

**GOVT. COLLEGE OF ENGINEERING,
AMRAVATI**



**B. TECH. (Information Technology)
VI SEMESTER Curriculum
Department of Information Technology**

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVTI.
Department of Information Technology
Scheme for B. Tech. (Information Technology)

SEM VI

Category	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme						Credits
							Theory			Practical			
			Theory hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	MSE	TA	ESE	ICA	ESE		
PCC	ITU621	Geo Spatial Technologies	3	--	-	3	30	10	60	---	---	100	3
PCC	ITU622	Artificial Intelligence	3	1	-	4	30	10	60	---	---	100	4
PEC	ITU623	Program Elective- II	3	---	-	3	30	10	60	---	---	100	3
PEC	ITU624	Program Elective- III	3	---	-	3	30	10	60	---	---	100	3
PCC	ITU625	Cloud Computing	3	--	-	3	30	10	60	---	---	100	3
OEC	ITU626	Open Elective-I	3	---	-	3	30	10	60	---	---	100	3
PCC -LC	ITU627	Geo Spatial Technologies Lab	-	---	2	2	---	--	---	25	25	50	1
PCC -LC	ITU628	Artificial Intelligence Lab	-	-	2	2	---	--	---	25	25	50	1
PCC -LC	ITU629	Web & Internet Technology Lab	-	---	4	4	---	--	---	25	25	50	2
PROJ	ITU630	Minor Project	-	---	6	6	---	--	---	50	50	100	3
	Total		18	1	14	33	180	60	360	125	125	850	26

TA :Teacher Assessment

CT: Class Tests

ESE: End Semester Examination

ICA :Internal Continuous Assessment

Program Elective- II ITU623

- A) Web Mining
- B) Parallel Programming
- C) Wireless & Mobile Computing

Program Elective- III ITU624

- A) Network Architecture and Wireless Protocols
- B) Software Project Management- Industry Perspective
- C) Distributed Computing

Government College of Engineering, Amravati

Department of Information Technology

Program Educational Objectives

PEO 1: To formulate, analyze and solve real life problems in software industry, research academia and society at large.

PEO 2: To provide opportunity to learn the latest trends in information technology and prepare for lifelong learning process.

PEO 3: To exhibit strong communication and interpersonal skills, broad knowledge, and global perspectives to work effectively and ethically in multidisciplinary teams.

Program Specific Outcomes

PSO 1: To develop technically sound human resource that shows inclination to pursue IT career in profession, research and higher education.

PSO 2: To exhibit the knowledge of algorithms, data structures /management, software design, information security, programming languages, computer organization and architecture and data science and analytics as a IT professional.

ITU621 GEOSPATIAL TECHNOLOGIES

Teaching Scheme : 03 L + 00T

Total 03

Credits : 03

Evaluation Scheme: 30MSE +10TA+ 60ESE

Total Marks: 100

Duration of ESE: 2Hrs.30min

Course Objectives:

At the end of course Students will be able to

- I. Understand basic, practical understanding of GIS concepts, techniques and real world applications.
- II. Explore on geo-referencing, projection systems, mapping, satellite data systems, and spatial data acquisition systems.
- III. Apply the spatial data analysis and visualise using GIS tools and softwares.
- IV. Develop the solve societal problems using Geo spatial technologies, tools and programming language like webGIS and MobileGIS.

Geographic Information Systems, Science and Study: Introduction: Why GIS, Science and Technology of problem solving, GIS Systems, GIS Science, GIS applications, GIS Components, Geographic data representation, Geographic data models: Raster and Vector data models.

Geo referencing and projection system: Early measurements, The Geoid, Measuring the Earth: latitude and Longitude, Map projection and coordinate System, Digitizing: Coordinate capture, coordinate transformation, GNSS basics, GNSS control points, Map Projections vs Transformation. Geo-referencing, satellite based positioning.

Data acquisition and assimilation: Data Sources: Aerial images, Satellite images, LiDAR , Digital data, remote sensing, Data acquisition methods: Field survey, Control survey, old records, Integration challenges in geospatial systems

Visualizing spatial data: Introduction to maps, visualizing process, cartographic toolbox, Maps types, Map scales, Map Generalization, Map boundaries, maps and cartography, Principles of map design, how to map: qualitative, quantitative, terrain elevation, time series, geo visualization, map stories.

Spatial Analysis: Introduction: what is spatial analysis? Selection and Classification, Proximity Functions and Buffering, Fundamental spatial analysis techniques such as overlay, extraction and interpolation, Raster analysis: Map Algebra, Local Functions, global Functions, terrain analysis.

Web GIS: Introduction to Web GIS, Introduction to Web GIS, Introduction to Mobile GIS, Scripting Languages for GIS.

Advances in GIS: Data Standards, Data Quality, Data Accuracy, Advances and Currents developments **Text Books:**

1. GIS Fundamentals_A First Text on Geographic Information Systems, Paul Bolstad– XanEdu(2016)/
2. Geographic information systems and science. , Longey, Good Child, Paul A., et al. ,John Wiley & Sons, 2005.
3. Principals of GIS, Otto Huisman. **Reference Books:**

1. Fundamentals of Geographic Information Systems, Michael N. DeMers, 4th edition. Hoboken, NJ: Wiley.
2. Concepts and techniques of geographic information systems, Lo, C.P., Yeung Albert, 2007, 2nd edition, Upper Saddle River, NJ: Pearson Prentice Hall.
3. Textbook of remote sensing and geographical information systems, Reddy, M. Anji Reddy, Hyderabad: BS Publications, 2008.
4. Geospatial Infrastructure ,Application and Technologies:India case Studies, Sarda, N.L., Acharya, P.S., Sen, Sumit (Eds.), 2019. **Course Outcomes:**

ITU621.1 Analyze spatial data, using GIS analysis tool

ITU621.2 Create maps, images and apps to communicate spatial data in a meaningful way to others

ITU621.3 Workplace competencies are strengthened as students apply the analytical and evaluative tools to GIS mapping and apps

ITU621.4 Explore mapped data & Relate GIS with remote sensing technologies

ITU621.5 Develop and manage geodatabases **CO-PO-PSO**

Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU621.1	3	2	0	0	2	0	3	0	0	2	0	0	0	2	
ITU621.2	0	2	3	2	0	0	0	0	0	0	0	0	0	3	
ITU621.3	3	1	1	2	2	2	3	2	9	0	0	0	0	3	
ITU621.4	1	0	2	0	0	1	0	0	2	3	2	2	2	2	
ITU621.5	2	0	0	0	0	3	0	1	2	0	2	3	2	2	

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

ITU622 ARTIFICIAL INTELLIGENCE

Teaching Scheme : 03 L + 01T Total 04

Evaluation Scheme: 30MSE + 10TA + 60ESE

Credits : 04

Total Marks: 100

Duration of ESE: 2Hrs.30min

Course Objectives:

- I. To gain a historical perspective of AI and its foundations
- II. To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- III. To investigate applications of AI techniques in intelligent agents, expert systems and other machine learning models.

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Processing.

Knowledge Representation & Reasoning : Syntax and semantics for propositional logic, Syntax and semantics for first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

[illegible]

ITU622.5	0	0	0	0	2	0	0	0	0	0	0	0	2	0	
0- Not correlated		1 - Weakly Correlated			2- Moderately Correlated					3- Strongly Correlated					

PROGRAM ELECTIVE-II ITU623 (A) WEB MINING

Teaching Scheme : 03 L + 00T

Total 03

Credits : 03

Evaluation Scheme: 30 MSE +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE : 2Hrs.30min

Course Objectives:

- I. To focus on a detailed overview of the data mining process and techniques, specifically those that are relevant to Web mining
- II. To Understand the basics of Information retrieval and Web search with special emphasis on web
- III. Crawling To appreciate the use of machine learning approaches for Web Content Mining
- IV. To understand the role of hyper links in web structure mining
- V. To appreciate the various aspects of web usage mining

Information Retrieval and Web Search: Basic Concepts of Information Retrieval, Information Retrieval Models, Relevance Feedback, Text and Web Page Pre-Processing, Inverted Index and Its Compression, Latent Semantic Indexing, Web Search, Meta-Search: Combining Multiple Rankings, Web Spamming.

Social Network Analysis: Co-Citation and Bibliographic Coupling, PageRank, HITS, Community Discovery, A Basic Crawler Algorithm, Implementation Issues, Universal Crawlers.

Opinion Mining and Sentiment Analysis: The Problem of Opinion Mining, Document Sentiment Classification, Sentence Subjectivity and Sentiment Classification, Opinion Lexicon Expansion, Aspect-Based Opinion Mining, Mining Comparative Opinions, Opinion Search and Retrieval, Opinion Spam Detection.

Web Usage Mining: Data Collection and Pre-Processing, Data Modeling for Web Usage Mining, Discovery and Analysis of Web Usage Patterns, Recommender Systems and Collaborative Filtering, Query Log Mining, Computational Advertising.

Web Content Mining: Supervised Learning, Naïve Bayesian Text Classification. Unsupervised Learning, Hierarchical Clustering, Partially Supervised Learning, Markov Models, Probability-Based Clustering, Evaluating Classification and Clustering.

Text Books:

1. Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data-Centric Systems and Applications), Bing Liu, Springer; 2nd Edition, 2009.
2. Web Mining and Social Networking: Techniques and Applications, Guandong Xu ,Yanchun Zhang, Lin Li, Springer; 1st Edition.2010

Reference Books:

1. Data Mining the Web: Uncovering Patterns in Web Content, Structure, and Usage, Zdravko Markov, Daniel T. Larose, John Wiley & Sons, Inc., 2007
2. Mining the Web: Discovering Knowledge from Hypertext Data, Soumen Chakrabarti, Morgan Kaufmann; edition 2002
3. Graph-Theoretic Techniques for Web Content Mining, Adam Schenker, World Scientific Pub Co Inc, 2005

Course Outcomes:

ITU623(A).1 Apply machine learning concepts to web content mining

ITU623(A).2 Implement Page Ranking algorithm and modify the algorithm for mining information

ITU623(A).3 Process data using the Map Reduce paradigm

ITU623(A).4 Design a system to harvest information available on the web to build recommender systems

ITU623(A).5 Analyze social media data using appropriate data/web mining **CO-PO-PSO**

Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU623(A).1	2	2	0	0	0	0	3	0	0	0	0	0	2	1	1
ITU623(A).2	2	3	3	2	2	0	1	0	0	1	0	0	2	2	2
ITU623(A).3	0	0	0	3	2	0	0	0	0	0	1	0	2	2	1
ITU623(A).4	0	0	0	2	1	2	2	1	1	1	0	1	2	2	3
ITU623(A).5	0	0	0	0	1	2	1	2	1	1	2	1	1	3	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

ITU623 (B) PARALLEL PROGRAMMING

Teaching Scheme: 03 L + 00T

Credits: 03

Evaluation Scheme: 30 MSE +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 02 Hrs. 30 min

Course Objectives:

- I. The course gives an overview of the architectures and communication networks employed in parallel computers.
- II. The course covers the foundations for development of efficient parallel algorithms, including examples from relatively simple numerical problems, sorting, and graph problems.
- III. This course is intended for students who are interested in learning how to take advantage of parallel and distributed computing.
- IV. The students use parallel computing in their research and enable them to write parallel code for their high-performance computing applications.

Introduction to Parallel Processing: Evolution of Computer Systems, Necessity of high performance, Constraints of conventional architecture Parallelism in Uni-processor Systems, Instruction and Thread Level Parallelism. Evolution of Parallel processors, Parallel Computer Structures, Future Trends. Instruction Set Architectures-classification, instruction formats, operations. Processor - Architectural Classification Schemes

Memory subsystems in parallel environment: Hierarchical Memory Structure: Interleaved memory - structure, performance. Virtual Memory - utilization, locality of reference, performance. Cache Memory - structure, performance, implementation, optimization **I/O subsystems in parallel environment:** I/O techniques- polling, interrupts, direct memory access. I/O channels, I/O processors - structures, bandwidth issues

Pipeline and Superscalar micro architecture: Pipelining: An Overlapped Parallelism, Principles and implementation of Pipelining. Classification of pipelining processors. Study and comparison of processors with and without pipelining. General pipelining reservation table. Instruction and Arithmetic Pipelining: Design aspects. Issues of designing Pipelined Processors: Pipelining hazards and resolving techniques, Data buffering techniques, Job sequencing and Collision detection. Data level parallelism: Vector processing . Superscalar Architecture.

SIMD Computer Organization: SIMD Array Processors: Masking and Data network mechanism, Inter PE Communication .Communication: SIMD Interconnection networks, Static Vs Dynamic Networks, Cube, hyper cube, Mesh Interconnection Network. Associative Array Processors. Parallel Algorithms for Array Processors: Matrix Multiplication algorithm, Sorting algorithm and their analysis. Performance Enhancement Methods of SIMD Array Processors

Multiprocessor, Multi-core, GPU Architectures: Functional Structures: Loosely and tightly coupled multiprocessors, Processor characteristics of multiprocessors, centralized and distributed shared memory architectures. Interconnection Networks: Time shared bus, Crossbar switch, Multiport Memory Model, Memory contention and arbitration techniques, Cache coherency. Exploiting Concurrency for Multiprocessing:Implementation issues of a program on multiprocessor system. Parallel Algorithms for Multiprocessors, Multiprocessor operating systems. Multi-core systems: Structure, performance. GPU based Architecture, CPU-GPU integration.

Text Books:

- 1 Computer Architecture: A Quantitative Approach (Third Edition), John Hennessy and David Patterson, Morgan Kaufmann Publishers, 2003.
- 2 Computer Architecture and Parallel Processing, Kai Hwang, Faye A. Briggs, McGraw- Hill international Edition.
- 3 Parallel Computer Architecture, D. E. Culler and J. P. Singh with A. Gupta, Morgan Cuffman 1st Edition ,1998.

Reference Books:

- 1 Parallel Computers, V.Rajaraman, L Sivaram Murthy, PHI.
- 2 High performance computer Architecture, Harrold Stone.
- 3 Advanced Computer Architecture, Richard Y. Kain.
- 4 Advanced Computer Architecture, Kai Hwang, Tata McGraw-Hill.

Course Outcomes:

Students will be able to -

ITU623(B).1. Describe different ways of achieving parallelism and different parallel computer systems.

- ITU623(B).2. Design Memory and Input/output subsystems in Uniprocessor and Multiprocessor environment considering the performance issues influencing its design.
- ITU623(B).3. Analyze the organization and operation of different parallel computer architectures such as Pipelined processor, SIMD Array processor, Multiprocessor and Multi- core systems, superscalar processor & GPU based architectures.
- ITU623(B).4. Demonstrate the parallel hardware constructs and operating system support for parallel computing.

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU623(B).1	3	2	0	0	2	0	3	0	0	0	0	0	0	3	
ITU623(B).2	0	2	3	2	0	0	0	0	0	0	0	0	0	3	
ITU623(B).3	0	1	1	2	2	3	3	2	3	0	0	0	0	3	
ITU623(B).4	1	0	0	0	0	0	0	0	2	3	2	2	2	2	

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

ITU623(C) WIRELESS & MOBILE COMPUTING

Teaching Scheme : 03 L + 00T

Total 03

Credits : 03

Evaluation Scheme: 30MSE +10TA+ 60ESE

Total Marks: 100

Duration of ESE: 2Hrs.30min

Course Objectives:

- I. To demonstrate the fundamentals of wireless technology.
- II. To apply the layered protocols and fundamentals for the design of wireless.
- III. To analyze and apply resource optimization techniques for better performance
- IV. To apply the working of different wireless networks.
- V. To demonstrate knowledge of the mobile network.

Introduction: History of wireless communication , Frequency spectrum, Applications

Wireless Transmission: Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, modulation, Spread spectrum, Cellular systems.

Medium Access Control: Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals, multiplexing techniques.

Wireless LAN: Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development; Brief Overview of HIPERLAN, Bluetooth.

Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunnelling and Encapsulation, Optimizations, Reverse tunnelling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics.

Mobile Transport Layer: Traditional TCP, indirect TCP, Snooping TCP, Fast retransmit/fast recovery, transmission/time out freezing, selective retransmission, transaction oriented TCP.
Support for Mobility: File system , World Wide Web, Wireless application protocol.

Text Books:

1. Mobile communications, Jochen Schiller, Addison wesley, Pearson education, 2nd Edition, 2002.

Reference Books:

1. Wireless Communications and Networks, William Stallings, Prentice Hall, 2nd edition, 2005.
2. Wireless Communications Principles and Practices, Rappaport, 2nd Edition, Pearson Education Pvt. Ltd, 2003.

Course Outcomes:

On completion of the course, student will be able to:

ITU623(C).1. Demonstrate the fundamentals of wireless technology.

ITU623(C).2. Apply the layered protocols and fundamentals for the design of wireless communication.

ITU623(C).3. Analyze and apply resource optimization techniques for better performance.

ITU623(C).4. Apply the working of different wireless networks.

ITU623(C).5. Demonstrate knowledge of the mobile network.

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU623(C).1	3	0	0	0	0	2	0	0	0	0	0	0	3	2	
ITU623(C).2	2	3	0	0	0	1	0	0	0	0	0	0	3	3	
ITU623(C).3	1	0	3	0	2	0	0	0	0	0	0	0	2	3	
ITU623(C).4	0	1	0	3	3	3	0	0	0	0	0	0	2	2	
ITU623(C).5	0	2	0	0	0	2	0	3	0	0	0	0	2	2	

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

PROGRAM ELECTIVE-III ITU 624 (A) NETWORK ARCHITECTURE AND WIRELESS PROTOCOLS

Teaching Scheme: 03 L+00T

Total:03

Credits: 03

Evaluation Scheme: 30 MSE+10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. To understand the network addressing.
- II. To explain the functions of the routing protocols.
- III. To identify the elements of wireless networks and its functioning.
- IV. To impart the knowledge of mobile Internet protocols.

Network Layer – Addressing: Network layer services, IPv4, Problems with IPv4, strategies to bridge the limitations (IP subnetting, CIDR, DHCP, NAT), Network design with CIDR, IPv6.

Network Layer Protocols: Routing algorithms: Unicast protocols: RIP, OSPF, BGP and multicast routing protocols, ICMP, IGMP, DHCP

Transport Layer Protocols: Services, Transport layer protocols, UDP, TCP: State Transition diagram, flow control, error control, TCP Timers, Queuing disciplines, TCP Congestion control, Quality of Service

Wireless Networks and Protocols: Link Layer: IEEE 802.11 WLAN protocols, CSMA/CA, Wireless Application Protocol, Routing Protocols & Location Awareness Strategies in Wireless Networks, Resource Allocation and management in Wireless Networks, TCP over wireless network.

Mobile IP: Mobile IPv4 and Mobile IPv6. Problems with routing, Quality of Service and security

Applications: Traditional Applications (WWW, HTTP, FTP, Email, Telnet, SSH, DNS), Peer-to-Peer Networks, Socket programming.

Text Books:

1. Computer Networks, A Top-Down Approach, B. A. Forouzan and Firouz Mosharraf, Tata McGraw-Hill, 2012 ISBN-13: 978-0-07-337622-6
2. IPv6: Theory, Protocol, and Practice, Pete Loshin, Elsevier, 2004 ISBN: 9780080495873.
3. TCP/IP and Network Security: Attacks and Defense Mechanisms with Open Source Tools, Dr. B. B. Meshram, K. A. Shirsath, Shroff Publishers, 2017.

Reference Books:

1. Wireless Communications and Networking, Morgan Kaufmann, Vijay K Garg, 2008 ISBN: 978-0-12-373580-5.
2. Computer Networks: A Systems Approach, Larry L Peterson and B S Davie, Elsevier, 2012 ISBN 9780123850591.
3. TCP/IP Illustrated, W. Richard Stevens, Vol. 1: The Protocols, 2nd Edition, Pearson, 2012, ISBN-10: 0-321-33631-3.
4. Data Communications and Networking, B. A. Forouzan, 4th Edition, Tata McGrawHill, 2010, ISBN-13: 978-0-07-337622-6.

Course Outcomes:

At the end of this course students will demonstrate the ability to:

- ITU624(A).1. Describes fundamental concepts of computer networking and functionality of layered network architecture
- ITU624(A).2. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
- ITU624(A).3. Describe wireless and mobile networking concepts.
- ITU624(A).4. Apply networking concepts to various situations, classifying networks, analyzing performance and implementing new technologies.

CO-PO-PSO Mapping:

CO	PO / PSO
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU624(A).1	2	2	0	0	3	0	0	0	0	0	0	0	0	3	
ITU624(A).2	2	2	1	0	3	2	0	1	0	0	0	0	0	3	
ITU624(A).3	2	3	0	1	3	1	0	0	0	0	0	0	0	3	
ITU624(A).4	2	3	2	1	3	2	0	1	0	0	0	0	1	2	

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

ITU624 (B) SOFTWARE PROJECT MANAGEMENT- INDUSTRY PERSPECTIVE

Teaching Scheme: 03 L + 00T

Total: 03

Credits : 03

Evaluation Scheme: 30 MSE +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 02 Hrs. 30 min

Course Objectives:

To expose the students to the following:

- I. To introduce advanced principles, methods and tools for software project management in a realistic engineering context.
- II. Improve students' ability to manage complex product and system development projects.
- III. To imbibe a sense of role of IT in addressing the issues of real-life problems.
- IV. To introduce a systemic environment of team-work and influential leadership.
- V. To give students an appreciation of inter and intra-company cross-functional coordination necessary to deliver successful projects.

Introduction: Software Project Management in a perspective of software industry, Organization and management of large software projects, Modernizing project management: Introducing agile project management.

The communication in project: Managing Team Dynamics and Communication, Organization and team structures, choosing the right project team members, Influential leadership: concept and understanding, Ethics for IT professionals and IT users.

Project Planning and Project Scheduling: Project monitoring and control.

Software project evaluation and program management: Risk management and software quality, software reliability.

The impact of IT: on the quality of human life, standards of human living and productivity, health care, education, agriculture, environmental factors, digital divide, mobile and internet, case studies on various topics. **Text Books:**

1. Software Engineering: A Practitioner's Approach (Sixth Edition) Roger Pressman (TMH)
2. Software Engineering (Ninth Edition) Ian Sommerville (Pearson Education)
3. Pankaj Jalote, An integrated approach to Software Engineering, Springer/Narosa
4. Rajib Mall, Fundamentals of Software Engineering, Prentice Hall India

Reference Books:

1. Schaum's Outline of Software Engineering by David Gustafson (Tata Mc. Hill)
2. Software Project Management Sanjay Mohapatra (Cengage Learning India Pvt Ltd)
3. Ethics in information Technology, George Reynolds, Cengage Learning

4. A Gift of Fire: Social, Legal and Ethical Issues, for Computing and the Internet, Sara Baase, PHI Publications.

Course Outcomes:

- ITU624(B).1. Able to use the concepts of SPM to find solutions to general problems of the world.
- ITU624(B).2. Apply methodically the skills learned during the course to actual circumstances of problem understanding and software development.
- ITU624(B).3. Create in themselves abilities of thoughtful managers and team members through augmented understanding of the intricacies of software project management with inter, multi and cross-disciplinary approach.
- ITU624(B).4. Understand the distinctive challenges integral in planning, executing and monitoring projects, which provide quality results for their stake-holders.

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU624(B).1	1	2	1	1	2	2	2	0	2	0	0	0	2	2	
ITU624(B).2	1	3	2	2	2	0	0	0	0	0	0	0	2	2	
ITU624(B).3	0	0	0	2	1	3	2	2	3	2	2	1	2	3	
ITU624(B).4	1	0	0	0	0	3	2	1	2	2	3	2	2	3	

0- Not correlated 1- Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

ITU624 (C) DISTRIBUTED COMPUTING

Teaching Scheme: 03 L+ 00T

Total 03

Credits: 03

Evaluation Scheme: 30 MSE +10 TA+ 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30min.

Course Objectives:

- I. To expose students to both the abstraction and details of distributed file systems.
- II. To introduce concepts related to distributed computing systems.
- III. To focus on performance and flexibility issues related to systems design decisions.
- IV. To expose students to details of message passing system and remote procedure call in distributed systems.
- V. To expose students to current literature in distributed systems.

Distributed Computing System: DCS models, Distributed systems architecture, Distributed Operating Systems: Definition, Design Issues, Introduction to Distributed Computing Environment, Key characteristics, resource sharing, openness concurrency, scalability, fault tolerance, transparency.

Distributed Systems Models: Client-Server model, Thin Client, Mobile Devices, Software agents. Fundamental models: Interaction, Failure and Security models.

Message passing : Desirable features of a Good Message Passing System, Issue in IPC by message passing Synchronization, Buffering, Multi datagram messages, encoding and decoding of message data, process addressing, failure handling, Group Communication, case study 4.3 BSD UNIX IPC mechanism.

Remote Procedure Call :RPC Model, Transparency of RPC, Implementing RPC mechanism, RPC messages, Marshaling arguments and results, Server management, Parameter passing semantics, Call semantics, Communication protocols for RPC, Client Server binding, Exception handling, Security, RPC in heterogeneous environments, Optimization for better performance.

Distributed Shared Memory: General architecture of DSM system, Design and Implementation, issues of DSM, Granularity, Structure of shared memory space, Consistency models, Replacement strategy, Thrashing, Other approaches to DSM, Advantages of distributed shared memory.

Synchronization: Clock Synchronization, Event Ordering, Mutual Exclusion, Deadlock, Election Algorithms. Resource Management: Features of Global Scheduling Algorithm, Task Assignment Approach, Load Sharing Approach.

Distributed File System : Desirable features of good Distributed file system, file models, File Accessing, Sharing, Caching methods, File replication, Fault tolerance, Atomic transactions, Design principles.

Case study: CORBA.

Text Books :

1. Distributed Operation System, Concepts and Design, P.K. Sinha, 2nd Edition, IEEE Press, Prentice Hall India,1998.
2. Distributed Systems Concepts and Design ,George Coulouris, Jean Dollimore, and Tim Kindberg, 3rd Edition., Addison Wesley, 2002

Reference Books:

1. Distributed Operating System ,A. S. Tanenbaum , 2nd Edition, Prentice Hall India ,2002.

Course Outcomes:

ITU624(C).1. Identify the issues in designing distributed operating system.

ITU624(C).2. Identify the desirable features of good message passing system and issues in designing inter process communication system by message passing.

ITU624(C).3. Design and develop distributed programs using RPC.

ITU624(C).4. Identify the issues of distributed shared memory system.

ITU624(C).5. Analyze different algorithms and techniques for the synchronization.

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU624(C).1	3	2	0	0	2	0	0	0	0	0	0	0	0	2	
ITU624(C).2	2	2	0	0	3	0	0	0	0	0	0	0	0	2	
ITU624(C).3	2	2	2	2	2	0	1	0	0	0	0	0	0	2	
ITU624(C).4	2	2	2	2	3	0	0	1	0	0	0	0	0	2	
ITU624(C).5	2	2	2	2	3	0	0	0	0	0	3	0	0	2	

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

ITU625 CLOUD COMPUTING

Teaching Scheme : 03 L + 00T

Total 03

Credits : 03

Evaluation Scheme: 30MSE +10TA+ 60ESE

Total Marks: 100

Duration of ESE: 2Hrs.30min

Course Objectives:

- I. To understand the concepts of Cloud Computing.
- II. To learn Taxonomy of Virtualization Techniques.
- III. To learn Cloud Computing Architecture.
- IV. To acquire knowledge on Aneka Cloud Application Platform. V. To learn Industry Cloud Platforms.

Introduction to Cloud: Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model. Characteristics and Benefits, Challenges Ahead, Historical Developments.

Virtualization: Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization and Cloud computing, Pros and Cons of Virtualization, Technology Examples- VMware and Microsoft Hyper-V.

Before the Move into the Cloud: Know Your Software Licenses, The Shift to a Cloud Cost Model, Service Levels for Cloud Applications

Cloud Computing Architecture : Introduction, Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Interoperability and Standards, Scalability and Fault Tolerance. **Ready for the Cloud:** Web Application Design, Machine Image Design, Privacy Design, Database Management, Data Security, Network Security, Host Security, Compromise Response. **Defining the Clouds for Enterprise:** Storage as a service, Database as a service, Process as a service, Information as a service, Integration as a service and Testing as a service. Scaling a cloud infrastructure - Capacity Planning, Cloud Scale. Disaster Recovery: Disaster Recovery Planning, Disasters in the Cloud, Disaster Management.

Aneka: Cloud Application Platform Framework Overview, Anatomy of the Aneka Container, From the Ground Up: Platform Abstraction Layer, Fabric Services, Foundation Services, Application Services, Building Aneka Clouds, Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode, Cloud Programming and Management, Aneka SDK, Management Tools.

Cloud Applications: Scientific Applications – Health care, Geoscience and Biology. Business and Consumer Applications- CRM and ERP, Social Networking, Media Applications and Multiplayer Online Gaming.

Cloud Platforms in Industry: Amazon Web Services- Compute Services, Storage Services, Communication Services and Additional Services. Google AppEngine-Architecture and Core Concepts, Application Life-Cycle, cost model. Microsoft Azure- Azure Core Concepts, SQL Azure.

Text Books:

1. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi from TMH 2013.
2. Cloud Application Architectures, George Reese ,First Edition, O'Reilly Media 2009.

Reference Books:

1. Cloud Computing and SOA Convergence in Your Enterprise A Step-by-Step Guide , David S. Linthicum, Pearson 2010.
2. Cloud Computing, Dr. Kumar Saurabh, 2 nd Edition, Wiley India 2012.
3. Cloud Computing, web based Applications that change the way you work and collaborate Online, Micheal Miller.Pearson Education.

Course Outcomes:

After successful completion of this course, student will be able to

ITU625.1. Understand the concept of virtualization and how this has enabled the development of Cloud Computing

ITU625.2. Know the fundamentals of cloud, cloud Architectures and types of services in cloud

ITU625.3. Understand scaling, cloud security and disaster management

ITU625.4. Design different Applications in cloud

ITU625.5. Explore some important cloud computing driven commercial systems

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU625.1	3	0	0	0	0	2	0	1	0	0	0	0	0	2	
ITU625.2	2	2	0	0	0	2	0	0	0	0	0	0	0	3	
ITU625.3	2	0	3	0	2	0	0	2	0	0	0	0	0	3	
ITU625.4	0	3	0	0	3	3	0	0	0	0	0	0	0	2	
ITU625.5	0	2	0	0	2	2	0	3	0	0	0	0	0	2	

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

OPEN ELECTIVE-I ITU626 (A) COMPUTER ORIENTED OPERATION RESEARCH

Teaching Scheme : 03 L+ 00T

Total: 03

Credits : 03

Evaluation Scheme : 30 MSE +10 TA+ 60 ESE

Total Marks :100

Duration of ESE: 2hrs.30min.

Course Objectives:

Students will learn to

- I. Formulate a real-world problem as a mathematical programming model
- II. Understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand
- III. Understand the meaning, purpose, and tools of Operations Research
- IV. Solve specialized linear programming problems like the transportation and assignment problems
- V. Solve network models like the shortest path, minimum spanning tree, and maximum flow

[illegible]

ITU626(A).5	2	2	0	0	3	0	0	0	0	0	3	0	0	2	
0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated															

ITU626 (B) INTRODUCTION TO DATA STRUCTURES

Teaching Scheme : 03 L + 00T

Total 03

Credits : 03

Evaluation Scheme: 30MSE +10TA+ 60ESE

Total Marks: 100

Duration of ESE: 2Hrs.30min

Course Objectives:

- I. To impart the basic concepts of data structures and algorithms
- II. To understand basic concepts about stacks, queues, lists, trees and graphs
- III. To understand concepts about searching and sorting techniques

Introduction to data structure and Algorithms: Performance analysis of Algorithm, time complexity, Asymptotic Notation-Big O, Omega, and Theta notations, Elementary data organization, data structure operations. Arrays:- Operation on arrays, representation of arrays in memory. Single dimensional and multidimensional arrays, sparse matrices.

Stack, Queue and Linked List: Singly and doubly linked list, operations on Linked Lists and implementations. Stack operation, Array representation of stacks, Operation associated with stacks, Application of stacks, Recursion, Polish expression, Representation Queue, operation on Queue, Priority Queue

Trees : Basic terminology, Binary Trees, Binary tree representation, Algebraic/expressions, Complete Binary Trees, Extended binary tree, representing binary trees in memory, linked representation of Binary trees, Traversing binary trees & Searching in binary trees, Inserting in binary search trees, Complexity of searching algorithm, Heaps, general trees, Threaded binary tree. Introduction to B tree and B+ tree

Graphs and their applications: Introduction, Graph Theory Terminology, Sequential Representation of Graphs; Adjacency Matrix, Path Matrix, Shortest Paths, Linked Representation of a Graph, Operation on Graphs, Traversing a Graph. Topological Sorting.

Searching and Sorting: Linear search, binary Search, Internal and External sorting, Bubble sorting, selection sort, Insertion sort, quick sort, Two way merge sort, Heap sort, sorting on different keys. Introduction to hashing.

Text Book:

1. DataStructures ,Trembley and Sorenson 3rd Edition, Tata McGraw Hill,1986.

Reference Book:

1. Theory and Problems of Data Structures, S. Lipschutz, SCHAUM'S OUTLINE SERIES, 2nd edition, Tata McGraw Hill,1986.
2. Data Structures, Horowitz and Sahni 2nd Edition, Galgotia Publication, 1992 **Useful**

link:

<http://nptel.ac.in/courses/106106130/>, IIT Madras

<http://nptel.ac.in/courses/106103069/>, IIT Guwahati

<http://nptel.ac.in/courses/106106127/>, Prof. Shankar Balachandran, IIT Madras **Course**

Outcomes:

ITU626(B).1 For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity.

ITU626(B).2 For a given problem student will able to apply the concepts of Arrays,Stacks, Queues and linked list

ITU626(B).3 Student will able to understand concepts of Graph and traversal algorithms

ITU626(B).4 Student will able to summarize searching and sorting techniques

ITU626(B).5 Student will able to apply the concepts of Trees search and traversal algorithms

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU626(B).1	3	0	0	0	0	0	0	0	1	0	0	0	0	0	
ITU626(B).2	3	2	0	0	0	0	0	0	1	0	0	0	0	0	
ITU626(B).3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	
ITU626(B).4	3	0	0	0	0	0	0	0	1	0	0	0	0	0	
ITU626(B).5	3	0	0	0	0	0	0	0	1	0	0	0	0	0	

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

ITU627 GEOSPATIAL TECHNOLOGIES LAB

Teaching Scheme : 02 P

Total 02

Credits : 01

Evaluation Scheme: 25 ICA +25 ESE

Total Marks: 50

Duration of ESE: 3Hrs

Course Objectives:

- I. To understand basic practical understanding of GIS concepts.
- II. To apply spatial data analysis and visualize using GIS tools and software.
- III. Develop and solve societal problems using Geo spatial technologies and programming languages like webGIS and MobileGIS.

Minimum Eight Experiments to be performed to achieve course outcomes.

It is a representative list of practical/exercises. The instructor may choose experiments to fulfill the course outcomes.

List of Experiments:

1. Understanding QGIS and other GIS mapping tools.
2. Working with QGIS.
3. Creating digital maps using geospatial objects.
4. Understanding digital data,data collection techniques and various data formats.
5. Importing various data formats to QGIS to build map and features.
6. Working with basics of spatial data analysis.
7. Working with multipal layers of digital maps and complex query analysis.
8. Developing web pages for webGIS.
9. Working with scripting languages for dynamic webGIS contents.
10. Accessing webGIS/Mobile through private/public hosting infrastructure using GeoNode. ICA – The Internal Continuous Assessment shall be based on practical record

and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions. **Course Outcomes:**

Students will be able to

ITU627.1. Understand basic practical understanding of GIS concepts.

ITU627.2. Apply spatial data analysis and visualize using GIS tools and software.

ITU627.3. Develop and solve societal problems using Geo spatial technologies and programming languages like webGIS and MobileGIS.

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU627.1	3	2	0	0	2	0	0	0	0	0	0	0	0	2	
ITU627.2	0	2	3	1	0	0	0	0	0	0	0	0	2	2	
ITU627.3	0	2	2	1	3	0	0	0	0	0	0	0	0	3	

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

ITU628 ARTIFICIAL INTELLIGENCE LAB

Teaching Scheme : 02 P

Total 02

Credits : 01

Evaluation Scheme: 25 ICA +25 ESE

Total Marks: 50

Duration of ESE: 3Hrs

Course Objectives:

- I. To develop skills for designing and analyzing AI based algorithms.
- II. To enable students to work on various AI tools.
- III. To provide skills to work towards solution of real life problems

Minimum Eight Experiments to be performed to achieve course outcomes.

It is a representative list of practical/exercises. The instructor may choose experiments to fulfill the course outcomes.

List of Experiments:

1. Installation and working on various AI tools like: Python, R tool, GATE, etc.
2. Data preprocessing and annotation.
3. Learn existing datasets and Treebanks.
4. Searching techniques in AI.
5. Classification of linearly separable data with a perceptron
6. Classification of a 4-class problem with a perceptron
7. AI with Python – Supervised Learning: Classification
8. Support Vector Machines (SVM) Classifier.
9. Back propagation Algorithm
10. Case Study

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

Course Outcomes:

ITU628.1. Elicit, analyze and specify software requirements.

ITU628.2. Simulate given problem scenario and analyze its performance.

ITU628.3. Develop programming solutions for given problem scenario.

ITU628.4. Apply AI based algorithms to solve real life problems.

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU628.1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	
ITU628.2	3	0	0	0	3	0	0	0	0	0	0	0	2	0	
ITU628.3	0	3	0	3	3	0	0	0	0	0	0	0	0	0	
ITU628.4	0	0	0	0	3	0	0	0	0	0	0	0	0	3	

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

ITU 629 WEB & INTERNET TECHNOLOGY LAB

Teaching Scheme : 04 P

Total 04

Credits : 02

Evaluation Scheme: 25 ICA+ 25 ESE

Total Marks: 50

Duration of ESE: 3Hrs

Course Objectives:

- I. To study Cascading Style Sheets (CSS)
 - II. To study Client-side Programming using JavaScript for validating the data
 - III. To study Creation of software components (objects used for client and server communication) using Beans.
 - IV. To study Server-Side Programming using servlets.
 - V. To study Creating a pure Dynamic Web Application which retrieves the data from Database according to the client request using JDBC.
1. Create a web page with advanced layouts and positioning with CSS and HTML.
 2. Design a website with different methods of embedding CSS in a web page.
 3. Create a static web page which displays your personal details.
 4. Create a web page through which the user can enter his / her details to become an authenticated user of that page.
 5. Create a web page that shows different methods of embedding JavaScript.
 6. Create a web page with rollover menus. Rollover menus should be created using JavaScript.

7. Validate the registration form with the following criteria:
 - Name and Age should be Mandatory Fields.
 - Password and Re-enter Password fields should contain same value.
 - Name field should accept only character values.
8. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.
9. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
10. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
11. Create a registration form using Angular JS.
12. Create a simple AngularJS calculator application using Angular Services.
13. Create an application using angular JS filters.
14. Design an XML document to store information about a student in an engineering college. The information must include USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
15. Create an XML document with the following sample real estate data
 - Root element real-estate will contain a sequence of sub-elements agencies, owners, properties and flats, all with an empty content
 - Ensure well-formedness
16. Create an internal DTD for the previous XML document
 - Ensure its validity
 - Then try to break it
17. Move the previous DTD to an external file and validate the XML document again
18. Create an application that loads a text string into an XML DOM object, and extracts the info from it with JavaScript.
19. Create an application which reads data from an XML file into XMLDOM object and retrieves the text value of the first element in the xml file.
20. Write a Servlet program which uses JDBC connectivity.

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

Course Outcomes:

ITU629.1 Create and Mange static web pages for given scenario.

ITU629.2 Apply server side technologies to establish dynamic applications.

ITU629.3 Implement web applications with effective data management.

ITU629.4 Develop secure web applications with session management API"s.

CO-PO-PSO Mapping:

CO	PO / PSO
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU629.1	1	2	3	3	2	0	0	0	0	0	0	0	2	3	1
ITU629.2	0	0	0	2	3	0	0	0	0	0	2	0	1	2	2
ITU629.3	0	0	0	0	3	2	2	1	0	0	2	1	1	2	3
ITU629.4	0	0	2	2	2	0	0	0	0	0	2	0	1	1	3

0- Not correlated

1 - Weakly Correlated

2- Moderately Correlated

3- Strongly Correlated

ITU630 MINOR PROJECT

Teaching Scheme : 06 P

Total 06

Credit : 03

Evaluation Scheme: 50 ICA+50ESE

Total Marks: 100

Duration of ESE : 3Hrs.

Course Objectives:

- I. To offer students a glimpse into real world problems and challenges that need IT based solutions
- II. To enable students to create very precise specifications of the IT solution to be designed and use all concepts of IT in creating a solution for a problem.
- III. To introduce students to the vast array of literature available of the various research challenges in the field of IT and create awareness among the students of the characteristics of several domain areas where IT can be effectively used.
- IV. To enable students to and improve the team building, communication and management skills of the students.

Minor Project Each batch consists of maximum 2-3 students.

Students can refer following domain list for developing minor project.

1. Web server, DNS Server, Proxy Server, Mail Server.
2. Database connectivity.
3. Cyber Security
4. Client-server Architecture.
5. Networking.
6. Data mining and Data Ware housing.
7. Data Science.
8. Machine Learning, Deep Learning.
9. Internet of Things.
10. Cloud Computing.
11. Artificial Intelligence.
12. Block chain.
13. Network Security.
14. Big Data Analytics.

Workflow to be carried out by the students to develop Minor Project

1. Understand the full background of project study and Identify the statement of the problem.
2. A comprehensive literature review supporting your project study.
3. Data collection, analysis and project design should be carried out.
4. Actual Implementation of project modules should be carried out.
5. The final evaluation and interpretation of your project results.

ICA – The Internal Continuous Assessment shall be based on practical record and knowledge or skills acquired. The performance shall be assessed experiment wise by using continuous assessment format, A & B.

ESE- The End Semester Exam for Practical shall be based on performance in one of the experiments and may be followed by sample questions.

Course Outcomes:

Students will be able to:

ITU630.1. Discover potential research areas in the field of IT

ITU630.2. Conduct a survey of several available literature in the preferred field of study and Formulate and propose a plan for creating a solution for the research plan identified

ITU630.3. Compare and contrast the several existing solutions for research challenge and demonstrate an ability to work in teams and manage the conduct of the research study.

ITU630.4. To report and present the findings of the study conducted in the preferred domain

CO-PO-PSO Mapping:

CO	PO / PSO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ITU630.1	3	2	0	3	3	0	0	0	0	0	3	0	0	3	
ITU630.2	0	3	2	0	0	0	0	0	0	0	0	0	3	0	
ITU630.3	2	0	0	0	0	0	0	0	3	3	0	0	3	0	
ITU630.4	0	0	0	0	0	0	0	0	0	0	3	3	0	3	

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

