attributes: measuring internal product attributes: size,aspects of software size, length &reuse,functionality& complexity ,measuring internal product attributes: Structure, types of structural measures - control flow structures, modularity and information flow attributes & data structures,difficulties with general "complexity" measures.

Measuring external product attributes: software quality - modelling software quality & measuring aspects of quality, software reliability:basics of reliability theory, the software reliability problem, parametric reliability growth models, predictive accuracy, the importance of the operational environment

Cost estimation & Documentation: making Process Predictions - Good Estimates,cost estimation-Problems and approaches,models of Effort and cost,software Documentation

Quality Assurance Techniques: quality assurance techniques- testing principles, goals, testing life cycle, phases of testing manual testing- test case design criteria, automated testing introduction of testing tools- J-meter, Win Runner, QTP, selenium etc..ISO-9000 model, SEI's CMM Model, comparison of the ISO-9000 model with SEI's CMM model.

Text Books:

1. Flanton, Pfleeger, "Software Metrics- A Rigorous and Practical Approach" Thompson Learning.

2. Mordechai Ben-menachem/Garry S.Marliss, "Software Quality", Thompson

Learning.

3. Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672-32798-8.

Reference Books:

1. Roger S. Pressman, "Software Engineering- A Practitioner's Approach", TMH.

2. Paul C. Jorgensen, "Software Testing", IVth Edition, O'REILLY.

CO404C MOBILE COMPUTING

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION: This course focuses on the principles Mobile Computing, Architecture and services of GSM.

DESIRED AWARENESS/SKILLS: Computer Network

COURSE OBJECTIVE:

1. To understand the fundamentals involved in technologies of Mobile computing.
2. To study GSM Architecture and Services.
3. To learn about different architectures of mobile application development.
4. To know recent and future trends in mobile computing.

COURSE OUTCOMES :

1. Students will gain knowledge of GSM architecture.
2. Students will be able to understand mobility management.
3. Students will be able to understand working of wireless architectures and their applications.
4. Students will be able to understand recent trends and emerging technologies.

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

Sr. No.	Program Outcomes	Level of Operation
A	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	2
B	A recognition of the need for, and an ability to engage in life-long learning.	1
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	3

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Introduction: PCS Architecture, Cellular Telephony, Mobile Computing Architecture
Mobile devices: Device Overview, Input mechanism, Wireless communication, Mobile Device classification,

Device Manufacturers

Mobile Generations: Devices and Applications for: 1G, 2G, 2.5G, 3G

Mobility Management: Handoff, Roaming Management, Roaming Management under SS7

Handoff Management : Handoff Detection, Strategies for Handoff Detection, Channel Assignment, Link Transfer Types, Hard Handoff, Soft Handoff

GSM and Mobility Management: GSM System Overview: GSM Architecture, Data Services, Unstructured Supplementary Service Data **Mobility Management :** GSM Location Update, Mobility Databases, Failure Restoration, VLR Identification Algorithm, VLR Overflow Control

GSM Services:GSM Service: SMS Architecture, SMS Protocol Hierarchy, Mobile-Originated Messaging, Mobile – Terminated Messaging

International Roaming for GSM: International GSM, Call Setup, Reducing the International Call Delivery Cost.

Mobile Number Portability: Fixed Network Number Portability, Number Portability for Mobile Networks, Mobile Number Portability Mechanisms, Implementation Costs for Mobile Number, Mobile prepaid service: Wireless intelligent network approach, service node approach, hot billing approach, handset based approach

GSM DATA LAYER:General Packet Radio Service (GPRS): GPRS Functional Groups, GPRS Architecture GPRS Network Nodes, GPRS Interfaces, GPRS Procedures, GPRS Billing, Evolving from GSM to GPRS

Wireless Application Protocol (WAP): WAP Model, WAP Gateway, WAP Protocols WAP UAProf and Caching, Wireless Bearers for WAP, WAP Developer Toolkits, Mobile Station Application Execution Environment

Third-Generation Mobile Services: Paradigm Shifts in Third-Generation Systems W-CDMA and cdma2000, Improvements on Core Network, Quality of Service in 3G Wireless Operating System for 3G

Mobile Application Architectures: Choosing the right architecture: Application architecture, Device type, Enterprise connectivity, Enterprise data, Enterprise integration, User notification, security, battery life.

Application Architectures: Wireless internet, Smart Client, messaging

Smart Client Overview: architecture

Smart Client Development process: Need analysis phase, design phase, implementation and testing phase, deployment phase

Recent And Future Trends: Android OS and its Architecture, Mobile Applications, User Interface design for mobile Applications, Managing Application Data, Performance, Scalability, Modifiability, Availability and Security of Mobile Applications, Testing Methodologies for Mobile Applications.

Mobile Generations: 4G, 5G

Text Books

1. Yi Bang Lin, "Wireless and Mobile Network Architectures", Wiley Publications.
2. Martyn Mallick, "Mobile and Wireless design essentials", Wiley Publications.

Reference Books

1. Johen Schiller, "Mobile communications", Pearson Publications.
2. AsokeTalukder and RoopaYavagal", Mobile Computing Technology, Applications and Service Creation", Second Edition, ISBN-13: 978-0-07-014457-6, Tata McGraw Hill.

3. Iti Shah Mishra, "Wireless Communication and Networks 3G and Beyond", Second Edition, ISBN-13: 978-1-25-906273-5, McGraw Hill Education.
4. Theodore S. Rappaport, "Wireless Communications principles and practice", 2nd edition, Pearson Education, ISBN – 978-81-317-3186-4.
5. Ke-Lin Du & M.N. S. Swamy, "Wirless Communication Systems, From RF Subsystems to 4G Enabling Technologies, ISBN: 978-0-521-18736-7, Cambridge University Press.

CO404D BIO-INFORMATICS

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION: This course provides a comprehensive view of the Bio Informatics principles and its applications in engineering.

DESIRABLE AWARENESS/SKILLS:

Basic Computer Network, Database management System

COURSE OBJECTIVES:

The objectives of offering this course are:

1. To be able to use various Bioinformatics tools to visualize and build small application
2. To make students familiar with the fundamental concepts of bioinformatics
3. To develop the algorithms for sequencing and alignments
4. To study and use various tools and biological databases for genomics

COURSE OUTCOMES:

On the successful completion of this course; student shall be:

1. Understand the basics of biology required to work in the field of bioinformatics
2. Learn various algorithms for sequencing and alignments
3. Implement proof of concepts for the algorithm studied with some sample data
4. Apply the molecular biology techniques for drug design for various diseases

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to apply knowledge of mathematics, science, and engineering.	2
B	An ability to identify, formulates, and solves engineering problems.	3
C	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Introduction to Bioinformatics: Introduction and Historical overview of Bioinformatics, Bioinformatics Applications, Molecular biology Basic concepts-Protein and amino acid, DNA and RNA, Tools for web search, Bioinformatics Major databases, Data mining of biological databases.

Data Structure & Data Analysis: Sequence Visualization, Structure visualization, statistical concepts, micro

arrays, Imperfects data, quantitative randomness, data analysis, Tool selective, Statistics of alignment, Clustering and classification.

Bioinformatics Databases and Data mining: Introduction, Primary & Secondary database,Biological databases, Protein pattern databases and structure classification databases, Methods & Technology overview, infrastructure, Pattern recognition &discovery, machine learning, text mining & tools, Dot matrix analysis, substitution matrices, dynamic programming, word methods, Multiple sequence, alignment, tools for pattern matching.

Data Representation, Simulation & Collaboration: Drug discovery, fundamentals, Protein structure, System biology, Collaboration & communications, standards, Bioinformatics Issues.

HumanGenome Project and Bioinformatics Tools: History, Nucleic Acids, Genes, Genomes Introduction of National Institutes of Health (NIH), Introduction of National Library of Medicine (NLM) ,Introduction of National center for Biotechnology Information(NCBI), Human Genome Project, it's need, goal, uses and applications, Introduction, working with FASTS, working with BLAST.

Text Books:

1.T.K. Attwood and Parry Smith, Introduction to Bioinformatics, Benjamin-Cummings Publishing Company, 2001.

2.S.C.Rastogi, N.Mendiratta, P.Rastogi "Bioinformatics-Methods & Application", [RMR]PHI

3.Bryan Bergeron, "Bioinformatics Computing", Pearson Education [BB].

References:

1. Vince Buffalo, " Bioinformatics Data Skills, O'REILLY.

2. Krane and Raymer, Fundamental Concepts in Bioinformatics, Benjamin-Cummings, 2002.

   DE: Advanced Compiler

3.A.D. Baxevanis and B.F.F. Ouellette, "Bioinformatics: A practical guide to the analysis of

genes and proteins" (Eds). 2002 John Wiley and Sons.

4.D.W. Mount, "Bioinformatics: Sequence and Genome Analysis", 2001, Cold Spring Harbor

   Laboratory Press.

CO405A SOFTWARE ENGINEERING

Teaching Scheme: 03L + 00T, Total: 03 **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION: This course introduce students the knowledge of Software Development Life Cycle, Software Engineering Process, Agile development process, SCRUM process, requirement engineering, softwareanalysis, software design, user interface design, software testing principles and project planning & management concepts to develop quality software economically, formal methods, automation and trends in software engineering.

DESIRABLE AWARENESS/SKILLS: Knowledge of programming languages and data structures.

COURSE OBJECTIVES: The objectives of offering this course are:
The objectives of offering this course are:
1. To understand the nature of software complexity in various application domains, disciplined way of software development and software lifecycle process models.
2. To introduce principles of agile software development, the SCRUM process and agile practices.
3. To know methods of capturing, specifying, visualizing and analyzing software requirements.
4. To understand concepts and principles of software design and architecture.
5. To understand user-centeredness approach and principles of designing effective user interfaces.
6. To present formal methods, automation and recent trends in software engineering.
7.

COURSE OUTCOMES: On the successful completion of this course student shall be;

On the successful completion of this course students shall be
1. Able to identify unique features of various software application domains and classify software applications.
2. Able to apply appropriate lifecycle model of software development.
3. Able to apply principles of agile development.
4. Able to identify user needs and formulate software specifications.
5. Able to analyze software requirements by applying various modeling techniques.
6. Able to translate the requirements model into the design model

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to apply knowledge of mathematics, science, and engineering .	2
B	An ability to design and conduct experiments, as well as to analyze and interpret data .	1
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	2
D	An ability to identify, formulates, and solves engineering problems.	1
E	The broad education necessary to understand the impact of engineering	1

	solutions in a global, economic, environmental, and societal context.	
F	A recognition of the need for, and an ability to engage in life-long learning.	1
G	A knowledge of contemporary issues.	1
H	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3

1-Weakly correlated   2–Moderately correlated   3–Strongly correlated

COURSE CONTENTS:

Software Engineering Process-Nature of software – application domains, web-apps, mobile-apps, cloud computing, product line software introduction to software engineering – The discipline, layers, the process (guiding principles), the practice (guiding principles) and myths Process models – Generic process model, process assessment and improvement, prescriptive models, specialized models, unified process, product and process

Agile Development Process – Agile manifesto, agility and cost of change, agility principles, myth of planned development, toolset for the agile process Extreme Programming – XP values, process, industrial XP SCRUM – process flow, scrum roles, scrum cycle description, product backlog, sprint planning meeting, sprint backlog, sprint execution, daily scrum meeting, maintaining sprint backlog and burn-down chart, sprint review and retrospective Agile Practices - test driven development, refactoring, pair programming, continuous integration, exploratory testing versus scripted testing

Requirement Engineering-Requirements capturing - requirements engineering (elicitation, specification, validation, negotiation), eliciting requirements, elicitation techniques, developing use cases, building requirements model, negotiating requirements, requirements monitoring, validating requirements, prioritizing requirements (kano diagram)

Requirements Analysis – basics, scenario based modeling, UML models, data modeling, data and control flow model, behavioralmodeling using state diagrams Agile Requirements - user stories, 3 Cs of user story, INVEST characteristics.

Software Design – definition of design, translating requirements model to design model, design considerations (quality guidelines and attributes), design concepts, design model, design strategies or methods (function oriented, data-flow-oriented, object-oriented, data-structure-centered, aspect-oriented), design methods classification , design trade-offs, Software architecture, architectural styles (data-centered, data-flow, call and return, layered, peer-to-peer, publish-subscribe, event-based, client-server), architectural trade-off analysis method (ATAM), domain-specific architectures and product-lines

User Interface Design – Seeheim model and definition of user interface User-centeredness in design - dealing with different types of users, collecting user-requirements, building narratives, creating personas and scenarios Interface design principles–place the user in control, reduce user's memory load, make interface consistent, Shneiderman's 8 Golden Rules UI Analysis – context of use, user analysis, task analysis Interface design steps – user interface design process, applying design steps, interface design issues Usability - characteristics (ISO, Shneiderman, Nielson) , principles (principle of proximity, visibility, visual feedback, visual prominence, mental models and metaphors, consistency, affordance and constraints, confirmation, Hick's law, Fitt's law)

Formal Methods, Automation and Trends in Software Engineering- Cleanroom Design – cleanroom strategy, process model, black-box, state-box, clear-box specifications, design refinement and verification, cleanroom testing Software configuration management – SCM basics, SCM repository, SCM process CASE – taxonomy, tool-kits, workbenches, environments, components of CASE, categories(upper, lower and integrated

CASE tools) emerging software engineering trends – technology evolution, process trends, collaborative development, model-driven development, test-driven development , challenges of global software development.

Text Books:
1. Software Engineering: A Practitioner's Approach by Pressman, R., 7th or 8th Edition, Singapore: McGraw Hill, 2010, ISBN- 9780071267823
2. Agile Software Development with SCRUM by Schwaber, K. and Beedle, M., 1st Edition, New Jersey : Pearson, 2001, ISBN- 9780130676344.
3. User-Centered Design by Lowdermilk, T., 1st edition, O'Reilly Media, 2013, ISBN- 9781449359836.

Reference Books :
1. Software Engineering: Principles and Practice by Vliet, H, Ian Sommerville, Peter Sawyer, Requirement Engineering A Good Practice Guide,3rd Edition, New Delhi: Wiley India Pvt Ltd., 2012, ISBN- 978-81-265-2457-0.
2. The Mythical Man Month - Essays on Software Engineering by Brooks, F. ANV SUB 2nd Edition. Addison Wesley, 1995, ISBN - 9780201835953.
3. Software Engineering, by Somerville, I. ninth Edition, New Jersey: Pearson Education, 2010, ISBN - 9788131762165.
4. Fundamentals of Software Engineering by Mall R., 3rd Ed. Prentice Hall India, 2009, ISBN- 978812033819.
5. An Integrated Approach to Software Engineering by Jalote P., 3rd Edition, Narosa Publishing House, 2011, ISBN- 9788173197024.
6. Agile Web Development with Rails by Ruby, et. Al, Pragmatic, ISBN- 9789350234303.

CO405B DATABASE MANAGEMENT SYSTEM

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03

Evaluation Scheme: 10 ISA + 15 ISE I +15 ISE II + 60 ESE   **Total Marks:** 100

Duration of ESE: 03Hrs

COURSE DESCRIPTION:

This course introduce the student Database Management System (DBMS), different data models, relational algebra concept, Relational Database design theory, Transaction management and query optimization in DBMS. This course also introduces the Object Oriented databases and Database architecture. This course equips students with fundamental knowledge and basic technical competence in the field of DBMS.

DESIRED AWARENESS/SKILLS: knowledge of Data Structure, Discrete Mathematics

COURSE OBJECTIVES:

The objectives of offering this course are:

1. To learn and understand various Database Architectures and Applications.

2. To implement an entity relationship diagrams (ERD) to express requirements and demonstrates skills to model data requirements and create data models into normalized designs.

COURSE OUTCOMES:

On the successful completion of this course student able to:

1. create a good database design
2. handle relational databases.
3. use advanced storage technologies.

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to apply knowledge of mathematics, science, and engineering .	2
B	An ability to design and conduct experiments, as well as to analyze and interpret data .	2
D	An ability to identify, formulates, and solves engineering problems.	1
E	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENT:

Introduction to conceptual modelling: Characteristics of the database approach, actors on the scene, workers behind the scene, advantages of using the dbms approach, data models, schemas, and instances, three-schema architecture and data independence, database languages and interfaces, the database system environment, centralized and client/server architectures for dbmss, database design and implementation process.

Data modeling using E-R Relationship: Using high-level conceptual data models for database design, entity types, entity sets, attributes, and keys, relationship types, relationship sets, roles and structural constraints weak entity types, er diagram, relationship types of degree higher than two, enhanced entity -relationship model, relational database design by ER and EER to relational mapping.

Concepts and Constraints: Relational model concept, relational model constraints and relational database schemas, update operations, transactions, and dealing with constraint violation

Relational Algebra and Relational Calculus: Unary relational operations: SELECT and PROJECT, relational algebra operation from set theory, binary relational operations: JOIN and DIVISION, additional relational operation, tuplerelational calculus, domain relational calculus

Data Storage, Indexing and Query Processing: Disk storage, basic file structure, hashing, indexing structure for files, measures of query cost, selection operation, sorting and join operation.

Introduction, Transaction and System Concepts, desirable properties of transactions, characterizing schedules based on recoverability, characterizing schedules based on serializability, concurrency control : concurrency and recovery system, Different concurrency control protocols such as timestamps and locking, validation, multiple granularity, deadlock handling, recovery system: different crash recovery methods such as log based recovery, shadow paging, buffer management and remote backup system, database security and authorization

Text Books:

1. Fundamentals of Database Systems by RamezElmasri, Shamkant B Navathe, 5th Edition,Pearson, 2008, ISBN- 9788131250.
2. Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 5th Edition, McGraw-Hill, 2006, ISBN- 007-124476-X.

Reference Books:

1. Database Management Systems by R. Ramakrishnan, J. Gehrke, 2nd Edition, McGraw-Hill, 2000, .ISBN-13: 978-0072322064.
2. Introduction to Database Management Systems by C. J. Date, 8th Edition, Pearson, 2003, ISBN- 978-0321197849.
3. Database Management Systems by G. K. Gupta, 1st Edition, McGraw–Hill, 2011, ISBN 13: 9780071072731.
4. Database Systems Concepts, Design and Applications by S. K. Singh, 2nd Edition, Pearson Education, 2006, ISBN- 9788131760925.
5. Introduction to Database Management System by AtulKahate, 3rd Edition, Pearson, 2004, ISBN- 9788131700785.

6. Database Management System by V.K.Jain, Dreamtech Press (Wiley India), 2002, ISBN: 9788177222272.
7. Introduction to database management systems by Bipin Desai, 1st Edition, Concordia universityMontral 1999.

CO405C WEB TECHNOLOGY

Teaching Scheme: 03L + 00T, Total: 03   **Credit:**03
Evaluation Scheme:10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:**100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION: This course aims at developing skill and awareness amongst students in area of Web Technology. After completion of this course student will be able to understand concepts of Web development, they will learn the new technologies associated with web.

DESIRABLE AWARENESS/SKILLS: Basic knowledge of internet and IoT.

COURSE OBJECTIVES:

The objectives of offering this course are:

1 To Learn advanced Web Technologies
2 To apply technologies while solving problems

COURSE OUTCOMES:

On the successful completion of this course student shall be

1 To present a survey on building blocks of Web Technologies and open source tools.
2 To write presentations on using Web Technologies with case studies.
3 To write test cases to use technologies for solving problems using Web Technologies.

RELEVANCE OF PO'S AND STRENGTH OF CORRELATION:

Sr. No	Program Outcomes	Level of Operation
A	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	3
B	An understanding of professional and ethical responsibility.	2
C	The recognition of the need for, and an ability to engage in lifelong learning.	2

1-Weakly correlated   2–Moderately correlated   3–Strongly correlated

COURSE CONTENT:

HTML: What is HTML, HTML Documents, Basic structure of an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags. Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images
and Multimedia, Working with Forms and controls.

CSS: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color , Creating page Layout and Site Designs.

XML: Introduction and Overview of XML, Creating an XML Document , Defining Structure , Rules for Well Formed and Valid XML, Tag Attributes and Naming Rules , Empty and Non Empty Elements , XML Document Type Definition (DTD) ,Creating a DTD .

JSP: Java Script :Introduction, Client Side JavaScript, Server Side JavaScript, JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), --(Decrement), -(Unary Negation), logical Operators, Short

-Circuit Evaluation, String Operators, Special Operators, ? (Conditional operator), ,(Comma operator), delete, new, this, void Statements :Break, comment, continue, delete, do ... while, export, for, for...in, function, if...else, import, labelled, return, switch, Array.

IoT Web Technology: the internet of things today, time for convergence, towards the IoTuniverse, internet of things vision, IoT strategic research and innovation directions, IoTapplications,future internet technologies, infrastructure, networks and communication, processes,data management, security, privacy & trust, device level energy issues, iot related standardization, recommendations on research topics.

Text Books:

1. HTML 5 in simple steps, Kogent Learning Solutions Inc., Dreamtech Press publication.

2. A beginner's guide to HTML, NCSA,14th May,2003 publication Creating a Web Page and Web Site, Murray,Tom/Lynchburg.

3. Dr.OvidiuVermesan, Dr. Peter Friess, Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, River Publishers, 2013, ISBN: 978-87-92982-96-4 (EBook), ISBN: 978-87-92982-73-5 (Print)

4. Poonam Railkar, Identity Management for Internet of Thing,River Publishers, 2015, ISBN: 978-87-93102-91-0 (EBook), ISBN:978-87-93102-90-3(Hard Copy)]

Reference Books:

1. HTML, XHTML, and CSS Bible, 5thed Steven M. Schafer ,Wiley India publication
2. Beginning HTML, XHTML, CSS, and JavaScript, John Duckett, Wiley Ind publication
3. CunoPfister, Getting Started with the Internet of Things, O'Reilly Media, 2011,ISBN: 978-1-4493-9357-1.
4. BoS Content: Books, Course Notes, Digital contents, Blogs developed by the BoS for bridging the gaps in the syllabus, problem solving approaches and advances in the course
5. Vijay Medishetty, ArshdeepBahga, Internet of Things: A Hands-On Approach (Paperback).

CO405D MULTIMEDIA TECHNIQUES

Teaching Scheme: 03L + 00T, Total: 03　　　　　　　　　　　**Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE　　　**Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION:

This course introduces students to basic multimedia components, digitalization of various types of data. It also gives details of techniques for compression audio and video. Students will be helped through knowledge of advances in multimedia.

DESIRABLE AWARENESS/SKILLS: Knowledge of Database Management System

COURSE OBJECTIVES:

The objectivities of offering this course are:

1. To learn basic components of multimedia (text, image, audio, video and animation)
2. To learn the advance graphics.
3. To learn compression techniques for various multimedia components
4. To learn Gaming and animation.

COURSE OUTCOMES:

On the successful completion of this course student shall be

1. Able to create their own file formats for specific application
2. Able to do some projects based on current trends in multimedia
3. Able to use of open sources for authoring tool for animation and presentations
4. Able to develop simple games and animation

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation
A	Ability to apply knowledge of mathematics, science and engineering.	3
B	An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social political, ethical, health and safty, manufacturability and sustainability.	2
C	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	3

1-Weakly correlated　　　2–Moderately correlated　　　3–Strongly correlated

COURSE CONTENTS:

Introduction to Multimedia: Goals, objectives, and characteristics of multimedia, multimedia building blocks, multimedia architecture, hardware support, distributed multimedia applications, streaming technologies, multimedia database systems, multimedia authoring tools, overview of multimedia software tools, multimedia applications, media entertainment, media consumption, web-based applications, e-learning and education text: types of text, text compression: huffman coding, LZ & LZW

Text file formats: TXT, DOC; RTF, PDF, PS

Digital Image:Basic Image fundamentals, image File formats - (BMP, TIFF, JPEG, GIF)image acquisition, storage processing, Communication, and display, image enhancement: enhancement by point processing, spatial filtering, image compression: types of compression: lossy& lossless, symmetrical & asymmetrical, intra-frame & inter-frame hybrid JPEG, lossless: RLE, Shannon - Fano algorithm, arithmetic coding. lossy: vector quantization, fractal compression technique, transform coding, psycho-analysis, and inter-frame Correlation. hybrid: JPEG-DCT.

Audio and Audio Compression:Nature of sound waves, characteristics of sound waves, psycho-acoustic, MIDI, digital audio, CD formats; Audio file formats: WAV, AIFF, VOC, AVI, MPEG. audio file formats, RMF, WMA; audio compression techniques : DM, ADPCM and MPEG audio file conversions multimedia supported audio formats in android, media playback

Video: Video signal formats, video transmission standards: EDTV, CCIR, CIF, SIF, HDTV, digitization of video; video file formats: MOV, Real Video, H-261, H-263, Cinepack, nerodigtal,video editing, DVD formats, MPEG, video streaming; multimedia supported video formats in android, media Playback.

Animation AndOpengl: Animation: basics of animation, types of animation, principles of animation, techniques of animation, creating animation; OpenGL: OpenGL over windows/Linux, Extension, programming languages, SDK, shadowing techniques, rendering,

Advances In Multimedia: Virtual Reality : Concept, Forms of VR, VR applications, VR devices: hand gloves, head mounted tracking system, VR chair, CCD, VCR, 3D Sound system, head mounted display; synchronization: multimedia communication and applications, study of multimedia networking, quality of data transmission, multimedia over IP, media on demand; multimedia in android: android multimedia framework architecture, GStreamer :Introduction, GStreamer based multimedia framework, OpenCore multimedia engin

Text Books:

1. Multimedia Computing, Communication and Applications, Ralf Steinmetz and Klara Nahrstedt, Pearson Education. **ISBN**, 8177584413
2. Multimedia Communication Systems: Techniques, Standards, and Networks, K.R. Rao, TMH. ISBN-13: 978-0130313980
3. Principles of Multimedia, 2/E, RanjanParekh,Tata McGraw-Hill, ISBN: 1259006506

Reference Books:

1. Ashok Banerji, Ananda Ghosh, "Multimedia Technologies", ISBN: 9780070669239
2. Digital Image Processing, Gonzalez, Woods, Addison Wesley ISBN-10: 0201110261

3. Fundamentals of Multimedia",Ze-Nian Li, Marks S. Drew, Pearson Education. ISBN 0-13127256
4. OpenGL: A Primer, Edward Angel, Addison-Wesley. ISBN-10: 0321398114
5. Multimedia Systems, Parag Havaldar, Gerard Medioni, Cengage Learning. ISBN-10: 1418835943

CO405E COMPUTER ETHICS AND CYBER SECURITY

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION:

This course introduces fundamental concepts of computer ethics. It will examine the ethical issues that arise as a result of increasing use of computers, and the responsibilities of those who work with computers, either as computer science professionals or end users. It will summarize Cyber Crimes and its associated investigation and forensics with relation to Cyber law. Students will have a new dimension to look towards their day to day computer activities.

DESIRABLE AWARENESS/SKILLS:

Basic Computer and Internet knowledge.

COURSE OBJECTIVES:

The objectives of offering this course are:
1. To make students familiar with the fundamental concepts of computer ethics
2. To develop the concepts in computer forensics
3. To give emphasis on how cyber security operations are carried out
4. To introduce the linkage between technology, law and ethics

COURSE OUTCOMES:

On the successful completion of this course; student shall be:
1. Apply Professional Ethics to solve Ethical Dilemma & identify their Professional Responsibilities
2. Examine Intellectual Property Rights in Cyber space and Summarize Cyber Forensics and its role in Cyber Laws
3. Evaluate Cyber Crimes and its severity, and measures for Incident detection and response.
4. Describe Scope, jurisdiction, offense and contraventions, powers of police, adjudication

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to apply knowledge of mathematics, science, and engineering.	2
B	An ability to identify, formulates, and solves engineering problems.	3
C	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3

1- Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Computer and Philosophical ethics: Moral v/s Ethics, Why Computer Ethics, Philosophical Ethics: Distinguishing Descriptive and Normative Claims, Ethical Relativism, Utilitarianism, Deontological Theories, Rights, Virtue Ethics.

Professional Ethics: Why Professional Ethics, Characteristics of Professionals, The System of Professionals, is Computing a Profession, Professional Relationships, Code of Ethics and Professional Conduct, Steps in Ethical

Decision Making.

Ethics & Internet: Three Moral Significant Characteristics, Hacking & Hacker Ethics, Netiquette Intellectual property issues in cyberspace: Introduction to intellectual property Protections via Copyright , Trade Secrets, Trademarks, and Patents. Contracting to protect intellectual property, Protection options - Encryption / PGP, copyright on web-content, Copyright on software, digital contracts, digital signatures.
Ethical Decision Making**:** Types of ethical choices, Making defensible decisions, Ethical dilemmas, law and ethics

Data and Evidence Recovery- Introduction to Deleted File Recovery, Formatted Partition Recovery, Data Recovery Tools, Data Recovery Procedures and Ethics, Preserve and safely handle original media, Recover Internet Usage Data, Recover Swap Files/Temporary Files/Cache Files, Introduction to Encase Forensic Edition, Forensic Tool Kit (FTK), Use computer forensics software tools to cross validate findings in computer evidence-related cases.

Cyber Forensics Investigation- Introduction to Cyber Forensic Investigation, Investigation Tools,Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers, Recovering deleted evidences, Password Cracking

Cyber Security- Introduction to Cyber Security, Implementing Hardware Based Security, Software Based Firewalls, Security Standards, Assessing Threat Levels, Types of incidents, Stages of incident response Threats in cyberspace, Blended attacks, incident prevention and detection, Forming an Incident Response Team, Reporting Cybercrime, Operating System Attacks, Application Attacks, Reverse Engineering 34 &Cracking Techniques and Financial Frauds

Crime incident Handling Basics:
Hacking, cyber activism, tracking hackers, clues to cybercrime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations
Information technology Act 2000: Scope, jurisdiction, offense and contraventions, powers of police, adjudication

Text Books:
1. Computers, Ethics, And Social Values, Johnson and Nissenbaum, 1994 Prentice Hall
2. Cyber security operations Handbook, John Rittinghouse,William Hancock 3. Computer ethics,
         Deborah G.Johnson, third edition, Pearson education.
3. Josiah Dykstra "Essential Cybersecurity Sciences",Ist Edition, O'REILLY.

References:
1. Earnest A. Kallman, J.P Grillo, "Ethical Decision making and IT: An Introduction with Cases", McGraw Hill Pub.
2. John W. Rittinghouse, William M. Hancock, "Cyber security Operations Handbook", Elsevier Pub.
3. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", 2nd Edition,,CengageLearning Pub.

CO406 COMPILER CONSTRUCTION LAB

Teaching Scheme: 02P Total: 02   **Credit:** 01
 Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks:** 50
Duration of ESE: 03Hrs

COURSE DESCRIPTION:

Minimum 10 experiments (five from group A and five from group B) shall be performed to cover entire curriculum of course CO401. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

GROUP A

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines.
2. Write a C program to identify whether a given line is a comment or not.
3. Write a C program to recognize strings under 'a*', 'a*b+', 'abb'.
4. Write a C program to simulate lexical analyzer for validating operators.
5. Simulate First and Follow of a Grammar.
6. Write a C program for constructing of LL (1) parsing.
7. Write a program to Design LALR Bottom up Parser.

Group B

1. Write a C program to implement operator precedence parsing
2. Design of a Predictive parser of given language
3. Write a C program to generate machine code from abstract syntax tree generated by the parser
4. Write a program to check whether a string belongs to a grammar or not
5. Implement Deterministic Finite Automata
6. Implementation of shift reduce parsing algorithm

NOTE:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (ESE) for this laboratory course shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

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CO407 OBJECT ORIENTED MODELLING AND DESIGN LAB

Teaching Scheme: 02P Total: 02
Evaluation Scheme: 25 ICA + 25 ESE
Duration of ESE: 03 Hrs

Credit: 01
Total Marks: 50

Minimum 08 (four from Group A, four from Group B) experiments shall be performed to cover entire curriculum of course CO402. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably).

Group A:
1. Design Passport Automation System.
2. Design E-ticketing system using Structural and Behavioral UML diagram.
3. Design Exam registration system using Structural and Behavioral UML diagram
4. Design ATM system using Structural and Behavioral UML diagram.
5. Design Hotel Management system using Structural and Behavioral UML diagram.

Group B:
6. Design Coffee vending machine using Structural and Behavioral UML diagram.
7. Design Book Bank Management system using Structural and Behavioral UML diagram.
8. Design Hospital Management system using Structural and Behavioral UML diagram.
9. Design E-book Management system using Structural and Behavioral UML diagram.
10. Design Online Shopping system using Structural and Behavioral UML diagram.

Text Book:

1. James Rumbaugh , Michael Blaha , William Premerlani, Frederick Eddy, William Lorensen ,"Object- Oriented Modeling and Design", Pearson Education.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education.

Reference Books:

1. Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.
2. Mike O'Docherty, "Object-Oriented Analysis & design understanding system development with UML 2.0", John Wiley and Sons.
3. AtulKahate, "Object Oriented Analysis & Design", The McGraw-Hill Companies.
4. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education.

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NOTE: ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

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CO408A CRYPTOGRAPHY AND NETWORK SECURITY LAB

Teaching Scheme: 02P Total: 02   **Credit:** 01

Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks:** 50

Duration of ESE: 03 Hrs

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover entire curriculum of course CO404A. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably).

Group A

1. Write a Program to Implement Columnar Cipher Text.
2. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).
3. Calculate the message digest of a text using the SHA-1 algorithm.
4. Create a digital certificate of your own.
5. Attack on Digital Signature/Hash Collision.
6. Implement DES Encryption and Decryption.
7. Implement the AES Encryption and decryption

Group B

1. Write a Program for Encryption/Decryption using Rail Fence Technique.
2. Encryption/Decryption using XOR symmetric-key cryptography algorithm.
3. RSA Encryption and Factorization Attacks.
4. Write a program that contains functions, which accept a key and input text to be encrypted /decrypted. This program should use the key to encrypt/decrypt the input by using the triple DES algorithm.
5. Implementation of RLE data compression algorithm.
6. Encryption using binary/byte addition
7. Implement the following techniques
   – Ceaser Cipher

   – Playfair Cipher

   – Hill Cipher

   – Vigenère Cipher

8. Write a program that contains a string (char pointer) with a value 'Hello World'. The program should AND or and XOR each character in this string with 127 and display the result.

9. Using Java Cryptography, encrypt the text "Hello world" using BlowFish. Create your own key using Java keytool.

Text Books:

1. William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall of India, 5th Edition, 2003,ISBN 10: 0-13-609704-9 ISBN 13:978-0-13-609704-4.
2. Forouzan, "Cryptography and Network Security", TMH, 3rd edition, ISBN- 10:9339220943, ISBN-13: 978-9339220945.

Reference Books:

1. AtulKahate, Cryptography and Network Security, Tata McGraw-Hill, 8th edition, 2003, ISBN 0-070049483-5.
2. Allan Liska and Timothy Gallo, "Ransomware", O'REILLY.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Pearson Education,5th Edition, 2003, ISBN 978-0-13-408504-3.
4. Douglas Stinson, Cryptography Theory and Practice, CRC Press, 3rd edition, 1995, ISBN 9781584885085.
5. Alfred Menezes, Paul van Oorschot, Scott Vanstone, Handbook of Applied Cryptography, CRC Press, 1997, ISBN 9780849385230
6. Wade Trappe and Lawrence C. Washington, Introduction to Cryptography with Coding Theory, Pearson, 2nd edition, ISBN 0-13-1981199-4.
7.Bernard Menezes, Network Security and Cryptography, Cengage Learning India, 1st edition, 2010, ISBN-10: 813151349, ISBN-13: 978-8131513491.
8. Radia Perlman Network Security: Private Communication in a Public World, Prentice Hall, 2 edition, Department of Computer Science and Engineering, 2002 ISBN-10: 0130460192, ISBN-13: 978-0130460196.

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NOTE:

ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO408B SOFTWARE METRICS AND QUALITY ASSURANCE LAB

Teaching Scheme: 02P Total: 02   **Credit:**01

Evaluation Scheme: 25 ICA + 25 ESE   **Total Mark:** 50

Duration of ESE: 03 Hrs

Minimum 10 experiments (Group A is compulsory and six from Group B) shall be performed to cover entire curriculum of course CO404B. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output. Use of Open source tool/ technology is recommended for laboratory assignments.

Group A

1. To perform the effort estimation based on project specification.
2. Program for finding Length of program.
3. Implementation of program for finding Length of program using Lines of Code.
4. Program for measuring Size of program using Albrecht's Method.

Group B

1. Implementation of program for measuring size of program using Function Point Calculation Albrecht's method.
2. Write a test case for any known application.
3. Create a test plan document for any application.
4. Study of any testing tool.
5. Study of any web testing tool.
6. Study of any test management tool.
7. Schedule estimation using Gantt chart.

Text Books:

1. Flanton, Pfleeger, "Software Metrics- A Rigorous and Practical Approach" Thompson Learning.

2. Mordechai Ben-menachem/Garry S.Marliss, "Software Quality", Thompson

Learning.

3. Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672-32798-8.

Reference Books:

1. Roger S. Pressman, "Software Engineering- A Practitioner's Approach", TMH.

2. William E. Lewis,"Software Testing and Continuous Quality Improvement", O'REILLY.

NOTE:

ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO408C MOBILE COMPUTING LAB

Teaching Scheme: 02P Total: 02   **Credit :**01
Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks:** 50
Duration of ESE: 03 Hrs

Minimum 10 experiments (four from Group A and four from Group B) shall be performed to cover entire curriculum of course CO404C. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A
1. Study structure of WML and basic tags in WML
2. Use of Anchor tag and program for College intake status.
3. Use of Template, use input formats and program for online shopping
4. Use of WML Script and program for online quiz.
5. Use of WML String functions and program for checking validity of Credit Card
6. Use of Active Server Pages (ASP) with WML

Group B
1. Design of simple Calculator having +,,,* and / using WML/J2ME
2. Design of Calendar for any given month and year using WML/J2ME
3. Design a Timer to System Time using WML/J2ME
4. Design of simple game using WML/J2ME
5. Animate an image using WML/J2ME
6. Design a personal phone book containing the name, phone no., address, e-mail,etc.
7. Simulation of Authentication and encryption technique used in GSM

NOTE:

ICA–Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO408D BIO-INFORMATICS LAB

Teaching Scheme: 02P, Total: 02   **Credit:** 01
Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks:** 50
Duration of ESE: 03Hrs

Minimum 10 experiments (five from group A and five from group B) shall be performed to cover entire curriculum of course CO404D. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

GROUP A

1. To view and use (preprocessing) the various biological databases available on the World Wide Web.
2. To retrieve the gene sequence in FASTA format corresponding to P00519.
3. To determine the Post Translational Modifications involved in P53355 and to determine the residues involved in PTM.
4. To retrieve any one FASTA sequence of GABA transaminase in Human, mouse, pig and chick
5. To determine the number of entries in SWISSPROT for Serine kinase in PIG.
6. To determine the Secondary structure of P68871 AND P24071
7. To determine the conserved domain present in Q8NFM4

Group B

1. Find the gene sequences of Mouse origin similar to U80226.1.
2. To determine the function of C7AE31 and to find its orthologous proteins.
3. To perform the local alignment between the given sequences using any two variants of BLOSUM
4. To identify the 10- homologues sequences of P68871 of various origins. Find the conserved region existing between them comment on the same. Comment on the evolutionary relationship between the sequences
5. Identify the Genes present if any in the given genomic sequence NC_010456.
6. To predict secondary structure of the give protein sequences
7. To do homology modelling for human gaba transaminase using MODELLER
8. To quantify the interaction of the ligand with the protein target using Glide protocol of Schrodinger package.

NOTE:

ICA–Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO409 PROJECT PHASE -I

Teaching Scheme: 00L + 00T + 04P, Total: 04   **Credit:** 02

Evaluation Scheme: 50 ICA+50 ESE   **Total Marks**: 100

COURSE DESCRIPTION:

The course explores the knowledge of design, experiment and analysis of the data. The course develops ability to work on multidisciplinary teams, identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

COURSE OBJECTIVES:

The course objectives are:

1. To become familiar with the process of undertaking literature survey /performing industrial visit and identifying the problem statement.
2. To apply algorithmic strategies while solving problems.
3. To practice the process of solving the problem in a team.
4. Exposure to Learning and knowledge access techniques using Conferences, Journal papers and participation in research activities.

COURSE OUTCOMES:

After completing this course, students will be able to:

1. Identify and finalize problem statement by surveying variety of domains.
2. Perform requirement analysis and identify design methodologies.
3. Design innovative idea for solving the problem.
4. Apply advanced programming techniques.

RELEVANCE OF PO'S AND STRENGTH OF CORRELATION:

Sr.No.	Program Outcomes	Level of operation
A	An ability to identify , formulate and solve engineering problems	3
B	An ability to design and conduct experiments ,as well as to analyse and interpret data.	3
C	An ability to function in multidisciplinary teams.	3
D	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.	2

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

Guidelines for completing the Project phase I:

1. It is expected that the broad area of Project phase-I shall be finalized by the student in the beginning of the VII semester.

2. A group of Maximum 4 students shall be allotted for Project phase-I and same project group for Project phase-II.

3. Exhaustive survey of literature based on a clear definition of the scope and

focus of the topic should be carried out by the students. The **Synopsis/Abstract** on the selected topic, after detail literature survey should be submitted to the Project coordinator appointed by Head of the department.

4. Project phase -I may involve literature survey, problem identification, work methodology preparing specification and material procurement, collection of data. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.

5. Approximately more than 40% work should be completed by the end of VII semester.

6. Each student group is required to maintain a logbook for documenting various activities of Project-I and submit group project report in the form of thermal bound as per the guidelines at the end of semester –VII.

7. Evaluation Committee comprising of the Guide, Project Coordinator and Expert appointed by the Head of the department will award the marks based on the work completed by the end of semester and the presentation based on the project work.

Guide lines for ICA: The Internal Continuous Assessment shall be based on the based on the active participation of the students in the Project work and knowledge / skill acquired, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.

Assessment of the project-I for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in following table.

Assessment of Project phase-I (ICA)

Title of the Project: _____

Name of the Guide: _____

Sr. No.	Problem Identification and project objectives (5M)	Literature Survey (10M)	Progress Status (5M)	Project Methodology/ Design/PCB/ hardware/ simulation/ programming (10M)	Report Writing (5M)	Depth of Understanding (5M)	Presentation (10)	Total (50M)

Guide lines for ESE: The End Semester Examination for Project shall consist of demonstration , presentation and oral examinations based on the project**.**

CO410 SEMINAR

Teaching Scheme: 00L + 00T **+** 02P, Total: **Credit:** 02
Evaluation Scheme: 25 ICA+25 ESE   **Total Marks**: 50

COURSE DESCRIPTION: The course develops ability to work on multidisciplinary teams, identify, formulate, and solve engineering problems in view of economic, environmental and societal context. The course explores the knowledge of presentation andeffective communication.

COURSE OBJECTIVES:

1. To survey selected topics addressing issues of science in society today.
2. To assimilate, synthesize and integrate information related to a topic.
3. To familiarize with scientific literature.
4. To organize, discuss and present the information into an analysis.
5. To present the work in prescribed formats.

Course Outcomes:

After completing this course, students will able to:

1. Collect, Organize &Analyze information about emerging technologies /market demands/current trends.
2. Exhibit effective communication skills, stage courage, and confidence.
3. Demonstrate intrapersonal skills,
4. Prepare a well organized report employing elements of technical writing and critical thinking.

RELEVANCE OF PO'S AND STRENGTH OF CORRELATION:

Sr.No.	Program outcomes	Level of operation
A	An ability to identify , formulate and solve engineering problems.	3
B	An ability to communicate effectively.	3
C	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.	2
D	A recognition of the need for and an ability to engage in lifelong learning,	1

1 - Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Guidelines for presenting a seminar:

1. Each Student shall select a topic for seminar which is not covered in curriculum. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.

2. Topic of Seminar shall be registered within a three weeks from commencement of VII Semester and shall be approved by the committee.
3. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar.
4. Student should prepare a report based on outcomes of literature studies, field visits, observation schedules, group meetings etc related to a problem in relevant technology area.
5. Each student should deliver a seminar in scheduled period (Specified in time table or time framed by department) and submit the seminar report (paper bound copy/Thermal bound) in the suggested format.

ASSESSMENT OF SEMINAR

Guide lines for ICA: ICA shall be based on topic selection, presentation and Seminar report submitted by the student in the form of thermal bound. Assessment of the seminar for award of ICA marks shall be done jointly by the guide and a departmental committee, as per the guidelines given below:

Name of Guide: _____

SrNo.	Name of Student	Seminar Topic	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5M	5M	5M	5M	5M	25M

Guide lines for ESE: ICA shall be based on topic selection, presentation and Seminar report submitted by the student in the form of thermal bound. Assessment of the seminar for award of ESE marks shall be done jointly by the guide and a departmental committee, as per the guidelines given below:

CO411 SELF STUDY-III

Teaching Scheme: 00 Total: 00   **Credit:**02
Evaluation Scheme: 50 ICA + 00 ESE   **Total Marks:** 50

Grade of course Self Study-III shall be based on one test each conducted on 20% syllabus of five subjects – CO401, CO402,CO403, CO404, CO405. One faculty member should be appointed as course coordinator for the course 'Self Study' to compile the marks of all tests and enter into MIS.

The 20% syllabus for self - study shall be declared by subject teacher at the beginning of semester and he/she shall conduct the test examination for that course, assess answer papers of test examination and submit the marks   to   course   coordinator.

CO451 DISTRIBUTED OPERATING SYSTEM

Teaching Scheme: 03L + 00T, **Total:** 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION: The course introduces the main principles underlying distributed systems, processes, communication, naming, synchronization, consistency, fault tolerance, and security

COURSE OBJECTIVES:

1. To study the concepts of Distributed Operating System
2. To study Methods of understanding clock synchronization protocols.
3. To introduce the concepts of file system implementation in DOS.

COURSE OUTCOMES:

At the end of this course, students shall be able to:

1. Identify the core concepts of distributed systems: the way in which several machines orchestrate to correctlysolve problems in an efficient, reliableand scalableway.
2. Understand the middleware technologies that support distributed applications such as RPC, RMI and object based middleware.
3. Apply and use the techniques, skills, and modern engineering tools necessary for engineering practices learned in the distributed system
4. Develop/design distributed system/applications.

RELEVANCE OF PO'S AND STRENGTH OF CORRELATION:

Sr. No	Program Outcomes	Level of Operation
A	An ability to design and conduct experiments, as well as to analyze and interpret data .	3
B	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental,social, political, ethical, health and safety, manufacturability, and sustainability.	2
C	An ability to identify, formulate, and solve engineering problems	3
D	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	3

1 - Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT:

Distributed Operating System

Fundamentals: What is a distributed computing system, Evolution of distributed computing systems, distributed computing system models, Why are distributed computing system gaining popularity, What is distributed operating system?, Issues in designing a distributed operating system, Introduction to distributed computing environment(DCE).

Message Passing: Introduction, Desirable features of a good message-passing system, Issues in IPC by message passing, Synchronization, Buffering, Multidatagram messages, Encoding and decoding of message data, Process addressing, Failure handling, Group communication, Case study:4.3BSD UNIX IPC mechanism.

Remote Procedure Calls: Introduction, The RPC model, Transparency of RPC, Implementing RPC mechanism, Stub generation, RPC messages, Marshaling arguments and results, Server management, Parameter-passing semantics, Call semantics , Communication protocols for RPCs, Complicated RPCs, Client-server binding, Exception handling, Security, Some special types of RPCs,RPC in heterogeneous environments, lightweight RPC, optimizations for better performance, Case studies: Sun RPC, DCE, RPC.

Distributed Shared Memory: Introduction, General architecture of DSM systems, Design and implementation issues of DSM, Granularity, Structure of shared memory space, Consistency models, Replacement strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM.

Synchronization: Introduction, Clock synchronization, Event ordering, Mutual exclusion, Deadlock, Election algorithms.

Resource Management: Introduction, Desirable features of a good global scheduling algorithm, Task assignment approach, Load-balancing approach, Load-sharing approach.

Process Management: Introduction, Process migration, Threads.

Distributed File System: Introduction, Desirable features of a good distributed file system, File models, file-accessing models, File-sharing semantics, File-caching schemes, File replication, Fault tolerance, Atomic transactions, Design principles, Case study:DCE Distributed file service.

Text Books:
1. Distributed Operating Systems Concepts and Design, Pradeep K.Sinha, PHI.
2. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.

Reference Books:
1. Distributed Computing, S.Mahajan and S.Shah, Oxford University Press.
2. Distributed Systems, S.Ghosh, Chapman and Hall/CRC, Taylor & Francis Group, 2010.
3. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, Tata McGraw-Hill Edition.
4. Reliable Distributed Systems, K.P.Birman, Springer.

5. Distributed Systems: Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
6. Distributed Operating Systems and Algorithm Analysis,R.Chow, T.Johnson,Pearson.
7. Distributed Operating Systems, A.S.Tanenbaum, Pearson Education

CO452 DATA WAREHOUSING AND DATA MINING

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03

Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100

Duration of ESE: 03Hrs

COURSE DESCRIPTION:

This course introduces the students to learn and practice data modeling using various techniques of data mining. It also encourages use of data warehouse, OLAP to extract knowledgeable information for decision support system.

COURSE OBJECTIVES:

The objectives of offering this course are:

1. To learn the basic principles, concepts and applications of datawarehousing and data mining.
2. To introduce the task of data mining as an important phase of knowledge recovery process.
3. To familiarize Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment
4. To impart knowledge of the fundamental concepts that provide the foundation of data mining

DESIRABLE AWARENESS/SKILLS: Knowledge of Database Management System

COURSE OUTCOMES:

On the successful completion of this course student shall be;
1. Able to present survey on different learning, classification and data mining foundations.
2. Able to write programs and methods for data Mining applications.
3. Able to extract knowledge using data mining techniques
4. Able to adapt to new data mining tools.
5. Able to study the application and model of classification and clustering.

RELEVANCE OF PO'S AND STRENGTH OF CORRELATION

Sr. No.	Program Outcomes	Level of Operation
1	An ability to design and conduct experiments, as well as to analyze and interpret data.	3
2	An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social political, ethical, health and safety, manufacturability and sustainability.	2
3	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	3

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Introduction to Data Mining: Why Data Mining? moving toward the Information Age, data mining as the evolution of information technology; What Is Data Mining? What kinds of data can be mined? database data , Data Warehouses , Transactional Data , Other Kinds of Data; What kinds of patterns can be mined? class/concept description: characterization and discrimination , mining frequent patterns, associations, and correlations , classification and regression for predictive analysis cluster analysis , outlier analysis , Are All Patterns Interesting? Which Technologies Are Used? statistics , machine learning , database systems and data warehouses , information retrieval. Which kinds of applications are targeted? business intelligence , web search engines; major issues in data mining; mining methodology , user interaction , efficiency and scalability , diversity of database types; data mining and society

Data Warehousing and Online Analytical Processing: Data warehouse: basic concepts
 What is a data warehouse? differences between operational database systems and and data warehouses, but, Why have a separate data warehouse? Data Warehousing: A multitiered architecture, Data warehouse models: enterprise warehouse, data mart, and virtual warehouse , extraction, transformation, and loading , metadata repository. Data warehouse modeling: data cube and OLAP ; data cube: A multidimensional data model, stars, snowflakes, and fact constellations: schemas, for multidimensional data models, dimensions: the role of concept hierarchies, measures: their categorization and computation , typical OLAP operations , a starnet query model for querying multidimensional, databases:

datawarehouse design and usage:a business analysis framework for data warehouse design, data warehouse design processdata warehouse usage for Information processing , from online analytical processing to multidimensional data mining. **Datawarehouse implementation:** efficient data cube computation: an overview, indexing OLAP data: bitmap index and join index , efficient processing of OLAP queries, OLAP server architectures: ROLAP versus MOLAP. versus HOLAP

Data Preprocessing:Datapreprocessing: an overview- data quality: why preprocess the data? major tasks in data preprocessing; data cleaning- missing values, noisy data , data cleaning as a process , data integration-entity identification problem , redundancy and correlation analysis , tuple duplication , data value conflict detection and resolution; data reduction- overview of data reduction strategies, wavelet transforms , principal components analysis attribute subset selection , regression and log-linear models: parametricdata reduction, histograms , clustering , sampling, data cube aggregation, data transformation and data discretization, data transformation strategies overview, data transformation by normalization, discretization by binning . discretization by histogram analysis ,discretization by cluster, decision tree, and correlation analyses , concept hierarchy generation for nominal data

Mining frequent patterns: associations, and correlations: basic concepts , market basket analysis: a motivating example , frequent itemsets, closed itemsets, and association rules , frequent itemset mining methods , apriori algorithm: finding frequent itemsets by confined candidate generation , generating association rules from frequent itemsets , improving the efficiency of apriori , a pattern-growth approach for mining frequent itemsets , mining frequent itemsets using vertical data format, mining closed and max patterns; which patterns are interesting: strong rules are not necessarily interesting, from association analysis to correlation analysis , a comparison of pattern evaluation measures

Classification and clustering :basic concepts classification basic concepts - what is classification? general approach to classification decision tree induction decision tree induction, attribute selection measures, tree pruning , scalability and decision tree induction , visual mining for decision tree induction, bayes classification methods - bayes' theorem , na¨ıvebayesian classification, rule-based classification- using if-then rules for classification , rule extraction from a decision tree, rule induction using a sequential covering algorithm, cluster analysis basic concepts - what is cluster analysis? requirements for cluster analysis overview of basic clustering

methods, partitioning methods - *k*-means: a centroid-based technique, *k*-medoids: a representative object-based technique, hierarchical methods - agglomerative versus divisive hierarchical clustering

Text Books:

1. Data mining concepts and techniques,3rd Edition, Jawai Han, MichellineKamber, Jiran Pie, Morgan Kaufmann Publishers ISBN 978-0-12-381479.

Reference Books:

1. Introduction to Data Mining, Vipin Kumar, Pang-Ning Tan , Pearson ISBN 10: 0321321367.
2. Building the Data Warehouse, William H Inmon, Wiley Publication 4th Edition. ISBN-13: 978-0-7645-9944-6.
3. Business modeling and Data Mining Dorian Pyle, Elsevier Publication MK. ISBN: 9781558606531.
4. Monte F. Hancock jr., "Practical Data Mining",O'REILLY.

CO453A WEB SERVICES AND SOA

Teaching Scheme:03L + 00T, Total: 03   **Credit:**03

Evaluation Scheme:10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:**100

Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

The focus of this course is to understand service orientation of technology to serve business. This course cements the translations between business and various information technology layers. The course will provide a deep understanding of Service Oriented Architecture (SOA) fundamentals from Application as well as Infrastructure perspective and impact to business. We will look at the evolution of service orientation over computing eras leading up to current practices including cutting edge trends in global industry.

DESIRABLE AWARENESS/SKILLS:

Basic knowledge of web services and Service OrientedArchitecture, Basic knowledge of web technology.

COURSE OBJECTIVES:

The objectives of offering this course are
1. To Understand Web Services and implementation model for SOA
2. To provide fundamental concepts of Service Oriented Architecture.
3. Integrate SOA technologies with Web Services paradigms.

COURSE OUTCOMES:

On the successful completion of this course student shall
1. Know about the basic principles of Service Oriented Architecture, its components and techniques.
2. Understand the architecture of web services.
3. Able to design and develop web services using protocol.

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

Sr. No	Program Outcomes	Level Of Operation
A	An ability to design and conduct experiments, as well as to analyze and interpret data.	2
B	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice	3

1 - Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENTS:

Roots of SOA: Characteristics of SOA, comparing SOA to client-server and distributed internet architectures, Anatomy of SOA, How components in an SOA interrelate, principles of service orientation.

Web services: service descriptions, messaging with SOAP, message exchange patterns, coordination, atomic transactions business activities, orchestration,choreography, service layer abstraction, application service layer,

business service layer, orchestration service layer.

Service oriented analysis: Business, centric SOA, deriving business services, service modeling, service oriented design, WSDL basics, SOAP basics, SOA composition guidelines, entity, centric business service design, application service design, task centric business service design

SOA platform basics: SOA support in J2EE, Java API for XML, based web services (JAX-WS), Java architecture for XML binding (JAXB) Java API for XML registries(JAXR), Java API for XML based RPC (JAX-RPC), Web Services Interoperability Technologies (WSIT), Common Language Runtime,web forms,web services,Web Services Enhancements (WSE).

WS-BPEL basics: WS-Coordination overview, WS-Choreography, WS-Policy,WS-Security

Text Book:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design",Pearson Education 2005.

References:

1. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented   Computing Series from Thomas Erl), 2005.
2. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education,2005.
3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, " Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006.

CO453B EMBEDED SYSTEMS

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03

Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100

Duration of ESE: 03Hrs

COURSE DESCRIPTION:

This course gives detailed introduction of embedded system along with its designing. Students will get an insight of ARM architecture. It also gives a sight of real time operating system and programming.

COURSE OBJECTIVES:

The objectives of offering this course are
1. To introduce basics of embedded system structure.
2. To give knowledge about ARM system architecture and study of on-chip peripherals
3. To impart knowledge of real time operating systems.
4. To introduce RTOS programming.

DESIRABLE AWARENESS/SKILLS:

Knowledge of microprocessor architecture and assembly language, microprocessor peripherals, digital design, and the C programming language.

COURSE OUTCOMES:

On the successful completion of this course student shall be;
1. Able to understand working of real time operating system.
2. Able to understand structure and working of embedded system.
3. Able to write programs for RTOS.

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr No.	Program Outcomes	Level of Operation
A	An ability to identify, formulate and solve engineering problems.	**3**
B	An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social political, ethical, health and safty, manufacturability and sustainability.	**2**
C	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	**3**

     1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Introduction to embedded systems: Embedded systems, processor embedded to a system, embedded hardware units and devices in a system, embedded software in a system, examples of embedded systems, embedded systems on chip (SOC) and use of VLSI circuit design technology, complex systems design and processors, design process in embedded system, formalization of system design, design process and design examples, classification of embedded systems.

Devices and Communication Buses for Device network: IO types and example, serial communication devices, parallel device ports, sophisticated interfacing features in device ports, wireless devices, timer and counting devices, watch dog timer, real time clock, networked embedded systems, serial bus communication protocols, parallel bus device protocols, internet enabled systems, wireless and mobile system protocols.

Device Drivers and Interrupt service Mechanism: Programmed I/O busy-wait approach without interrupt service mechanism, ISR concept, interrupt sources, interrupt servicing (handling) mechanism, multiple interrupts, context and the periods for context switching ,interrupt latency and deadline, classification of processors interrupt service mechanism from context saving angle, direct memory access, device driver programming.

Programming Concepts and Embedded Programming in C, C++ and JAVA: Softwareprogramming in assembly language and high level language 'C', C program elements: header and source files and preprocessor directives, program elements: embedded programming in C++, embedded programming in JAVA

Real Time Operating System: OS services, process management, timer function, event functions, memory management, device, file and I/O subsystem managements, Interrupt routines in RTOS environment and handling of interrupt source call, real time operating system, basic design using an RTOS, RTOS task scheduling models, interrupt latency and response of the tasks as performance matrix, OS security issues.

Embedded Software Development Process and Tools: Introduction to embedded software development process and tools, host and target machines, linking and locating software, getting embedded software into the target system, issues in hardware software design and co-design.

Testing, Simulation and Debugging Techniques and Tools: Testing on host machine, simulators, laboratory tools.

Text Book
1. Rajkamal - Embedded Systems- Architecture, Programming, and Design, Second Edition. TMH. ISBN-10: 0070151253

Reference Books:
2. Embedded systems software primer, David Simon Pearson ISBN:8177581546.
3. ARM System-on-Chip Architecture, Steve Furber, Pearson ISBN-10: 0201675196.
4. MicroC / OS-II, Indian Low Price Edition, Jean J Labrose - ISBN-10: 1578201039.
5. Embedded / real time system, DR.K.V.K.K. Prasad DreamtechISBN 10: 8177224611.
6. Embedded real systems Programming ,Iyer, Gupta TMH ISBN-13: 978-0136079675.
7. Embedded System Design ,Neuwans, Steve Heath ISBN-10: 0750655461.
8. ARM System Developers Guide , Andrew SlossISBN: 9781558608740.

CO453C ADVANCED DATABASE MANAGEMENT SYSTEM

Teaching Scheme: 03L+00T Total:03   **Credit:** 03
Evaluation Scheme:10 ISA+15 ISE I+15 ISE II+60 ESE   **Total Marks**:100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduce the student Advanced Database Management System (ADBMS), concepts of parallel and distributed databases, object oriented databases big data big data analytics, xml analysis, mining text and web and current trends in DBMS. This course also introduce the Object Oriented databases and Database architecture. This course equips students with fundamental knowledge and basic technical competence in the field of DBMS.

DESIRABLE AWARENESS/SKILLS:

Database Management System, Java programming, basic xml, OOT.

COURSE OBJECTIVE:

1. To learn and understand Database Modeling, Database Architectures.
2. To learn and understand Object Oriented Databases.
3. To learn and understand web database language, XML, JDOQL.
4. To learn NoSQL Databases (Open source) and big data analytics.
5. To learn Web data and mining.
6. To learn current trends in databases.

COURSE OUTCOMES:

1. Understanding of Advances in parallel and distributed Database for Big data.
2. Master the basics of web and object oriented database using XML and JDOQL.
3. Master the basic concepts of NoSQL Databases.
4. Understand how analytics and big data affect various functions now and in the future.
5. Appreciate the impact of analytics and big data on the information industry and the external ecosystem for analytical and data services.
6. Understanding of current trends in databases.

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to apply knowledge of mathematics, science, and engineering .	2
B	An ability to design and conduct experiments, as well as to analyze and interpret data .	2
C	An ability to identify, formulates, and solves engineering problems.	1

D	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENT:

Parallel And Distributed Databases
Parallel Database: Introduction, Architectures, Interquery and Intraquery Parallelism, Parallelism on Multicore processor, Parallel Query Optimization.
Distributed Database: Introduction, Data Storage, Distributed Transactions, Commit Protocol, Concurrency control, Distributed Recovery.

Object-Based Database And XML
Overview, Complex databases, structured data types, operations on structured and unstructured data. Encapsulation and ADTs.Inheritance, Objects, OIDs and Reference types, Database Design, ORDBMS Implementation challenges-Storage and Access methods, Query Optimization, ODMS-Object model. NOSQL object database-ObjectDB (JDO), JDO Data Model, XML Data Model, DOM, XQuery, Efficient evaluation of XML Queries.

Big Databases
Introduction to Big Data, NoSQL database system – Column based and key value based.
Column based Database (Cassandra) : Architecture, Managing data, Data Caching, Tuning, Data backup, Cassandra Query Language, CQL Data Model, Indexing.
Key Value based Database (DynamoDB) : Data Model, Operations, Data Access, Indexing.

Big Data Analytics: Introduction to data mining and analytics, Data Streams mining, Stream data management systems: Issues and solutions, Stream frequent pattern analysis, Stream classification, Stream cluster analysis, Graph based database, graph mining, Methods for Mining Frequent Sub graphs Mining Variant and Constrained Substructure Patterns, Social Network Analysis, Models of social network generation, mining on social network, Apache Flume NG - Microsoft StreamInsight as tools for Complex Event Processing (CEP) applications. Case Studies Big Data in E-Commerce and IT Energy Consumption, Social and Health Science.

Mining Text And Web: Text mining: Introduction, natural language processing and information extraction: An Introduction Text categorization methods.WebMining : Introduction, Web Contents and Usage, Data Modeling for Web Usage Mining, Mining Web linkage structures. Discovery and Analysis of Web Usage Patterns: Session and Visitor Analysis, Analysis of Sequential and Navigational patterns. Recommender Systems and Collaborative Filtering: The Recommendation Problem, Content Based Recommendation, Collaborative Filtering using K-Nearest Neighbor KNN and Association Rules, Matrix Factorization.

Current Trends In Advanced Databases
Deductive Databases: Introduction, Semantics, Fix point operator, Safe data log programmers, Least Model, Least fixed point, Query Processing, Query Evaluation, Prototypes, and Deductive Vs RDBMS. Multimedia Database, Cloud Databases, Spatial Databases, Temporal Databases.

Text Books

1. Raghu Ramkrishanan, Johannes Gehrke 4th Edition "Database Management Systems"
2. AviSilberschatz , Henry F. Korth , S. Sudarshan, "Database System Concepts, Sixth Edition", ISBN-13: 978-93-3290-138-4, MCGraw Hill

Reference Books

1. Shio Kumar Singh, Database Systems Concepts Design and Applications, ISBN- 978-81- 317-6092-5, Pearson
2. Mario Piattini, Oscar Diaz "Advanced Database Technology and Design"- online book.
3. J. Han, M. Kamber Data mining: concepts and techniques. Morgan Kaufmann.
4. Bing Liu, Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data, Springer.
5. Big Data Black Book, DT Editorial Services, Wiley-Dreamtech Press, ISBN- 9789351197577, May 2015.
6. http://nosql-database.org/

CO453D ADVANCED COMPUTER NETWORK

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03

Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100

Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course introduces data communication techniques and concept of advanced computer network. Provide knowledge of wireless networking. It also provides 802.11 framing and management operations. Provide concept of Contention-Free Service with the PCF and user authentication with 802.1X. To have a detailed knowledge about 802.11i, Ad Hoc Wireless Networks, Routing Protocols for Ad Hoc Wireless Networks 802.11i, Routing Protocols for Ad Hoc Wireless Networks, Wireless Sensor Networks.

DESIRABLE AWARENESS/SKILLS:

Data communication, Computer network technology, Cryptography and network security.

COURSE OBJECTIVES:

The objectives of offering this course are:

1. To learn overview of 802.11 wireless networking.
2. To learn frame format and management operations.
3. To understand concept of Contention-Free Service with the PCF and user authentication with 802.1X.
4. To learn various Routing Protocols for Ad Hoc Wireless Networks 802.11i.
5. To understand the concepts of Wireless Sensor Networks.

COURSE OUTCOMES:

On the successful completion of this course student shall be

1. Able to understand wireless Communication Methods.
2. Able to design wireless network
3. Able to design secure communication over the network.
4. Able to know in-depth knowledge of 802.11 wireless networking, Ad Hoc Wireless Networks, Wireless Sensor Networks.

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation.
A	An ability to design and conduct experiments, as well as to analyze and interpret data.	2
B	An ability to design a system, component, or process to meet desired	3

	needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	
C	An ability to identify, formulates, and solves engineering problems.	1
D	An ability to communicate effectively.	3
E	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	2

1 - Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT:

Wireless Networking, Overview of 802.11 Networks, 802.11 MAC Fundamentals: Introduction to wireless Networking: Why Wireless? What makes Wireless Network different? A Network by Any other name, Overview of 802.11 Networks: IEEE 802 Network Technology Family tree, 802.11 Nomenclature and design, 802.11 Network Operation, Mobility Support, 802.11 MAC Fundamentals: Challenges for the MAC, MAC Access Modes and Timing, Contention-Based Access Using the DCF, Fragmentation and Reassembly, Frame Format, Encapsulation of Higher-Layer Protocols Within 802.11,Contention-Based DataService, Frame Processing and Bridging.

802.11 Framing in Detail and Management Operations: 802.11 Framing in Detail: Data Frames, Control Frames, Management Frames, Frame Transmission and Association and Authentication States, Management Operations: Management Architecture, Scanning, Authentication, Pre-authentication, Association, Power Conservation, Timer Synchronization, Spectrum Management.

Contention-Free Service with the PCF, Wired Equivalent Privacy, User Authentication with 802.1X: Contention-Free Service with the PCF: Contention-Free Access Using the PCF, Detailed PCF Framing, Power Management and the PCF, Wired Equivalent Privacy (WEP): Cryptographic Background to WEP, WEP Cryptographic Operations, Problems with WEP, Dynamic WEP, User Authentication with 802.1X: The Extensible Authentication Protocol, EAP Methods, 802.1X: Network Port, Authentication, 802.1X on Wireless LANs.

802.11i, Ad Hoc Wireless Networks, Routing Protocols for Ad Hoc Wireless Networks 802.11i: Robust Security Networks, TKIP, and CCMP: The Temporal Key Integrity Protocol (TKIP), Counter Mode with CBC-MAC (CCMP), Robust Security Network (RSN) Operations, Ad Hoc Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet, Routing Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols.

Routing Protocols for Ad Hoc Wireless Networks, Wireless Sensor Networks: Routing Protocols for Ad Hoc Wireless Networks: Table-Driven Routing Protocols, On Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Power-Aware Routing Protocols, Wireless Sensor Networks: Introduction, Sensor Networks Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network.

Text Books:
 1. Matthew S. Gast, 802.11 Wireless Networks: The Definitive Guide, O'Reilly, 2nd Edition, 2005, ISBN-13:

978-0596100520.

2. C.Siva Ram Murthy, B.S. Manoj, Ad Hoc Wireless Networks: Architectures and Protocols, Pearson Education, 2004, ISBN 0-13-147023-X.

Reference Books:

1. Communication networks- Fundamental concepts and key architectures by Alberto, Leon Garcia, 2nd edition, TMH, 2004, ISBN- 9780070595019.

2. James F. Kurose, Computer Networking - A Top-Down Approach featuring the Internet, Pearson Education, 6th Edition, 2009, ISBN-13: 978-0132856201.

3. Nader. F. Mir, Computer and Communication Networks, Pearson Prentice Hall publishers, 2nd Edition, 2010, ISBN-13: 978-0-13-381474-3.

CO454A ADVANCED COMPUTER ARCHITECTURE

Teaching Scheme: 03L + 00T, Total: 03　　　　　　　　　　　　　　**Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE I +15 ISE II + 60 ESE　　　　**Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION:

This course is about the principles of computer design, instruction set design concepts, performance enhancements, new and alternative computer architectures, and the design and implementation of high performance computing systems. The module concentrates on the principles underlying systems organization, issues in computer system design, and contrasting implementations of modern systems. It equips you with the skills to undertake performance comparisons, improve the performance of applications, and develop applications to solve computationally intensive problems.

DESIRED AWARENESS/SKILLS: Computer Organization, Microprocessor and Microcontroller Interfacing

COURSE OBJECTIVE:

The objectives of offering this course are:
1. To understand the micro-architectural design of processors
2. To learn about the various techniques used to obtain performance improvement and power savings in current processors.
3. To undertake performance comparisons of modern and high performance computers.
4. To gain ability to improve the performance of applications on modern and high performance computers.
5. To be able to develop software to solve computationally intensive problems.

Course Outcomes:

On successful completion of this course student will be able to:
1. Describe the principles of computer design.
2. Classify instruction set architectures.
3. Describe the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors.
4. Compare the performance of different architectures.
5. Improve application performance for different cpu architectures.
6. Develop applications for high performance computing systems.

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation
A	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	2
B	A recognition of the need for, and an ability to engage in life long earning.	1

C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	3

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Overview of von Neumann architecture: Instruction set architecture; The Arithmetic and Logic Unit, The Control Unit, Memory and I/O devices and their interfacing to the CPU; Measuring and reporting performance; CISC and RISC processors.

Pipelining : Basic concepts of pipelining, data hazards, control hazards, and structural hazards; Techniques for overcoming or reducing the effects of various hazards.

Fundamentals of Quantitative Design and Analysis: Introduction, Classes of Computers, Defining Computer Architecture, Trends in Technology, Trends in Power and Energy in Integrated Circuits, Trends in Cost, Dependability, Measuring, Reporting, and Summarizing Performance, Quantitative Principles of Computer Design, Putting It All Together: Performance, Price, and Power

Memory Hierarchy Design: Introduction, Ten Advanced Optimizations of Cache Performance, Memory Technology and Optimizations, Protection: Virtual Memory and Virtual Machines, Crosscutting Issues: The Design of Memory Hierarchies, Putting It All Together: Memory Hierarchies in the ARM Cortex-A8 and Intel Core i7

Instruction-Level Parallelism and Its Exploitation: Instruction-Level Parallelism: Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch Costs with Advanced Branch Prediction, Overcoming Data Hazards with Dynamic Scheduling, Dynamic Scheduling: Examples and the Algorithm, Hardware-Based Speculation, Exploiting ILP Using Multiple Issue and Static Scheduling, Exploiting ILP Using Dynamic Scheduling, Multiple Issue, and Speculation, Advanced Techniques for Instruction Delivery and Speculation, Studies of the Limitations of ILP, Cross-Cutting Issues: ILP Approaches and the Memory System, Multithreading: Exploiting Thread-Level Parallelism to Improve Uniprocessor Throughput, Putting It All Together: The Intel Core i7 and ARM Cortex-A8, Fallacies and Pitfalls

Data-Level Parallelism in Vector, SIMD, and GPU Architectures: Introduction, Vector Architecture, SIMD Instruction Set Extensions for Multimedia, Graphics Processing Units, Detecting and Enhancing Loop-Level Parallelism, Crosscutting Issues, Putting It All Together: Mobile versus Server GPUs and Tesla versus Core i7, Fallacies and Pitfalls

Thread-Level Parallelism: Introduction, Centralized Shared-Memory Architectures, Performance of Symmetric Shared-Memory Multiprocessors, Distributed Shared-Memory and Directory-Based Coherence, Synchronization: The Basics, Models of Memory Consistency: An Introduction, Cross cutting Issues, Putting It All Together: Multicore Processors and Their Performance 400, Fallacies and Pitfalls

Warehouse-Scale Computers to Exploit Request-Level and Data-Level Parallelism: Introduction, Programming Models and Workloads for Warehouse-Scale Computers, Computer Architecture of Warehouse-Scale Computers, Physical Infrastructure and Costs of Warehouse-Scale Computers, Cloud Computing: The Return of Utility Computing, Crosscutting Issues, Putting It All Together: A Google Warehouse-Scale Computer, Fallacies and Pitfalls.

Text Books:
1. Computer Organization and Architecture: Designing for performance, W. Stallings, 4th Ed. PHI, 1996.
2. Computer Architecture: A Quantitative Approach, J. H. Hennessy and D. A. Patterson, 2nd Ed., Morgan

Kaufmann, 1996.

3. Advanced Computer Architecture: Parallelism, Scalability and Programmability, Kai Hwang, McGraw-Hill Inc, 1993.

References:

1. Parallel Computer Architecture: A Hardware/Software Approach, D. E. Culler, J. Pal Singh, and A. Gupta, HarcourtAsia Pte Ltd., 1999.

CO454B LINEAR ALGEBRA

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:
This course introduces concept of matrices, review of matrix algebra, vector space, Eigen values and Eigenvalues and eigenvectors of a linear operator, Optimization modelling and formulation of optimization problems.

DESIRABLE AWARENESS/SKILLS:
Engineering Mathematics, Discrete structure, Numerical Methods and Probability Theory.

COURSE OBJECTIVES:
The objectives of offering this course are
1. To learn the concept of Matrices, algebra of matrix and Gauss elimination method.
2. To know the concepts of vector space, subspaces, linear transformation, linear operators on R^n.
3. To learn the representation of square matrices,
4. To learn concept of Rank nullity theorem.
5. To know Eigenvalues and eigenvectors of a linear operator.
6. To understand the modelling and formulation of optimization problems.
7. To learn Linear programming and Simplex Algorithm (Big M and Two Phase Method).

COURSE OUTCOMES:
On the successful completion of this course student shall be
1. Able to understand the concept of Matrices, algebra of matrix and Gauss elimination method.
2. Able to apply vector space and subspace.
3. Able to learn concept of Rank nullity theorem.
4. Able to learn the representation of square matrices,
5. Able to know Eigenvalues and eigenvectors of a linear operator
6. Able to understand the modelling and formulation of optimization problems.
7. Able to learn Linear programming and Simplex Algorithm (Big M and Two Phase Method),

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to design and conduct experiments, as well as to analyze and interpret data.	3
B	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	3
C	An ability to identify, formulates, and solves engineering problems.	3
D	An ability to communicate effectively.	2

E	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	3

1 - Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT:

Matrix: Review of Matrix Algebra, Rank of matrix, Row reduced Echelon form, Determinants and their properties, Solution of the matrix Equation Ax = b, Gauss elimination method.

Vector Space, Subspaces Linear Dependence/Independence Basis, Dimension, Linear transformation, Range Space and Rank, Null Space and Nullity, Rank nullity theorem, Matrix Representation of a lineartransformation, Linear Operators on R^n and their representation as square matrices, Invertible linear operators, Inverse of a non-singular matrix.

Eigenvalues and eigenvectors of a linear operator, properties of eigenvalues and eigen vectors of Hermitian, skew-Hermitian, Unitary, and Normal matrices (including symmetric, skew-symmetric, and orthogonal matrices), Characteristic Equation, Bounds on eigenvalues,Cayley Hamilton theorem, Diagonalizability of a linear operator.

Inner Product Spaces, Norm, Orthonormal Sets, Gram Schmidt orthogonalisation process, projections and least squares approximation.

Optimization: Modeling and formulation of optimization problems, Least cost and Covex domain, Linear programming and Simplex Algorithm (Big M and Two Phase Method), Duality and the primal dual method.

Text Books:
1. Hoffman and Kunze, Linear Algebra, Prentice Hall of India, New Delhi
2. Gilbert Strang, Linear Algebra and Its Applications (Paperback), Nelson Engineering (2007)

Reference Books :
1 V. Krishnamoorthy et al, An introduction to linear algebra, Affiliated East West Press, New Delhi
P.G. Bhattacharya, S.K. Jain and S.R.
2. Nagpaul, First course in Linear Algebra, Wiley Eastern Ltd., New Delhi
3. K.B.Datta, Matrix and Linear Algebra, Prentice Hall of India, New Delhi

CO454C FUZZY LOGIC AND NEURAL NETWORK

Teaching Scheme: 03L + 00T, Total: 03 **Credit:** 03

Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE **Total Marks:** 100

Duration of ESE: 03Hrs

COURSE DESCRIPTION: This course describes basic introduction to development and implementation of neural networks and fuzzy logic. It includes neural versus conventional computing, learning processes, preceptor, backpropagation learning algorithm, recurrent networks, self-organization feature maps, applications, introduction to fuzzy theory, fuzzy logic, fuzzy logic in engineering.

DESIRABLE AWARENESS/SKILLS:A study of Artificial Intelligence

COURSE OBJECTIVES:

The objectives of offering this course are:

1. To expose the students to the concepts of feed forward neural networks.
2. To provide adequate knowledge about feedback neural networks.

3. To teach about the concept of fuzziness involved in various systems.

4. To provide adequate knowledge about fuzzy set theory.

5. To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic

and to design the fuzzy control using genetic algorithm.

6. To provide adequate knowledge of application of fuzzy logic control to real time

systems.

COURSE OUTCOMES:

On the successful completion of this course student shall be

1. Comprehend the concepts of feed forward neural networks.

2. Analyze the various feedback networks.

3. Understand the concept of fuzziness involved in various systems and fuzzy set theory.

4. Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy

Control.

5. Analyze the application of fuzzy logic control to real time systems.

RELEVANCE OF PO'S AND STRENGTH OF CORRELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to identify, formulate, and solve engineering problems.	3
B	An ability to use the techniques, skills, and modern engineering tools	2

	necessary for engineering practice.	
C	An ability to design and conduct experiments, as well as to analyze and interpret data.	1

1-Weakly correlated   **2–Moderately correlated**   **3–Strongly correlated**

COURSE CONTENTS:

Evolution of neural networks- artificial neural network, basic model, classification, feed forward and recurrent topologies, activation functions, learning algorithms- supervised, un-supervised and reinforcement, fundamentals of connectionist modeling- McCulloach – pits model, perceptron, adaline, madaline.

Topology of Multi-layer perceptron- back propagation learning algorithm, limitations of Multi-layer perceptron, radial basis function networks- topology, learning algorithm, Kohenen's self-organising network, topology, learning algorithm, bidirectional associative memory topology, learning algorithm, applications.

Recurrent neural networks: basic concepts, dynamics, architecture and training algorithms, applications, hopfield network, topology, learning algorithm, applications- industrial and commercial applications of Neural networks, semiconductor manufacturing processes, communication, process monitoring and optimal control, robotics, decision fusion and pattern recognition.

Classical and fuzzy sets: introduction, operations and properties, fuzzy relations- cardinality, operations and properties, equivalence and tolerance relation, value assignment, cosine amplitude and max-min method, fuzzification, membership value assignment, inference, rank ordering, angular fuzzy sets, defuzzification methods, fuzzy measures, fuzzy integrals, fuzziness and fuzzy resolution, possibility theory and fuzzy, arithmetic, composition and inference, considerations of fuzzy decision-making.

Basic structure and operation of Fuzzy logic control systems: design methodology and stability analysis of fuzzy control systems, applications of Fuzzy controllers, applications of fuzzy theory, applications of neural network, fuzzy logic, information retrieval systems, share market analysis, natural language processing.

Text Book:

1.   J.M.Zurda, "Introduction to Artificial Neural Networks", Jaico Publishing House

2.   S. Rajasekaran& G. A. V. Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms",

PHI.

Reference Books:

1.   Limin Fu, "Neural Networks in Computer Intelligence," McGraw Hill, 2003.

2.   Fakhreddine O. Karray and Clarence De Silva., "Soft Computing and Intelligent Systems Design, Theory,

Tools and Applications," Pearson Education, India, 2009.

3. Timothy J. Ross, "Fuzzy Logic with Engineering Applications," McGraw Hill,1995.

4. B.Yegnanarayana, "Artificial Neural Networks," PHI, India, 2006.

CO454D PROFESSIONAL ETHICS AND CYBER SECURITY

Teaching Scheme: 03L + 00T, Total: 03   **Credit:** 03
Evaluation Scheme: 10 ISA + 15 ISE1 +15 ISE2 + 60 ESE   **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION:

This course will introduce concepts of Professional and Philosophical Ethics amongst the students; it will summarize Cyber Crimes and its associated investigation and forensics with relation to Cyber law. Students will have a new dimension to look towards their day to day computer activities.

DESIRABLE AWARENESS/SKILLS:

Basic Computer and Internet, Finance and Management Information System

COURSE OBJECTIVES:

The objectives of offering this course are:

5. To make students familiar with the fundamental concepts of computer ethics
6. To develop the concepts in computer forensics
7. To give emphasis on how cyber security operations are carried out
8. To introduce the linkage between technology, law and ethics

COURSE OUTCOMES:

On the successful completion of this course; student shall be:

5. Apply Professional Ethics to solve Ethical Dilemma & identify their Professional Responsibilities
6. Examine Intellectual Property Rights in Cyber space and Summarize Cyber Forensics and its role in Cyber Laws
7. Evaluate Cyber Crimes and its severity, and measures for Incident detection and response.
8. Describe Scope, jurisdiction, offense and contraventions, powers of police, adjudication

RELEVANCE OF POS AND STRENGTH OF CO-RELATION:

Sr. No.	Program Outcomes	Level of Operation
A	An ability to apply knowledge of mathematics, science, and engineering.	2
B	An ability to identify, formulates, and solves engineering problems.	3
C	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3

1- Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENTS:

Computer and Philosophical ethics: Moral v/s Ethics, Why Computer Ethics, Philosophical Ethics: Distinguishing Descriptive and Normative Claims, Ethical Relativism, Utilitarianism, Deontological Theories, Rights, Virtue Ethics.

Professional Ethics: Why Professional Ethics, Characteristics of Professionals, The System of Professionals, is Computing a Profession, Professional Relationships, Code of Ethics and Professional Conduct, Steps in Ethical Decision Making

Ethics & Internet: Three Moral Significant Characteristics, Hacking & Hacker Ethics, Netiquette Intellectual property issues in cyberspace: Introduction to intellectual property Protections via Trade Secrets, Trademarks, and Patents. Contracting to protect intellectual property, Protection options - Encryption / PGP, copyright on web-content, Copyright on software, digital contracts, digital signatures

Data and Evidence Recovery- Introduction to Deleted File Recovery, Formatted Partition Recovery, Data Recovery Tools, Data Recovery Procedures and Ethics, Preserve and safely handle original media, Recover Internet Usage Data, Recover Swap Files/Temporary Files/Cache Files, Introduction to Encase Forensic Edition, Forensic Tool Kit (FTK), Use computer forensics software tools to cross validate findings in computer evidence-related cases.

Cyber Forensics Investigation- Introduction to Cyber Forensic Investigation, Investigation Tools,Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers, Recovering deleted evidences, Password Cracking

Cyber Security- Introduction to Cyber Security, Implementing Hardware Based Security, Software Based Firewalls, Security Standards, Assessing Threat Levels, Types of incidents, Stages of incident response Threats in cyberspace, Blended attacks, incident prevention and detection, Forming an Incident Response Team, Reporting Cyber crime, Operating System Attacks, Application Attacks, Reverse Engineering 34 &Cracking Techniques and Financial Frauds

Information technology Act 2000 :Scope, jurisdiction, offense and contraventions, powers of police, adjudication

Text Books:

1. Computers, Ethics, And Social Values, Johnson and Nissenbaum, 1994 Prentice Hall
2. Cyber security operations Handbook, John Rittinghouse,William Hancock 3. Computer ethics,
      Deborah G.Johnson, third edition, Pearson education

References:

1. Earnest A. Kallman, J.P Grillo, "Ethical Decision making and IT: An Introduction with Cases", McGraw Hill Pub.
2. John W. Rittinghouse, William M. Hancock, "Cyber security Operations Handbook", Elsevier Pub.
3. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", 2nd Edition,,CengageLearning Pub.

CO455 DISTRIBUTED OPERATING SYSTEM LAB

Teaching Scheme: 02P + 00T, Total: 02   **Credit:** 01
Evaluation Scheme: 25 ICA+25 ESE   **Total Marks:** 50
Duration of ESE: 03 Hrs

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover entire curriculum of course CO451. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output. Use of Open source tool/ technology is recommended for laboratory assignments.

Group A

1. Design a distributed application using RMI for remote computation where client submits two strings to the server and server returns the concatenation of the given strings
2. Design a distributed application using RPC for remote computation where client submits an integer value to the server and server calculates factorial and returns the result to the client program.
3. Design a Distributed Application using Message passing Interface for remote computation.
4. Write a program to simulate the Distributed Mutual Exclusion.
5. Design distributed application which consists of a server and client using threads.
6. To study the World Wide Web
7. To study MPI
8. To study Enterprise JavaBeans and Fractal.
9. To study Java RMI

Group B

1. Design and develop a distributed Hotel booking application using Java RMI.
   A distributed hotel booking system consists of the hotel server and the client machines. The server manages hotel rooms booking information. A customer can invoke the following operations at his machine
         i) Book the room for the specific guest
         ii) Cancel the booking of a guest
2. Implement distributed system using lock server
3. Design and develop a distributed application to find the coolest/hottest year from the available weather data. Use weather data from the Internet and process it using MapReduce.
4. Write a program to implement a Distributed chat server using TCP sockets.
5. Implement RPC mechanism for a file transfer across a network.
6. Write a code to implement sliding window protocol.
7. To study Squirrel
8. To study Coda
9. To study BitTorrent and End System Multicast.
10. To study Kerberos.

Text Books:

1. George Coulouris, Jean Dollimore, Tim Kindberg, & Gordon Blair, "Distributed Systems –
   Concept and Design", 5th Edition, Publisher: Pearson, ISBN – 978-13-214301-1
2. Randay Chow, Theodore Johnson, "Distributed Operating System and Algorithm Analysis",
   Publisher: Pearson (LPE). ISBN – 978-81-317-2859-8

Reference Books:
1. Distributed Computing, S.Mahajan and S.Shah, Oxford University Press.
2. Distributed Operating Systems Concepts and Design, Pradeep K.Sinha, PHI.
3. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, Tata McGraw-Hill
Edition.
4. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth
Edition, Pearson Education.
5. Distributed Systems, S.Ghosh, Chapman and Hall/CRC, Taylor & Francis Group, 2010.
6. Distributed Systems: Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson
Education.
7.. Distributed Operating Systems and Algorithm Analysis,R.Chow, T.Johnson,Pearson.
8. Distributed Operating Systems, A.S.Tanenbaum, Pearson Education NOTE:
9. Reliable Distributed Systems, K.P.Birman, Springer.

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NOTE:

ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

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CO456 DATA WAREHOUSING AND DATA MINING LAB

Teaching Scheme: 02P Total: 02   **Credit:** 01
Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks:** 50
Duration of ESE: 03 Hrs

Minimum 8 experiments (four from Group A and four from Group B) shall be performed to cover entire curriculum of course CO452. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A
1. Develop a program to construct a multidimensional data model (Star, Snowflake or Fact constellations)
2. Develop a program to implement data pre-processing techniques.
3. Develop a program to implement data integration techniques.
4. Implement Apriori algorithm for frequent item set.

Group B
1. Develop a program to implement data generalization and summarization techniques.
2. Develop a program to extract association mining rules.
3. Develop a program for classification of data.
4. Develop a program for implementing one of the clustering techniques.

NOTE:

ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO457A WEB SERVICES AND SOA LAB

Teaching Scheme: 02P Total: 02
Evaluation Scheme: 25 ICA + 25 ESE
Duration of ESE: 03 Hrs

Credit :01
Total Marks: 50

Minimum 8 experiments (four from Group A and four from Group B) shall be performed to cover entire curriculum of course CO453A. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A

1. Creation of web service for addition operation
2. Creation of web service client for finding factorial number
3. Login web service
4. Implementation of calculator and simple and compound interest calculation.
5. To develop student detail.
6. Invoke EJB components as web services.
7. EJB components for finding power value.
8. Invoking J2EE web service.

Group B

1. Develop at least 5 components such as Order Processing, Payment Processing, etc.,
2. Develop at least 5 components such as Order Processing, Payment Processing, etc., using EJB component technology.
3. Invoke any suitable components (such as .NET) as web services.
4. Invoke EJB components as web services.
6. Develop a J2EE client to access a web service.
7. Develop a client to access a J2EE web service.
8. Implementation of Orchestration with BPEL to Add Two Numbers

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NOTE:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO457B EMBEDDED SYSTEMS LAB

Teaching Scheme: 02P Total: 02   **Credit :**01

Evaluation Scheme: 25 ICA+25 ESE   **Total Marks:** 50

Duration of ESE: 03Hrs

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover entire curriculum of course 453B. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A

1. Writing basic C-programs for I/O operations.
2. Program to interface LCD.
3. Program to demonstrate I2C Protocol.
4. Program to demonstrate CAN Protocol.
5. Program to interface Keyboard and display key pressed on LCD.
6. Program to interface stepper motor.
7. Program to interface Graphics LCD.

Group B

1. Program to interface Touch Panel.
2. Program to implement AT commands and interface of GSM modem.
3. Interfacing 4 x 4 matrix keyboards and 16 x 2 character LCD display to microcontroller /Microprocessor and writing a program using RTOS for displaying a pressed key.
4. Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard LCD, LED etc. and porting it on microcontroller/ microprocessor.
5. Implement a semaphore for any given task switching using RTOS on microcontroller board.
6. Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.
7. Program for exploration of (Process creation, Thread creation) using Embedded Real Time Linux.

Text Books:

1. Dr. K.V.K.K. Prasad, "Embedded /Real-Time System: Concepts, Design & Programming", Dreamtech, Edition 2010.
2. Andrew. N. Sloss, DomnicSymes, Chris Wright, "ARM System Developer's Guide", Elsevier, edition 2004.

Reference Books:

1. KarimYaghmour , "Building Embedded Linux Systems**",** 2003 O'Reilly & Associates,
2. Rajkamal, "Embedded Sytems ", TMH.
3. David Simon, "Embedded systems software primer", Pearson
4. Steve Furber, "ARM System-on-Chip Architecture", Pearson
5. Iyer,Gupta, "Embedded real systems Programming", TMH

NOTE:

ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO457C ADVANCED DATABASE MANAGEMENT SYSTEM LAB

Teaching Scheme: 02P+00T Total:02   **Credit:** 01
Evaluation Scheme: 25 ICA+25 ESE   **Total Marks:**50
Duration of ESE: 03 Hrs

Minimum 10 experiments (5 from Group A and 5 from Group B) shall be performed to cover entire curriculum CO453C. The list given below is just a guideline. All assignments are to be implemented using open source technology only. Every assignment should include use of syntax, commands/Programs/ clauses used for performing assignment and printout of queries with proper comment and output. Use of Open source tool/ technology is recommended for laboratory assignments.

Group A

Group A practicals includes learning basics of Hadoop which is an open-source framework that allows to store and process big data in a distributed environment across clusters of computers using simple programming models.

1. Study Basics of Hadoop framework. Setup Hadoop environment on any flavour of Linux.
2. Study Hadoop Distributed File System (HDFS) and basic HDFS operations like starting HDFS, Listing Files in HDFS, inserting Data into HDFS, retrieving data from HDFS, closing HDFS etc.
3. Study Map-Reduce framework provided by Hadoop. Implement a program to the sample data using MapReduce framework.
4. Write codes for the mapper and the reducer in python or ruby or perl script to run it under Hadoop.
5. Setup of the Hadoop Multi-Node cluster on a distributed environment, add new node to this environment, remove a node from this environment.

Group B

1. Develop a database application to store and retrieve BLOB and CLOB databases.
2. Design of Object Relational Database System with the following

   Specifications:

   a. Object definition and creation. (with attributes & member function)

   b. Object table creation / manipulation (create, select, insert, update, delete)

3. Implementation of Distributed Database with help of Database links.
4. Performance Tuning in using Enterprise Manager & SQL tuning
   advisor tools.

5. Study the XML support in in any of the other DBMS such as Oracle 11g, MySQL etc. and implement the following :

a. Create an XML documents for the schema.

b. Transfer these XML documents into the One mini-seminar / presentation on topic assigned to each student independently.

Text Book

1. SQL and PL/SQL for Oracle 11g Black Book by Dr. P. S. Deshpande, DreamTech, 2011, ISBN-9788177229400.
2. Hadoop: The Definitive Guide, 3rd Edition Storage and Analysis at Internet Scale, Tom White,*3rd Edition,* O'Reilly Media, ISBN:978-1-4493-1152-0

Reference Books

1. Oracle 9i/10g The Complete Reference, Kevin Loney, George Koch, Tata McGraw Hill.
2. SQL Server – Black Book by Dalton Patrik, 1st Edition, DreamTech Press, 2007, ISBN-8 817722722X.

NOTE:

ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CO457D ADVANCED COMPUTER NETWORK LAB

Teaching Scheme: 02P Total: 02   **Credit:** 01

Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks:** 50

Duration of ESE: 03 Hrs

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover entire curriculum of course CO453. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output. Use of Open source tool/technology is recommended for laboratory assignments.

Group A
1. Setting up wireless network with and without infrastructure support.
2. Configuring Access Point with bridging mode (Point to Point and Point to Multi Point).
3. Configuring Routing between wired and wireless Networks.
4. Configuring Security in wireless network with and without infrastructure support.
5. At least 3 lab assignments based on above syllabus using any network simulator such as NS2, OPNET, OMNET, NetSim, NS3 etc.
6. Configuration of networking in Linux using ifconfig, route, bind, etc; configuration of firewall and masquerading in Linux; network trouble-shooting and performance monitoring using netstat, ping, tcpdump, etc.

Group B
1. Simulating a MANET using Network Simulator.
2. Simulating a WSN using Network Simulator.
3. Simulating Bluetooth Network with Network Simulator.
4. Design the SONET/SDH system.
5. Simulate the WiMax Network.
6. Capture and study the wireless frames that are exchanged between wireless host and the access point.
7. Set up the ZigBee Network and study a few protocols.

Text Books:
1. Matthew S. Gast, 802.11 Wireless Networks: The Definitive Guide, O'Reilly, 2nd Edition, 2005, ISBN-13: 978-0596100520.
2. C.Siva Ram Murthy, B.S. Manoj, Ad Hoc Wireless Networks: Architectures and Protocols, Pearson Education, 2004, ISBN 0-13-147023-X.

Reference Books:
1. Communication networks- Fundamental concepts and key architectures by Alberto, Leon Garcia, 2nd edition, TMH, 2004, ISBN- 9780070595019.
2. James F. Kurose, Computer Networking - A Top-Down Approach featuring the Internet, Pearson

Education, 6th Edition, 2009, ISBN-13: 978-0132856201.

3.   Nader. F. Mir, Computer and Communication Networks, Pearson Prentice Hall publishers, 2nd Edition, 2010, ISBN-13: 978-0-13-381474-3.

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NOTE:

ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Exam for this course shall be based on oral examination which covers content of syllabus and practical conducted, to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

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CO458 PROJECT PHASE - II

Teaching Scheme: 00L + 00T + 06 P, Total: 06   **Credit:** 04
Evaluation Scheme: 50 ICA +100 ESE   **Total Marks**: 150

COURSE DESCRIPTION:

The course explores the knowledge of design, experiment and analysis of the data. Thecourse develops ability to work on multidisciplinary teams, identify, formulate, andsolve engineering problems in view of economic, environmental and societal context.

COURSE OBJECTIVES:

The course objectives are:
1. To apply algorithmic strategies while solving problems.
2. To practice the process of solving the problem in a team.
3. To apply management principles and testing techniques
4. To select and use engineering fundamentals and modern IT tools.
5. Exposure to Learning and knowledge access techniques using Conferences, Journal papers and participation in research activities.
6. To encourage and expose students for participation in National/ International paper   presentation activities.

COURSE OUTCOMES:

After successful completion of this course, students will be able to:
1. Develop solutions for framed problem statement.
2. Test and analyze different modules of planned project and integrate them into a single module.
3. Implement hardware and/or software techniques for identified problem.
4. Prepare project report and deliver presentation.

RELEVANCE OF PO'S AND STRENGTH OF CORRELATION:

Sr.No.	Program Outcomes	Level of Operation
A	An ability to identify , formulate and solve engineering problems	2
B	An ability to design and conduct experiments as well as to analyze and interpret data.	3
C	An ability to function in multi-disciplinary teams.	3
D	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.	3

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

Guidelines for completing the Project:

1. Project phase-I work decided in VII semester shall be continued as Project in VIII semester.
2. Students should complete implementation of ideas given in synopsis/Abstract, so that project work should be completed before end of semester.
3. Project may involve fabrication, design, experimentation, data analysis within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability, and sustainability. The stage also includes testing, possible results and report writing.
4. Each student project group is required to maintain log book for documenting various activities of Project-II and submit group project report at the end of Semester-VIII in the form of Hard bound.

Guide lines for ICA :ICA shall be based on continuous evaluation of students performance throughout semester in project-II and report submitted by the students project group in the form Hard bound. Assessment of the project-II for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in following able.

Assessment of Project phase-II (ICA)

Title of the Project: _____

Name of the Guide: _____

Sr No.	Project Methodology/ Design/PCB/ hardware/ simulation/ programming (15M)	Progress Status (10M)	Attendence (5M)	Report Writing (5M)	Depth of Understanding (10M)	Depth of Understanding (15M)	Presentation (10 M)	Total (100 M)

Guide lines for ESE:-

1. In ESE the student may be asked for demonstration and questions on Project.
2. Evaluation will be based on answers given by students in oral examination.

CO459 INDUSTRIAL VISIT/INDUSTRIAL TRAINING

Teaching Scheme: 00 Total: 00   **Credit:** 01
Evaluation Scheme: 25 ICA+00 ESE   **Total Marks**: 25

COURSE DESCRIPTION: The course explores the knowledge of industry organization, new trends in manufacturing, maintenance and safety. The industrial visit provides the practical visualization of theoretical study of various engineering subjects.

COURSE OBJECTIVES:
1. To provide an excellent opportunity to interact with industries and know more about industrial environment.
2. To provide students an insight regarding internal working of companies.
3. To give them exposure to current work practices used in industry.
4. To prepare graduates to quickly become productive upon entering the workforce.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
1. Understand the subject to its core and its deeper practical experience in real field situation.
2. Apply prior acquired knowledge in problem solving.
3. Analyse a given engineering problem, identify an appropriate problem solving methodology, implement the methodology and propose a meaningful solution.

RELEVANCE OF PO'S AND STRENGTH OF CORRELATION:

Sr. No	Program Outcomes	level of Operation
A	The broad education necessary to understand the impact of engineering solutions in a global , economic, environmental, and societal context.	2
B	A recognition of the need for, and an ability to engage in lifelong learning.	2
C	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.	3

Guidelines for Industry visit:
1. Industry visits to minimum two industries shall be carried out by each student preferably or college shall arrange the industrial visit during the vacation period otherwise during the regular VIII semester.
2. The student should obtain appropriate certificates of visit from the concerned organizations just after the visits.
3. Every Student should submit Industrial Visit report individually at the end of Semester-VIII (Second Term of Final Year).
4. The report should contain information about the following points:
    a. The organization - activities of organization and administrative setup technical personnel and

their main duties.

    b. The project / industry brief description with sketches and salient technical information.

    c. The work / processes observed with specification of materials, products, equipment etc. and role of engineers in that organization.

    d. Suggestions (if any) for improvement in the working of those organizations.

5. The evaluation of the report of technical visits will be made by panel of three teachers appointed by Head of the department based on following points:

Guide lines for ICA: ICA shall be based on knowledge gain by student and Industrial Visit Report submitted by the student in the form of Thermal bound. Assessment of the Industrial Visit for award of ICA marks shall be done jointly by industrial visit coordinators departmental committee based on viva -voce as per the guidelines given in following table.

Sr.No.	Total	Depth of Understanding	Report writing	Name of Industry	Name of Student
	25	10	15		

CO460 INDUSTRIAL LECTURE

Teaching Scheme: 01TH Total: 01   **Credit:** 01

Evaluation Scheme: 25 ICA + 00 ESE   **Total Marks**: 25

Duration of ESE: 00 Hrs

COURSE DESCRIPTION: This course introduces institutes committed to creation and growth of technological knowledge of student. Also, it helps to bridge the gap between industry needs and the academic community.

COURSE OBJECTIVES:

The objectives of offering this course are:
1. To bridge the gap between industry needs and the academic community.
2. To develop ability of students as per expectations of the industrialists from the fresh engineers.
3. To make students familiar with industrial environment.
4. To communicate the industrial experience, attitudes, needs, and viewpoints of industrial experts to students.
5. To provide appropriate exposure to world of work.

COURSE OUTCOMES:

On the successful completion of this course students shall be able to:
1. Understand recent trends in technology.
2. Enhance the industry institute interaction.

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

Sr.No.	Program Outcomes	Level of Operation
A	An ability to function on multidisciplinary teams. An ability to identify, formulates, and solves engineering problems	3
B	An ability to identify, formulate, and solve engineering problems	2
C	A knowledge of contemporary issues.	2

1 - Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENT:

1. There shall be minimum 6 lectures of 60 -90 minutes duration by industry persons.
2. The lecture shall include presentation, informal discussions with students and faculty, and laboratory tours (if required).
3. Topics of Industrial Lectures shall be Technical in nature and should not be the specific part of the curriculum.
4. Typically speakers should:
    i. Their own career following (and sometimes including) university
    ii. Interesting jobs they've had or projects they've worked on

iii. What areas of work they're currently involved in
iv. The type of work graduates could expect
v. Current job opportunities that may be available
vi. Any suggestions for students with regard to job hunting / CV writing / interviews etc.

5. Course coordinator shall discuss with students on the content of lecture and may conduct oral or give written assignments to judge the depth of understanding of students.
6. Students shall submit the report based on minimum five lectures giving summary of the lecture delivered.
7. The summary should contain brief resume of the expert, brief information of his organization and brief summary of the lecture in the format provided by institute/department.

Industrial Lecture deliverables: An industrial lecture report as per the specified format (available on in the department and institutes website) and assignments given by course coordinator (if any).

NOTE: Evaluation of the course CO362 Industrial Lectures shall be done in VIIIth semester along with the course CO460 Industrial Lecture.

ICA-Internal Continuous Assessment shall support for regular performance of industrial lecture and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student based on lectures attended by him/her.

CO461 SELF STUDY-IV

Teaching Scheme: 00 Total: 00   **Credit:** 02
Evaluation Scheme: 50 ICA + 00 ESE   **Total Marks:** 50

Grade of course Self Study-IV shall be based on one test each conducted on 20% syllabus of four subjects – CO451, CO452,CO453, CO454, One faculty member should be appointed as course coordinator for the course 'Self Study' to compile the marks of all tests and enter into MIS.

The 20% syllabus for self - study shall be declared by subject teacher at the beginning of semester and he/she shall conduct the test examination for that course, assess answer papers of test examination and submit the marks to course coordinator.