

MAZHARUL ULOOM COLLEGE (AUTONOMOUS)

(Established & Managed by the Ambur Muslim Educational Society)

Accredited by NAAC with Grade 'A' CGPA 3.23 in Cycle 3

Affiliated to Thiruvalluvar University, Vellore

Ambur 635802 (Tirupattur District)



COURSE STRUCTURE & SYLLABUS (For the students admitted from year 2025-2026 onwards)

Programme: M.Sc.

Course: Information Technology

At the end of the M.Sc Information Technology Programme, the student will:

Program Outcomes (POs)	
PO Code	Program Outcome Statement
PO1	Critical Thinking: Demonstrate advanced proficiency in critical thinking skills, evidenced by their ability to analyze complex datasets, and identify patterns. Ability to apply the knowledge of Information Technology with recent trends aligned with research and industry.
PO2	Effective Communication: Demonstrate proficiency in presenting data – driven insights through compelling visualizations and articulate documentation, fostering collaboration and facilitating informed decision - making in diverse professional settings.
PO3	Usage of Technology: Exhibit a mastery of cutting – edge technologies, harnessing advanced tools and platforms to manipulate, analyze and visualize complex datasets.
PO4	Individual and Team Work: Excel in collaborative team environments, effectively contributing their expertise to interdisciplinary projects, thereby fostering a synergetic approach to addressing complex challenges in the field of data science.
PO5	Project Management: Demonstrate the ability to lead multidisciplinary teams, applying project management principles to optimize resources and successfully navigate the dynamic landscape of data –driven initiatives.
PO6	Ethics and Values: Integrate ethical considerations into decision – making processes, emphasizing the responsible and respectful use of data to address societal challenges and contribute positively to the evolving field of data science.
PO7	Life Long Learning : Proactively engage in continuous professional development, fostering adaptability and a thirst for knowledge to remain at the forefront of advancements in data science throughout their careers.

After the successful completion of the programme, the students are expected to

Program Specific Outcomes (POs)	
PSO Code	Program Specific Outcome Statement
PSO1	Able to analyze, design and develop problem solving skills in the discipline of Information Technology.
PSO2	Demonstrate hands-on expertise through practical labs in web development, mobile app development, database systems, and software engineering projects.
PSO3	Understand and manage operating systems, computer networks, and security principles to design secure and efficient IT infrastructures.
PSO4	Acquire evaluation of potential benefits of alternative solution in designing software and/or hardware systems in broad range of open source programming languages to withstand technological changes.
PSO5	Apply the practices and strategies of computer science for software project development to deliver a quality software product and contribute to research in the chosen field and perform effectively.

Cognitive Levels of Learning

The cognitive domain is the first and most common hierarchy of learning objectives (Bloom, 1956). It focuses on the acquisition and application of knowledge and is widely used in the educational setting. It aims to develop the mental skills and the acquisition of knowledge of the individual. The cognitive domain encompasses of six categories which include remembering, understanding, applying, analyzing, evaluating and creating.

Level	Definition	Key Actions
K1 : Remembering	Ability to recall or recognize facts, terms, basic concepts, or answers without necessarily understanding them.	Retrieve, Memorize, Repeat, Define, Identify, Recognize
K2 : Understanding	Comprehending the meaning of information, interpreting or translating knowledge into your own words.	Explain, Describe, Summarize, Interpret, Paraphrase
K3 : Applying	Using knowledge in new situations, such as solving problems or applying theories to real-world situations.	Use, Demonstrate, Implement, Calculate, Practice
K4 : Analyzing	Breaking information into parts to explore understandings and relationships; identifying motives or causes.	Compare, Contrast, Categorize, Distinguish, Examine, Organize
K5 : Evaluating	Making judgments based on criteria and standards, often involving checking and critiquing.	Judge, Critique, Justify, Assess, Prioritize, Recommend
K6 : Creating	Putting elements together to form a new coherent whole or original product.	Design, Develop, Invent, Compose, Construct, Generate

PG Department of Information Technology
SYLLABUS AND SCHEME OF EXAMINATIONS – III & IV SEMESTER

Sem	Course Code	Course Category	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
						CIA	ESE	
Semester III		Core -7	Advanced Java	6	5	25	75	100
		Core-8	Advanced Java–Practical	6	5	25	75	100
		Core-9	Open Source Technologies	6	5	25	75	100
		Core-10	Open Source Technologies-Practical	6	4	25	75	100
		Elective V	Internet of Things	3	3	25	75	100
			Research Methodology					
			Trends in Computing					
		Skill Enhancement Course -SEC	Industry Module – Mini project done with in the campus	3	2	25	75	100
			Internship / Industrial Activity (Carried out in Summer Vacation at the end of I year – 30 hours)	-	2			
	Total			30	26			
Semester - IV		Core-11	.NET with C# Programming	6	5	25	75	100
		Core-12	.NET with C# Programming – Practical	6	5	25	75	100
		Core	Project with viva voce	10	7	25	75	100
		Elective VI	Intelligent Systems	4	3	25	75	100
			Introduction to Robotics					
			Virtual and Augmented Reality					
		Professional Competency Skill Enhancement Course	Professional Competency Skill Enhancement Course Term paper & Seminar presentation – Staff supervisor should Select and assign different Advanced Technology topics to the students. The students must give presentation of the allotted topic in the respective class hours. The document of the presentation of respective topic allotted to them must be prepared and submitted with soft binding (around 50 to 100 Pages). – Evaluation is done by the External examiners similar to Project Viva voce.	4	2	25	75	100
			Extension Activity	-	1	-	-	100
	Total			30	23			

Semester - III

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III		Core	6	5	25	75	100
Course Title		ADVANCED JAVA					

Learning Objectives	
LO1	Understand the fundamental concepts of Java programming, including data types, variables, operators, control structures, classes, methods, and inheritance.
LO2	Utilize Java string handling functions, collection framework classes, packages, interfaces, and abstract classes to develop modular and reusable programs.
LO3	Apply exception handling, multithreading, synchronization, and JDBC techniques to build reliable and database-driven Java applications.
LO4	Develop graphical user interface applications and applets using AWT components, event handling mechanisms, graphics, text processing, and layout managers
LO5	Design and implement web-based applications using Servlets, JSP, JavaBeans, sessions, cookies, and the MVC framework for dynamic content generation.

SYLLABUS		
Unit	Contents	Hours
I	The Genesis of Java: Java's Magic, The Java Buzzwords-An Overview of Java - Data types, Variables, Arrays-Operators-Control Statements- Introducing Classes – A Close Look at Methods and Classes-Inheritance	18
II	String Handling Functions – Collections Framework: Collection Classes, String Tokenzier, Date, Calendar - Abstract Classes - Packages and Interfaces: Packages – Access Protection Importing Packages – Interfaces	18
III	Exception Handling: Exception types – Creating your own exceptions - Multithreaded Programming: Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Inter-thread Communication, Suspending, Resuming and Stopping Threads - JDBC	18
IV	The Applet Class-Event Handling – Introducing the AWT: Working with windows, graphics and Text, Using AWT Controls, Layout Managers and Controls - Developing JavaServer Pages	18
V	Developing Servlets -Structuring Web application with the MVC pattern – Sessions and Cookies - Using JSP tags with JavaBeans	18

Text Book(s):
- Herbert Schildt, (2004), "Java 2: The Complete Reference", Fifth Edition, Tata McGraw Hill, New Delhi. - Joel Murach, (2008), "Andrea Steelman,,Murach's Java Servlets and JSP", Second Edition, Shroff Publishers
Reference Book(s):
- Matthew Mac Donald, (2002), "ASP.NET : The Complete Reference", MC Graw Hill. - VladaMatena, (2003), "Applying Enterprise JavaBeans", Second Edition, Addison Wesley.

3. Cay S Horstmann & Gary Cornell, Core Java Vol II Advanced Features, Eighth Edition, Addison Wesley.
4. Bruce W Perry (2004), Java Servlets & JSP Cook Book, Second edition, O'reilly Media
Web Resource(s):
1. http://netbeans.org/kb/docs/javaee/javaee-intro.html
2. http://www.jsptube.com/
3. http://articles.sitepoint.com/article/java-servlets-1
4. http://www.java-tips.org/javatutorials/tutorials/introduction-to-javaservlets-with-netbeans.html
5. http://download.oracle.com/javase/tutorial/javabeans/index.html
6. http://www.javapoint.com/steps-to-connect-to-the-database-in-java/ (Unit III: JDBC)

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Understand and explain programming language constructs, Java mechanisms, OOP and Internet programming concepts	K2, K3
CO 2	Apply logical constructs as well as include Object oriented features, Packages, Interfaces, Exceptions and Threads, JDBC, Internet programming technologies	K3, K4
CO 3	Compare and contrast classical and advanced Java in terms of features, architecture, platform and technologies	K4, K5
CO 4	Choose an approach to solve real world problem from the acquired knowledge of Java	K4, K5
CO 5	Create programs that make strong use of classes and objects and develop JDBC, GUI, Web and Enterprise based applications	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	3	2	3	3	3	2	2	2.4
CO2	3	3	3	2	2	3	2	3	3	3	3	2	2.6
CO3	3	2	3	2	2	3	3	3	3	3	3	3	2.75
CO4	2	3	2	2	2	3	3	2	3	3	2	2	2.41
CO5	3	3	3	3	3	2	2	3	3	3	3	3	2.83
Mean Overall Score													2.6
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III		Core	6	5	25	75	100
Course Title		ADVANCED JAVA - PRACTICAL					

Learning Objectives	
LO 1	Understand the fundamental concepts of Java programming, including data types, variables, operators, control structures, classes, methods, and inheritance.
LO 2	Utilize Java string handling functions, collection framework classes, packages, interfaces, and abstract classes to develop modular and reusable programs.
LO 3	Apply exception handling, multithreading, synchronization, and JDBC techniques to build reliable and database-driven Java applications.
LO 4	Develop graphical user interface applications and applets using AWT components, event handling mechanisms, graphics, text processing, and layout managers
LO 5	Design and implement web-based applications using Servlets, JSP, JavaBeans, sessions, cookies, and the MVC framework for dynamic content generation.

SYLLABUS		
Unit	Contents	Hours
	1. Classes and objects 2. Implementing classes 3. Strings 4. Collection 5. Date and Calendar 6. Packages 7. Exception handling 8. Threads 9. JDBC 10. Applets 11. Event handling 12. Simple Web Applications 13. Using Sessions and Cookies 14. Forwarding requests and Redirecting responses 15. Web Applications using Database 16. Developing Simple Beans 17. Use Beans with JSP tags	90

Text Book(s):
1. Herbert Schildt, (2004), “Java 2: The Complete Reference”, Fifth Edition, Tata McGraw Hill, New Delhi. 2. Joel Murach, (2008), “Andrea Steelman,,Murach”s Java Servlets and JSP”, Second Edition, Shroff Publishers
Reference Book(s):
1. Bruce W Perry (2004), Java Servlets & JSP Cook Book, Second edition, O’reilly Media.
Web Resource(s):
1. http://netbeans.org/kb/docs/javaee/javaee-intro.html 2. http://www.jsptube.com/ 3. http://articles.sitepoint.com/article/java-servlets-1 4. http://www.java-tips.org/javatutorials/tutorials/introduction-to-javaservlets-with-netbeans.html 5. http://download.oracle.com/javase/tutorial/javabeans/index.htm

Course Outcomes		
Upon successful completion of this course ,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Demonstrate understanding and use of different Java mechanisms for efficient application development	K2, K3
CO 2	Use an appropriate development environment to write, compile and run Java Programs	K3, K4
CO 3	Analyze the problem and apply the appropriate problem solving method with the required building blocks and mechanisms of Core and Advanced Java	K4, K5
CO4	Test the correctness and consistency of the Java program with different inputs	K4, K5
CO 5	Create simple applications that make use of core java concepts and develop JDBC, GUI, Web and Enterprise based applications	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	2	2	2	2	2	2	3	3	3	2	2	2.25
CO2	3	2	3	2	2	2	2	3	3	3	2	3	2.5
CO3	3	2	3	2	2	2	3	3	3	3	3	3	2.66
CO4	3	2	3	2	2	3	3	3	3	3	3	3	2.75
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3
Mean Overall Score													2.63
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III		Core-III	6	5	25	75	100
Course Title		OPEN SOURCE TECHNOLOGIES					

Learning Objectives	
LO1	Understand the fundamentals of PHP and Ruby programming, including variables, data types, operators, control structures, strings, arrays, and functions.
LO2	Develop dynamic web pages using PHP by handling user input, form controls, data validation, and file processing techniques.
LO3	Design and manage database-driven applications using PHP with operations such as creating, inserting, retrieving, updating, deleting, and sorting data.

LO4	Implement state management in web applications using cookies and sessions, and apply file handling mechanisms for data storage and retrieval.
LO5	Create object-oriented applications in Ruby using classes, objects, methods, exception handling, file handling, and collection data structures.

SYLLABUS		
Unit	Contents	Hours
I	PHP: Introduction – Creating a PHP page – Running PHP page –HTML and PHP – Printing Text – Comment Statements – Working with variables – Storing data in variables -Interpolating strings – Constants - Understanding Internal Datatypes – Operators – Flow Control – Strings: String Functions - Converting to and from strings - Formatting text strings - Working with numbers.	18
II	Date and Time - Create an Array - Use an Associative Array - Functions to Work with Arrays - Work with Arrays of Arrays - Create and Use Functions	18
III	Reading Data in web pages: Handling various controls - PHP Browser-Handling power: Data Validation - File Handling :Opening a file – Reading Text from a file – Closing a file- Working with Databases: Creating , Inserting , Accessing , Updating , Deleting and Sorting Database-Work with Cookies and Sessions	18
IV	Ruby: Getting Started with Ruby– Working with Numbers and Strings – Variables – Constants–Operators–Conditionals and Loops	18
V	Arrays - Hashes - Methods - Blocks : Classes and Objects : Creating a Class and an Object- Exception Handling – File Handling	18

Text Book(s):
1. Steven Holzner, (2016), “PHP: The Complete Reference”, McGraw Hill Education Private Limited, Indian Edition. (Unit I, II) 2. RachnaKapur, Mario Briggs, Tapas Saha, Ulisses Costa, PedroCarvalho,RaulF.Chong,PeterKohlmann (2010), “Getting Started with Open Source Development”, DB2 on Campus Book Series. (Unit III) 3. http://indexof.es/Ruby/Beginning%20Ruby%20On%20Rails.pdf(UnitIV) http://www.cs.uni.edu/~wallingf/teaching/agile-may2010/ruby/programming-ruby.pdf(Unit V)
Reference Book(s):
1. W. Jason Gilmore (2010), “Beginning PHP &MySQL”, Apress. 2. Joel Murach, Ray Harris (2010), “PHP and MySQL”,Shroff Publishers & Distributors 3. Larry Ullman (2008), “PHP 6 and MySQL 5”, Pearson Education. 4. JohnCoggeshall(2006),“PHP5”,PearsonEducation. 5. Michale C. Glass (2004), “Beginning PHP, Apache, MySQL Web Development”, Wiley DreamTech Press
Web Resource(s):
1. http://www.w3schools.com/php/ 2. http://howtostartprogramming.com/PHP/ 3. http://www.massey.ac.nz/~nhreyes/MASSEY/159339/Lectur es/Lecture%2011%20-%20PHP%20-%20Part%205%20-%20CookiesSessions.pdf

Course Outcomes

Upon successful completion of this course ,the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Demonstrate the setup and configuration of development environment to write PHP and Ruby Scripts	K2, K3
CO 2	Select the appropriate language fundamentals and techniques to write and compile PHP and Ruby programs	K3, K4
CO 3	Examine the bugs and analyze how to prevent and remove the bugs	K4, K5
CO 4	Test and debug the application with sample inputs to check the correctness and consistency of the scripts	K4, K5
CO 5	Create simple programs that make use of various PHP and Ruby features and functions and solve web application and database tasks using PHP	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	2	3	3	3	3	2	3	3	2	2	2	2.5
CO2	2	3	3	2	3	3	3	3	3	2	2	3	2.67
CO3	3	2	3	2	3	2	3	3	3	2	2	3	2.58
CO4	2	2	3	3	2	2	3	3	3	2	2	3	2.50
CO5	2	3	3	3	3	2	3	3	3	2	3	3	2.75
Mean Overall Score													2.6
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III		Core	6	4	25	75	100
Course Title		OPEN SOURCE TECHNOLOGIES - PRACTICAL					

Learning Objectives

LO1	Understand the fundamentals of PHP and Ruby programming, including variables, data types, operators, control structures, strings, arrays, and functions.
LO2	Develop dynamic web pages using PHP by handling user input, form controls, data validation, and file processing techniques.
LO3	Design and manage database-driven applications using PHP with operations such as creating, inserting, retrieving, updating, deleting, and sorting data.

LO4	Implement state management in web applications using cookies and sessions, and apply file handling mechanisms for data storage and retrieval.
LO5	Create object-oriented applications in Ruby using classes, objects, methods, exception handling, file handling, and collection data structures.

SYLLABUS		
Unit	Contents	Hours
I	PHP: Introduction – Creating a PHP page – Running PHP page –HTML and PHP – Printing Text – Comment Statements – Working with variables – Storing data in variables -Interpolating strings – Constants - Understanding Internal Datatypes – Operators – Flow Control – Strings: String Functions - Converting to and from strings - Formatting text strings - Working with numbers.	18
II	Date and Time - Create an Array - Use an Associative Array - Functions to Work with Arrays - Work with Arrays of Arrays - Create and Use Functions	18
III	Reading Data in web pages: Handling various controls - PHP Browser-Handling power: Data Validation - File Handling :Opening a file – Reading Text from a file – Closing a file- Working with Databases: Creating , Inserting , Accessing , Updating , Deleting and Sorting Database-Work with Cookies and Sessions	18
IV	Ruby: Getting Started with Ruby– Working with Numbers and Strings – Variables – Constants–Operators–Conditionals and Loops	18
V	Arrays - Hashes - Methods - Blocks : Classes and Objects : Creating a Class and an Object- Exception Handling – File Handling	18

Text Book(s):
1. Steven Holzner, (2016), “PHP: The Complete Reference”, McGraw Hill Education Private Limited, Indian Edition. (Unit I, II) 2. RachnaKapur, Mario Briggs, Tapas Saha, Ulisses Costa, Pedro Carvalho, Raul F. Chong, Peter Kohlmann (2010), “Getting Started with Open Source Development”, DB2 on Campus Book Series. (Unit III) 3. http://indexof.es/Ruby/Beginning%20Ruby%20On%20Rails .pdf (Unit IV) 4. http://www.cs.uni.edu/~wallingf/teaching/agilemay2010/ruby/programming-ruby.pdf(Unit V)
Reference Book(s):
1. W. Jason Gilmore (2010), “Beginning PHP &MySQL”, Apress. 2. Joel Murach, Ray Harris (2010), “PHP and MySQL”,Shroff Publishers & Distributors 3. Larry Ullman (2008), “PHP 6 and MySQL 5”, Pearson Education. 4. John Coggeshall (2006), “PHP 5”, Pearson Education. 5. Michale C. Glass (2004), “Beginning PHP, Apache, MySQL Web Development”, Wiley DreamTech Press.
Web Resource(s):
1. http://www.w3schools.com/php/ 2. http://howtostartprogramming.com/PHP/ 3. http://www.massey.ac.nz/~nhreyes/MASSEY/159339/Lectur es/Lecture%2011%20- %20PHP%20- %20Part%205%20-%20CookiesSessions.pdf 4. http://www.tutorialspoint.com/mysql/

Course Outcomes		
Upon successful completion of this course ,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Demonstrate the setup and configuration of development environment to write PHP and Ruby Scripts	K2, K3
CO 2	Select the appropriate language fundamentals and techniques to write and compile PHP and Ruby programs	K3, K4
CO 3	Examine the bugs and analyze how to prevent and remove the bugs	K4, K5
CO 4	Test and debug the application with sample inputs to check the correctness and consistency of the scripts	K4, K5
CO 5	Create simple programs that make use of various PHP and Ruby features and functions and solve web application and database tasks using PHP	K5, K6

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	3	3	3	3	2	3	2	2	2.75
CO2	3	3	2	2	3	3	3	3	3	2	2	2	2.58
CO3	3	2	3	3	2	2	3	3	3	3	2	3	2.67
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3
Mean Overall Score													2.8
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV		Elective-V	3	3	25	75	100
Course Title		INTERNET OF THINGS					

Learning Objectives	
LO 1	Explain the concepts, architecture, enabling technologies, and deployment models of the Internet of Things (IoT).
LO 2	Illustrate IoT applications in various domains and distinguish between IoT and Machine-to-Machine (M2M) communication technologies.
LO 3	Analyze IoT architectures, M2M communication frameworks, networking, gateway technologies, and data management techniques.

LO 4	Examine IoT reference models, communication models, and security, privacy, trust, and safety mechanisms in IoT systems.
LO 5	Develop IoT-based solutions by applying IoT concepts to smart grid, smart metering, smart homes, smart cities, and commercial building automation.

SYLLABUS		
Unit	Contents	Hours
I	Introduction to IoT - Introduction to Internet of Things: Introduction- Physical Design of IoT- Logical Design of IoT- IoT Enabling Technologies - IoT Levels & Deployment Templates	9
II	Domain Specific IoT: Introduction-Home Automation-Cities Environment-Energy-Retail Logistics-Agriculture-Industry Health & Lifestyle. IoT and M2M: Introduction - M2M- Differences between IoT and M2M - SDN and NFV for IoT	9
III	M2M to IoT- An Architectural Overview: Building an Architecture-Main design principles and needed capabilities-An IoT Architecture Outline- Standard Considerations. M2M and IoT Technology Fundamentals: Devices and Gateways-Local and wide area Networking-Data Management.	9
IV	IoT Architecture - Architecture Reference Model: Introduction Reference Model and Architecture- IoT Reference Model: IoT Domain Model-Information Model-Functional Model- Communication Model-Safety, Privacy, Trust, Security Model IoT.	9
V	Implementation Examples: The Smart Grid-Introduction-Smart Metering-Smart House-Smart energy city. Case Study: Commercial Building automation today and in the future	9

Text Book(s):
1. ArshdeepBahga, Vijay Madiseti, —Internet of Things – A hands-on approach, Universities Press, 2015 (Unit I and II) 2. Jan Holler, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, “From Machine to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Elsevier, 2014(Unit III, IV and V).
Reference Book(s):
1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017 2. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols, Wiley, 2012 3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things, Springer, 2011.
Web Resource(s):
1. https://www.tutorialspoint.com/internet_of_things/ 2. https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/ 3. https://www.slideshare.net/khusuma/domain-specific-iot(Unit-II) 4. https://www.slideshare.net/PascalBodin/an-introduction-to-m2m-iot-technologies(Unit-III) 5. https://www.smartgrid.gov/the_smart_grid/smart_grid.html

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Outline the fundamental concepts and Terminologies of IoT	K2, K3
CO 2	Determine the IoT enabling technologies, M2M and IoT, fundamentals and technological challenges faced by IoT in terms of Safety, privacy and trust	K3, K4
CO 3	Identify the different levels, models and standards of IoT and application areas in domain specific IoT	K4, K5
CO 4	Analyze the physical design, logical design, architecture Overview of M2M and IoT and reference models of IoT Architecture	K4, K5
CO 5	Assess the application areas and illustrate the implementation of IoT	K5, K6

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	2	2	3	2	3	2	2	2.25
CO2	3	3	2	2	3	3	3	3	2	2	3	2	2.58
CO3	3	3	3	3	2	3	3	3	3	3	2	3	2.83
CO4	3	3	3	3	2	3	3	3	3	3	3	3	2.92
CO5	3	3	3	3	2	3	3	3	3	3	3	3	2.92
Mean Overall Score													2.7
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III		Elective	3	3	25	75	100
Course Title		RESEARCH METHODOLOGY					

Learning Objectives	
LO 1	Understand the fundamental concepts of research methodology, including research types, approaches, problem formulation, research processes, and scientific methods
LO 2	Conduct effective literature surveys, evaluate scholarly sources, collect and analyze data, and adhere to research ethics and plagiarism guidelines.
LO 3	Apply appropriate research designs, experimental methods, hypothesis testing, and analytical techniques to investigate and solve research problems.
LO 4	Present research findings effectively through written reports and oral presentations using appropriate standards, codes, and data interpretation techniques.
LO 5	Understand the principles of Intellectual Property Rights (IPR), patents, copyrights, trademarks, licensing, technology transfer, and contemporary developments in patent systems and innovation management.

SYLLABUS		
Unit	Contents	Hours
I	Research Methodology: Objectives and motivation of research - Types of research - Research approaches - Significance of research - Research methods verses methodology - Research and scientific method - Importance of research methodology - Research process - Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations- Criteria of good research. Defining the research problem: Definition of research problem - Problem formulation - Necessity of defining the problem - Technique involved in defining a problem.	9
II	Literature Survey and Data Collection: Importance of literature survey - Sources of information - Assessment of quality of journals and articles - Information through internet. Effective literature studies approaches, analysis, plagiarism, and research ethics. Data - Preparing, Exploring, examining and displaying	9
III	Research Analysis and Design: Meaning of research design - Need of research design - Different research designs - Basic principles of experimental design - Developing a research plan - Design of experimental set-up - Use of standards and codes. Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.	9
IV	Intellectual Property Rights: Nature of Intellectual Property: Patents, Designs, Trade and Copyright- Process of Patenting and Development: technological research, innovation, patenting, development- Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.	9
V	Patent Rights: Scope of Patent Rights- Licensing and transfer of technology- Patent information and databases- Geographical Indications -New Developments in IPR: Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs -Licenses, Licensing of related patents, patent agents, Registration of patent agents.	9

Text Book(s):

1. R. Ganesan, "Research Methodology for Engineers", MIP Publishers, Chennai, 2011.
2. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007.

Reference Book(s):

1. Peter S. Menell, Mark A. Lemley, Robert P. Merges, "Intellectual Property in the New Technological "Vol. I Perspectives, 2021.
2. Laura R. Ford, "The Intellectual Property of Nations: Sociological and Historical Perspectives on a
3. RatanKhananabis and SuvasisSaha, "Research Methodology", Universities Press, Hyderabad, 2015.
4. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.
5. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners" 2010

Web Resource(s):

1. <https://www.coursera.org/courses?query=research%20metho+dology>
2. <https://www.researchgate.net/topic/Research-Methodology>
3. https://www.wto.org/english/tratop_e/trips_e/intel1_e.htm
4. https://www.isical.ac.in/~palash/research-methodology/RM_lec9.pdf
5. https://mrcet.com/downloads/digital_notes/CSE/Mtech/I%20Year/RESEARCH%20METHODOLOGY.pdf

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understanding of research, IPR and patent fundamentals	K2, K3
CO2	Identify the issues involved in research, IPR and patent filing	K3, K4
CO3	Apply suitable instrumentation and sampling techniques for the research studies and recognize the framework for protecting IPR and process for obtaining patents	K4, K5
CO4	Analyze data, and interpret research findings using appropriate methods and importance of IPR and patent protection in promoting research and development	K4, K5
CO5	Design and develop research reports, research proposals, academic papers and patents	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	3	2	2	3	2	2	3	2	2.42
CO2	3	3	2	3	3	3	3	3	3	2	3	2	2.75
CO3	3	3	3	3	2	3	3	3	3	3	2	3	2.83
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3.00
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3.00
Mean Overall Score													2.8
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III		Elective -V	3	3	25	75	100
Course Title		TRENDS IN COMPUTING					

Learning Objectives	
LO 1	Understand the fundamental concepts, architecture, services, benefits, limitations, and security aspects of cloud computing.
LO 2	Analyze cloud infrastructure components, including clients, network services, cloud platforms, storage solutions, and service providers.
LO 3	Develop and deploy applications in cloud environments using virtualization technologies, thin clients, server solutions, and cloud migration strategies.
LO 4	Explain the principles of grid computing, including resource management, scheduling techniques, grid architecture, software components, and user roles.

LO 5	Evaluate green computing practices, environmental impacts of information technology, industry initiatives, and sustainable approaches for energy-efficient computing systems.
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SYLLABUS		
Unit	Contents	Hours
I	Cloud Computing: Basics: Overview – Applications – Intranets and the Cloud – First Movers in the Cloud – Organization and Cloud Computing: Benefits – Limitations – Security Concerns- The Business Case for Going to the Cloud: Cloud Computing Services -Deleting Datacenter.	9
II	Hardware and Infrastructure: Clients – Security – Network Services- Accessing the Cloud: Platforms - Cloud Storage: Overview – Cloud Storage Providers.	9
III	Developing Applications: Google – Microsoft - Local Cloud and Thin Clients: Virtualization – Server Solutions – Thin Clients – Migrating to the Cloud.	9
IV	Grid Computing: Introduction - Benefits – Grid Terms and Concepts: Types of Resources – Jobs and Applications Scheduling, Reservation and Scavenging – Grid Software Components – Grid user role: User Perspective – Administrator Perspective - Design: Building grid architecture - Models – Topologies – Phases and Activities.	9
V	Green Computing: Introduction - History of Green Computing - Regulations and Industry Initiative - The Demons behind Green Computing - Approaches to Green Computing - Role of IT vendors - Green Computing Tips - Future is Green	9

Text Book(s):
1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing - A practical Approach" , McGraw Hill, 2010. 2. Bart Jacob, Michael Brown, Kentaro Fukui, and NiharTrivedi, "Introduction to Grid Computing" ,IBM Redbook, 2005.
Reference Book(s):
1. George Reese, "Cloud Application Architectures: Building Applications and Infrastructures in the cloud", O'Reilly Media Inc., 2009. 2. Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, "Cloud Computing for Dummies ", Wiley India Pvt Ltd ,2009. 3. J. Velete, Anthony T. Velete, Robert Elsenpeter, "Green IT – Reduce Your Information System's Environmental Impact While Adding to the Bottom Line", McGraw-Hill ,2008. 4. Bud E. Smith , " Green Computing: Tools and Techniques for Saving Energy, Money, and Resources", Auerbach Publications , 2013.
Web Resource(s):
1. . http://www.siteground.com/tutorials/cloud/cloud_computing_infrastructure.htm 2. http://thecloudtutorial.com/ 3. http://studymafia.org/wp-content/uploads/2015/11/CSE-Green-Computing-Report.pdf 4. http://www.znu.ac.ir/data/members/dastjerdi_mohammad/Book11.pdf (Unit IV) 5. http://www.cs.kent.edu/~farrell/grid06/lectures/grid01.pdf (Unit V)

Course Outcomes		
Upon successful completion of this course,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Outline the history, applications, benefits and limitations of Cloud, Grid and Green computing	K2, K3
CO2	Describe the cloud infrastructure services, virtualization and determine how applications can	K3, K4

	be developed using cloud services	
CO3	Identify cloud storage providers, software components of grid, technologies applied in building a green system and various key sustainability in Green IT Trends	K4, K5
CO4	Analyse the migrations and security concerns of cloud, different grid models, resources and also identify how the distributed computing environments can be built from lower level services	K4, K5
CO5	Assess the business cases of cloud, and also various laws, approaches and protocols for regulating green IT	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	3	3	3	3	3	2	3	2	2	2.58
CO2	2	2	3	3	3	3	3	3	3	3	2	2	2.67
CO3	3	2	3	2	2	2	3	3	3	3	3	3	2.67
CO4	3	2	3	2	2	2	3	3	3	3	3	3	2.67
CO5	3	2	3	2	2	2	3	3	3	3	3	3	2.67
Mean Overall Score													2.65
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III		Skill Enhancement Course - SEC	3	3	25	75	100
Course Title		Industry Module – Mini project done with in the campus					

Introduction

The Industry Module – Mini Project course is designed to provide students with practical exposure to industry-oriented problem-solving and application development within the institutional environment. The course enables students to integrate theoretical knowledge with practical implementation skills by developing a mini project based on real-world or industry-inspired problems.

The mini project promotes innovation, teamwork, project planning, technical documentation, software development skills, and professional competency. The project shall be carried out within the campus under the supervision of faculty members and may be based on industry case studies, simulated industrial requirements, emerging technologies, or institutional needs.

Objectives

The Industry Module – Mini Project aims to:

1. Apply Information Technology concepts and tools to solve practical and industry-related problems.
2. Develop project planning, analysis, design, implementation, and testing skills.

3. Enhance problem-solving, analytical thinking, and decision-making abilities.
4. Provide hands-on experience in software development, system implementation, and technology integration.
5. Strengthen teamwork, communication, documentation, and presentation skills.
6. Familiarize students with industry practices, standards, and project management techniques.
7. Encourage innovation, creativity, and entrepreneurship.

General Guidelines

1. The Mini Project shall be carried out within the campus under the guidance of a faculty supervisor.
2. The project may be undertaken individually or in groups consisting of not more than **two students**.
3. The project topic shall be approved by the Head of the Department based on the recommendation of the faculty supervisor.
4. The project shall preferably address:
 - Industry-oriented applications
 - Business process automation
 - Web application development
 - Mobile application development
 - Database applications
 - Cloud-based solutions
 - Data analytics projects
 - Artificial Intelligence applications
 - Cybersecurity solutions
 - IoT-based systems
 - Educational technologies
 - Institutional automation systems
 - Startup and innovation ideas
 - Social impact applications
5. Students shall submit a Mini Project Proposal containing:
 - Title of the Project
 - Problem Statement
 - Objectives
 - Scope of Work
 - Methodology
 - Tools and Technologies
 - Expected Outcome
 - Project Schedule
6. Each project shall be monitored periodically through review meetings conducted by the faculty supervisor.
7. Students shall maintain proper documentation relating to:
 - Requirement Analysis
 - System Design
 - Development Activities
 - Testing Procedures
 - Results and Outcomes
8. The project shall include:
 - Problem Identification
 - Requirement Analysis
 - System Design
 - Implementation
 - Testing and Validation
 - Documentation
 - Demonstration
9. Students shall ensure originality in project work and avoid plagiarism and unethical practices.
10. The mini project report shall ordinarily contain **30–50 pages** excluding appendices and references.
11. Students shall submit:

- One soft-bound copy of the report
- One soft copy in PDF format

12. The project shall culminate in a demonstration and presentation before the evaluation committee.

Mini Project Report Format

The report shall normally contain:

1. Title Page
2. Bonafide Certificate
3. Declaration
4. Acknowledgement
5. Abstract
6. Table of Contents
7. Introduction
8. Problem Statement
9. Objectives
10. System Analysis
11. System Design
12. Methodology
13. Implementation
14. Testing and Validation
15. Results and Discussion
16. Conclusion
17. Future Enhancements
18. References / Bibliography
19. Appendices (if any)

Evaluation Scheme

External Evaluation (75 Marks)

Component	Marks
Mini Project Report Evaluation	25
Project Demonstration / Presentation	30
Viva Voce Examination	20
Total	75 Marks

Internal Assessment (25 Marks)

Continuous Assessment – 15 Marks

Component	Marks
Problem Identification & Proposal	5
Design & Development Progress	5
Review Presentation	5
Total	15 Marks

Final Internal Evaluation – 10 Marks

Component	Marks
Project Report	4
Implementation / Output	3
Internal Viva Voce	3
Total	10 Marks

Assessment Component	Marks
Internal Assessment (CIA)	25
External Evaluation (ESE)	75
Grand Total	100 Marks

Evaluation Committee

The Mini Project Evaluation Committee shall consist of:

- External Examiner
- Head of the Department
- Internal Examiner / Faculty Supervisor

Suggested Areas for Mini Projects

Students may undertake mini projects in areas such as:

- Web Application Development
- Mobile Application Development
- Cloud Computing Applications
- Artificial Intelligence and Machine Learning
- Data Analytics and Visualization
- Cyber Security Applications
- Internet of Things (IoT)
- Blockchain Applications
- Smart Campus Solutions
- E-Commerce Applications
- Healthcare Information Systems
- Educational Technology Solutions
- ERP and Business Applications
- Social Networking Applications
- Digital Content Management Systems
- AR/VR Applications
- Startup and Innovation Projects

Expected Learning Outcomes

Upon successful completion of the Industry Module – Mini Project, students will be able to:

1. Analyze real-world and industry-oriented problems and identify suitable solutions.
2. Design, develop, and implement Information Technology applications using appropriate tools and technologies.
3. Apply project management, software engineering, and testing principles in project execution.
4. Demonstrate technical, analytical, and problem-solving competencies.
5. Communicate project outcomes effectively through reports, demonstrations, and presentations.
6. Work independently or collaboratively with professional and ethical responsibility.
7. Gain practical exposure to industry practices and emerging technologies.

SEMESTER - IV

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV			6	5	25	75	100
Course Title		.NET WITH C# PROGRAMMING					

Learning Objectives	
LO 1	Understand the fundamentals of C# programming, including variables, data types, control structures, methods, objects, namespaces, and delegates.
LO 2	Explain the architecture of the .NET Framework, Common Language Runtime (CLR), Common Type System (CTS), assemblies, and the Visual Studio development environment.
LO 3	Develop ASP.NET web applications using web forms, server controls, state management techniques, application structure, and page life cycle concepts.
LO 4	Apply LINQ queries, lambda expressions, navigation controls, validation controls, and login controls to build interactive and secure web applications.
LO 5	Design database-driven web applications using ADO.NET, data binding, data source controls, GridView controls, and Crystal Reports for data management and reporting.

SYLLABUS		
Unit	Contents	Hours
I	The C# Language : Basics- Variables and Data Types - Variable Operations - Object Based Manipulation - Conditional logic - Loops - Methods - Types, Objects and Namespaces- Delegates.	18
II	.NET Framework 4.5 : Common Language Runtime - Common Type System - Metadata and Assemblies Introduction to visual studio 2012 IDE: Exploring Visual Studio 2012 IDE - ASP.NET 4.5 Overview: ASP.NET Life cycle: Life cycle of an ASP.Net web page Developing a Web Application: File Types in ASP.NET 4.5- Exploring ASP.NET web pages - Understanding ASP.NET 4.5 Directives Application structure and State: The Global.asax Application File- Using states: Application State- Session State-View State Cookies- Post back and Cross-page posting.	18
III	Web Forms: Standard controls: Label control-Button Control Text Box Control-Literal Control- Place Holder Control Hidden Field Control -Navigation controls: Tree View, Menu and Site MapPath - Validation controls -Rich controls: Calendar Controls- Ad Rotator control.	18
IV	LINQ Queries : Standard Query operators: Filtering operators Projection operators- Sorting operators-Grouping operators-set operators-Aggregate operators -Lambda Expressions - Working with Login controls: Login control- Password Recovery control - Create User Wizard control-Change Password control	18
V	ADO.NET Fundamentals: Configuring your Database - ADO.NET Basics- Direct Data Access - Disconnected Data Access -Data Binding : Data Binding with ADO.NET- Data Source Controls - The Data Controls : The Grid View - Formatting the Grid View - Selecting a Grid View Row- Editing, Sorting and Paging the Grid View- Crystal Report	18

Text Book(s):
1. Kogent (2013), ASP.NET 4.5 Black Book – DreamtechPress, New Delhi (Unit 2,3,4) 2. Matthew MacDonald (2010), Beginning ASP.NET 4 in C#, Apress.(Unit 1,5)

Reference Book(s):	
1. Greg Buczek(2002), ASP.NET Developer's guide, Tata McGraw Hill Publications. 2. Jesse Liberty, (2002), Programming C#, 3.0, O'Reilly Press. 3. J.Sharp, (2009), Microsoft Visual C# 2008 Step by Step, PHI Learning Private Ltd. 4. Christian Nagel et al., (2007), Professional C# 2005 with .NET 3.0, Wiley India. 5. Herbert Schildt,(2010), C# 4.0 The Complete Reference, Tata McGraw Hill Publication	
Web Resource(s):	
1. www.homeandlearn.co.uk/csharp/csharp.html 2. http://msdn.microsoft.com/en-us/library/aa645596.aspx 3. http://www.csharpkey.com/csharp/ 4. http://www.w3schools.com/aspnet/default.asp 5. http://www.maconstateit.net/tutorials/ASPNET20/default.htm 6. http://csharp-station.com/Tutorial/AdoDotNet/Lesson01 (Unit V : ADO.NET Fundamentals) 7. http://www.c-sharpcorner.com/UploadFile/009464/usecrystal-report-in-Asp-Net-using-C-Sharp/	

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Outline the features of C# and ASP.NET concepts to understand the real time applications	K2, K3
CO 2	Identify the salient properties of C# programming concepts and ASP .NET Application	K3, K4
CO 3	List the various stages involved in creating a web form	K4, K5
CO 4	Select the appropriate web controls to develop the web forms	K4, K5
CO 5	Construct a database driven web applications with the facilitated web services	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	3	2	3	3	2	2	3	2.42
CO2	3	3	3	2	2	3	3	3	3	3	3	3	2.83
CO3	3	2	3	2	3	3	2	3	3	3	2	3	2.67
CO4	3	2	3	2	3	2	3	3	3	3	2	3	2.67
CO5	3	2	3	2	3	2	3	3	3	3	3	3	2.75
Mean Overall Score													2.67
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV		Core	6	5	25	75	100
Course Title		.NET WITH C# PROGRAMMING - PRACTICAL					

Learning Objectives	
LO1	Understand and apply the fundamentals of C# programming, including delegates, lambda expressions, and object-oriented programming concepts.
LO2	Develop and execute LINQ queries for efficient data manipulation, filtering, sorting, and retrieval operations.
LO3	Design interactive ASP.NET web applications using server controls, menu controls, AdRotator controls, and calendar controls
LO4	Implement state management and input validation techniques using cookies, session state, view state, and validation controls.
LO5	Create database-driven web applications using Data Grid controls and generate reports using Crystal Reports for effective data presentation

SYLLABUS		
Unit	Contents	Hours
	1. C# Basics 2. Delegates 3. Lambda Expressions 4. LINQ 5. Usage of Web Server Controls 6. Usage of AdRotator, Calendar Controls 7. Working with Validation controls 8. Menu Control 9. Cookies, View state, Session 10. Developing Database Applications using Data Grid 11. Creating Crystal Report	90

Text Book(s):
1. Kogent (2013), ASP.NET 4.5 Black Book –DreamtechPress, New Delhi
Reference Book(s):
1. Herbert Schildt, (2010), C# 4.0 The Complete Reference, Tata McGraw Hill Publications
Web Resource(s):
1. http://www.csharpkey.com/csharp/ 2. http://www.w3schools.com/aspnet/default.asp

Course Outcomes		
Upon successful completion of this course ,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Demonstrate simple programs using C# programming concepts such as classes, objects, method overloading	K2, K3
CO 2	Solve complex programs using delegates, Lambda expression and LINQ	K3, K4
CO 3	Analyze the usage of web server controls, calendar controls, validation controls and menu controls in asp.net application	K4, K5
CO 4	Evaluate the role of Cookies, View state and Session state in creating an web Application	K4, K5
CO 5	Design a data driven web application by connecting to the data sources	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	2	3	3	2	2	2	2	3	2.42
CO2	3	3	3	2	3	2	2	3	3	3	2	3	2.67
CO3	3	3	3	3	2	2	2	3	3	3	2	3	2.67
CO4	3	3	3	3	3	2	2	3	3	3	2	3	2.75
CO5	3	3	3	3	3	2	2	3	3	3	2	3	2.75
Mean Overall Score													2.65
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV		Elective-VI	4	3	25	75	100
Course Title		INTELLIGENT SYSTEM					

Learning Objectives	
LO 1	Understand the fundamental concepts of Artificial Intelligence, problem-solving techniques, production systems, and heuristic search methods used in intelligent systems.
LO 2	Apply knowledge representation techniques using predicate logic, frames, semantic structures, and rule-based approaches to model real-world problems.
LO 3	Analyze and implement reasoning mechanisms, including forward chaining, backward chaining, logic programming, matching, and control knowledge in AI applications.
LO 4	Design and develop expert systems using rule-based and fuzzy logic approaches for decision-making and problem-solving tasks.
LO 5	Explain the principles of artificial neural networks and robotics, including perceptrons, multilayer networks, Hopfield networks, robot hardware, perception, movement, and software architecture.

SYLLABUS		
Unit	Contents	Hours
I	Artificial Intelligence: AI problems-AI technique-Problem Search:-Production Systems – Problem Characteristics – Production system characteristics- Heuristic Search techniques: Generate and Test – Hill Climbing – Constraint Satisfaction, Means-end analysis	12
II	Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Frame problem –. Using Predicate Logic: Representing simple facts in logic - Representing Instance and ISA relationships – Computable functions and predicates – Resolution	12
III	Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge. Knowledge representation summary: Syntactic and Semantic spectrum of representation-Logic and slot – and filler structures- Other representational techniques	12
IV	Rule-based expert systems: Introduction- Rules as a knowledge representation technique- players- Structure- Forward chaining and backward chaining inference techniques- Fuzzy expert systems: Introduction- Fuzzy sets- Linguistic variables and hedges- Operations - Fuzzy rules- - Building a fuzzy expert system	12
V	Artificial neural networks: Neuron- perceptron- Multilayer neural networks- - The Hopfield network- Robotics: Introduction-Robot hardware-Perception Moving-Robotic software architecture	12

Text Book(s):

1. Elaine rich and Kelvin Knight, “Artificial Intelligence “, Tata McGraw hill Publication, 3rdEdition, 2009. [Unit - I,II,III] Unit I : Chapters 1, 2, 3 Unit II : Chapters 4, 5 Unit III : Chapters 6, 11
2. Artificial Intelligence: A Guide to Intelligent Systems, 3rd edition, Michael Negnevitsky, Addison Wesley, 2011.[Unit IV-Chapter 1,2,4,V-Chapter 6]
3. Artificial Intelligence a modern Approach “– Stuart Russell & Peter Norvig, 3rd Edition Pearson Education[Unit V- Chapter 25-Robotics]

Reference Book(s):

1. “Artificial Intelligence a modern Approach “– Stuart Russell & Peter Norvig, 3rd Edition, Pearson Education.
2. “Artificial Intelligence “, George F Luger , 4thEdition , Pearsons Education Publ, 2002.
3. “Foundations of Artificial Intelligent And Expert Systems”, V S Janaki Raman, K Sarukesi, P Gopalakrishnan, Macmillan India Limited

Web Resource(s):

1. <https://www.techopedia.com/definition/190/artificial-intelligence-ai>
2. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligent_systems.htm
3. <https://data-flair.training/blogs/heuristic-search-ai/>
4. <http://teaching.csse.uwa.edu.au/units/CITS7212/Lectures/Students/Fuzzy.pdf>
5. <http://engineering.nyu.edu/mechatronics/smart/pdf/Intro2Robotics.pdf>

Course Outcomes

Upon successful completion of this course ,the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Outline the applicability, strength and weakness of artificial intelligence in solving computational problems	K2, K3
CO 2	Demonstrate the role of knowledge representation, problem solving and learning in Intelligent-system engineering	K3, K4
CO 3	Identify the characteristics of AI, Knowledge representation, Experts systems and its variants with ANN and robotics.	K4, K5
CO 4	Analyze a comprehensive background in both software and hardware to work with the future of robotics and adaptive systems	K4, K5
CO 5	Assess the scientific background through various real time examples	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	3	2	2	2	2	3	2	2	2.25
CO2	3	3	3	2	3	2	3	3	3	3	2	3	2.75
CO3	3	2	3	2	3	2	2	2	3	3	3	3	2.58
CO4	3	3	3	3	3	2	3	3	3	3	3	3	2.91
CO5	3	3	3	3	3	2	2	3	3	3	3	3	2.83
Mean Overall Score													2.66
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV		Elective	4	3	25	75	100
Course Title		INTRODUCTION TO ROBOTICS					

Learning Objectives

LO 1	Understand the fundamentals of automation and robotics, including concepts, types, advantages, strategies, and their role in modern industrial applications.
LO 2	Explain the structure and operation of industrial robots, including robot components, classifications, work cells, machine vision systems, and end-of-arm tooling.
LO 3	Analyze robot sensing and actuation systems, such as tactile, proximity, vision, velocity sensors, grippers, and pneumatic, hydraulic, and electric drives.
LO 4	Apply robot kinematics, dynamics, transformations, and programming techniques to control robotic manipulators and perform automated tasks effectively
LO 5	Evaluate robotic applications in manufacturing and artificial intelligence, including material handling, vision systems, adaptive control, expert systems, autonomy, and intelligent robot operations

SYLLABUS		
Unit	Contents	Hours
I	Introduction-Definition of Automation-Mechanization Vs Automation-Advantages-Goals-Social Issues-Types-Current Emphasis in Automation-Issues in automation in Factory Operations-Strategies of Automation	12
II	Introduction -History of Robots- Definition- Laws of Robotics-Characteristics-Components-Comparison of the Human and the Robot Manipulator-Robot Wrist and End of Arm Tools-Robot Terminology-Robotic Joints-Classification Selection-Workcell-Robotics and Machine Vision-Applications	12
III	Robot Components: Sensors: Exteroceptors Sensors -Tactile Sensors -Proximity Sensors-Range Sensors-Machine Vision Sensors-Velocity Sensors-Proprioceptors-Robots with sensors- - End Effectors: Grippers-selection of grippers-Gripping mechanism- tools-Types of Grippers- Drives: Pneumatic, Hydraulic, Electric Actuators	12
IV	Transformations: Introduction to Manipulator Kinematics Homogeneous Transformations-Robot Kinematics-Manipulator Path Control-Robot Dynamics- Robot Programming Techniques: Online programming- Lead-through Programming Offline Programming-Task Level Programming-Motion Programming-Robot Programming Languages-Robot languages and its types	12
V	Applications of Robots: Robot Capabilities-Application of Robots-Manufacturing Applications-Material handling applications Robotics and Artificial Intelligence: Vision-Voice communication-Planning-Modelling-Adaptive control-Error monitoring and recovery-Autonomy and intelligence in robots Expert systems in robotics	12

Text Book(s):	
1. Gupta.A.K, Arora. S. K., Industrial Automation and Robotics, Mercury Learning and Information, 2017(Unit I,II ,III,IV,V) 2. Mikell P Groover, “Industrial Robotics”, Mc GrawHill, 2012.(Unit III: Drives :Fundamentals of Robot technology Robot Drive systems, Unit IV: Transformations) 3. D.J.Todd, “Fundamentals of Robot Technology”, An Introduction to Industrial Robots, Teleoperators and Robot Vehicles, Wiley,1986.(Unit V:Robotics and Artificial Intelligence)	
Reference Book(s):	
1. Thomas. K. Rufuss, “Robotics and Automation Handbook”, CRC Press, 2018 2. Ghoyal.K., Deepak Bhandari, “Automation and Robotics”, S.K.Kataria& Sons Publishers, 2012. 3. John.J. Craig, “Introduction to Robotics: Mechanics and Control”, Pearson, 2018. 4. Gonzalez, Fu Lee, Robotics: Control, Sensing, Vision and Intelligence, Wiley, 1998	
Web Resource(s):	
1. https://builtin.com/robotics 2. https://www.elprocus.com/robot-sensor/ 3. https://sp-automation.co.uk/the-top-seven-types-of-robots/ 4. https://robots.ieee.org/learn/types-of-robots/ 5. https://www.intel.in/content/www/in/en/robotics/types-and-applications	

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Outline the anatomy, specifications and applicability of Robotic system	K2, K3
CO 2	Demonstrate the role of kinematics and dynamic behavior of robots with programming technique	K3, K4
CO 3	Identify the characteristics and functionality of robots in various sectors.	K4, K5

CO 4	Analyze the various functionality of robotic systems with respect to software and hardware components	K4, K5
CO 5	Assess the scientific background of robotic systems through various real time examples	K5, K6

Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	2	2	3	2	2	2	2	2.16
CO2	3	2	3	3	3	3	2	3	3	3	3	2	2.75
CO3	3	2	3	3	3	3	3	3	3	3	3	2	2.83
CO4	3	3	3	3	3	3	3	3	2	3	3	2	2.83
CO5	3	3	3	2	2	2	2	3	2	3	3	2	2.5
Mean Overall Score													2.61
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV		Elective-VI	4	3	25	75	100
Course Title		VIRTUAL AND AUGMENTED REALITY					

Learning Objectives

LO 1	Understand the fundamental concepts, history, components, and technologies of Virtual Reality (VR) and Augmented Reality (AR).
LO 2	Explain the working principles and functionalities of VR input and output devices, including trackers, navigation interfaces, gesture interfaces, graphics displays, sound systems, and haptic feedback devices.
LO 3	Analyze VR system architecture, rendering pipelines, graphics architectures, programming toolkits, and scene graph-based application development
LO 4	Design and develop augmented reality experiences using appropriate hardware, software, content creation tools, and emerging AR technologies.
LO 5	Evaluate the applications of Virtual Reality and Augmented Reality in mobile, collaborative, educational, industrial, healthcare, and entertainment domains.

SYLLABUS

Unit	Contents	Hours
I	Virtual Reality: The Three I's of VR – History – Early commercial VR Technology – Components of a VR System –Input Devices: Trackers – Navigation and Manipulation Interfaces – Gesture Interfaces	12

II	Output Devices: Graphics Displays – Sound Displays – Haptic Feedback - Computer Architecture for VR: The Rendering Pipeline- PC Graphics Architecture - VR Programming: Toolkits and Scene Graphs – Traditional and Emerging Applications of VR	12
III	Augmented Reality: Introduction – Augmented Reality Concepts: Working Principle of AR – Concepts related to AR- Ingredients of an Augmented Reality Experience	12
IV	Augmented Reality Hardware– Augmented Reality Software– Software to create content for AR Application – Tools and Technologies	12
V	Augmented Reality Content: Introduction- Creating Content for Visual, Audio, and other senses – Interaction in AR - Mobile Augmented Reality: Introduction – Augmented Reality Applications Areas- Collaborative Augmented Reality	12

Text Book(s):

1. Grigore C. Burdea and Philippe Coiffet, “Virtual Reality Technology”, Wiley Student Edition , Second Edition (Unit I: Chapter 1,2 & Unit II: Chapter 3,4,6,8 & 9)
2. Alan B. Craig(2013), “Understanding Augmented Reality: Concepts and Applications”(Unit III: Chapter 1, 2, Unit IV : Chapter 3, 4 & Unit V: Chapter 5,6,8)
3. Jon Peddie (2017), “Augmented Reality: Where We Will All Live”, Springer, Ist Edition (Unit IV: Chapter 7 (Tools & Technologies)

Reference Book(s):

1. Alan Craig & William R. Sherman & Jeffrey D. Will, Morgan Kaufmann(2009), “Developing Virtual Reality Applications: Foundations of Effective Design”, Elsevier(Morgan Kaufmann Publishers)
2. Paul Mealy (2018), “Virtual and Augmented Reality”,Wiley
3. Bruno Arnaldi & Pascal Guitton & Guillaume Moreau(2018), “Virtual Reality and Augmented Reality: Myths and Realities”, Wiley

Web Resource(s):

1. Manivannan, M., (2018), “Virtual Reality Engineering,” IIT Madras, <https://nptel.ac.in/courses/121106013>
2. Dube, A., (2020), “Augmented Reality - Fundamentals and Development,” NPTEL Special Lecture Series, <https://www.youtube.com/watch?v=MGuSTAqlZ9Q>
3. <http://msl.cs.uiuc.edu/vr/>
4. [http://www.britannica.com/technology/virtual-reality/Living in -virtual-worlds](http://www.britannica.com/technology/virtual-reality/Living-in-virtual-worlds) 5. [https://mobidev.biz/blog/augmented-reality-development guide](https://mobidev.biz/blog/augmented-reality-development-guide)

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Outline the basic terminologies, techniques and applications of VR and AR	K2, K3
CO 2	Describe different architectures and principles of VR and AR systems	K3, K4
CO 3	Use suitable hardware and software technologies for different varieties of virtual and augmented reality applications	K4, K5
CO 4	Analyze and explain the behavior of VR and AR technology relates to human perception and cognition	K4, K5

CO 5	Assess the importance of VR/AR content and interactions to implement for the real-world problem	K5, K6
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Relationship Matrix:

Course Outcome s (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	2	2	2	3	2	3	3	2	2.41
CO2	3	2	3	2	3	3	3	3	3	3	3	2	2.75
CO3	3	3	3	2	2	2	2	3	3	3	3	2	2.58
CO4	3	2	3	3	2	2	2	3	3	3	3	3	2.66
CO5	3	2	3	3	2	2	3	3	3	2	3	2	2.58
Mean Overall Score													2.6
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV		Core	10	7	25	75	100
Course Title	Project with Viva Voce						

Introduction

The Project Work course is an integral component of the M.Sc. Information Technology programme. It provides students with an opportunity to apply advanced theoretical knowledge, technical skills, and research methodologies acquired during the programme to solve real-world problems. The project work encourages innovation, critical thinking, software development expertise, research aptitude, and professional competency in Information Technology.

The project may involve software development, system design, data analytics, artificial intelligence applications, cybersecurity solutions, cloud computing, networking, mobile computing, Internet of Things (IoT), blockchain, virtual reality, augmented reality, or interdisciplinary IT-based solutions.

The project work shall promote independent learning, problem-solving ability, teamwork, ethical practices, leadership qualities, and lifelong learning among postgraduate students.

Objectives of Project Work

The Project Work aims to:

1. Enable students to apply advanced Information Technology concepts and methodologies to solve real-world problems.
2. Develop analytical, research, design, implementation, testing, and evaluation skills.

3. Enhance software development, system integration, database design, and deployment competencies.
4. Promote innovation, creativity, entrepreneurship, and independent learning.

Strengthen communication and documentation skills through technical report writing, presentations, demonstrations, and viva voce examinations.

5. Encourage ethical practices, teamwork, leadership qualities, and professional responsibility.
6. Provide exposure to emerging technologies and industry-oriented applications.

General Guidelines for Project Work

1. Project work may be carried out individually.
2. The project topic shall be selected in consultation with the Project Guide and approved by the Head of the Department.
3. The project topic shall be relevant to Information Technology and may address:
 - Software Development
 - Web and Mobile Applications
 - Artificial Intelligence and Machine Learning
 - Data Science and Analytics
 - Cloud Computing
 - Cyber Security
 - Internet of Things (IoT)
 - Blockchain Technology
 - Networking and Distributed Systems
 - Virtual Reality and Augmented Reality
 - Database Management Systems
 - Educational Technologies
 - E-Governance Applications
 - Smart Systems and Automation
 - Industry-oriented Applications
 - Research-oriented Studies
 - Entrepreneurship and Startup-based Projects
 - Socially Relevant IT Solutions
4. Students shall submit a Project Proposal containing:
 - Title of the Project
 - Problem Statement
 - Objectives
 - Scope of the Study
 - Literature Survey
 - Methodology
 - Tools and Technologies
 - Expected Outcomes
 - Project Schedule / Timeline
5. Each student shall work under the supervision of a faculty member assigned as Project Guide.
6. Students shall meet the Project Guide periodically for monitoring and assessment of progress.
7. A minimum of **three review presentations** shall be conducted during the semester.
8. Students shall maintain proper documentation related to:
 - Literature Survey
 - Requirement Analysis
 - System Design
 - Database Design
 - Coding and Testing
 - Experimental Results
 - Data Collection and Analysis
 - Validation and Evaluation
 - Progress Reports
9. Software-based projects shall include:
 - System Analysis

- Design Documentation
- Database Design
- Implementation
- Testing
- User Documentation

10. Research-oriented projects shall include:

- Literature Review
- Research Methodology
- Experimental Setup
- Data Analysis
- Performance Evaluation
- Comparative Analysis

11. Students shall ensure originality in project work and avoid plagiarism or unethical practices.

12. Industry-based, interdisciplinary, startup-oriented, and community-oriented projects are highly encouraged.

13. Projects involving software development, experimentation, surveys, field studies, or data analysis shall include proper validation and documentation.

14. The final project report shall ordinarily contain **80–120 pages**, excluding appendices and references.

15. Students shall submit:

- Two hard copies of the project report
- One soft copy in PDF format

before the commencement of the viva voce examination.

16. The project shall be evaluated through:

- Internal Assessment
- Project Report Evaluation
- Project Demonstration / Presentation
- Viva Voce Examination

17. The decision of the evaluation board regarding award of marks shall be final.

Project Report Format

The Project Report shall normally contain:

1. Title Page
2. Bonafide Certificate
3. Declaration by Student
4. Acknowledgement
5. Abstract
6. Table of Contents
7. List of Tables
8. List of Figures
9. List of Abbreviations (if any)
10. Introduction
11. Review of Literature
12. Problem Statement
13. Objectives of the Study
14. Methodology / System Design
15. Analysis and Design
16. Implementation
17. Testing and Validation

Results and Discussion

18. Conclusion
19. Future Scope
20. References / Bibliography
21. Appendices (if any)

Viva Voce Board

The Viva Voce Board shall consist of:

- External Examiner
- Head of the Department
- Internal Examiner / Project Guide

External Evaluation (End Semester Examination – 75 Marks)

Component	Marks
Project Report Evaluation	30
Project Demonstration / Presentation	25
Viva Voce Examination	20
Total	75 Marks

Internal Assessment (CIA – 25 Marks)

Continuous Project Evaluation – 15 Marks

Component	Marks
Problem Identification & Proposal	3
Literature Survey & Methodology	4
Design / Development Progress	4
Review Presentation	4
Total	15 Marks

Assessment Component	Marks
Internal Assessment (CIA)	25
External Evaluation (ESE)	75
Grand Total	100 Marks

Resubmission of Project by Unsuccessful Candidates

Students who are declared unsuccessful in the Project Work or Viva Voce Examination shall be permitted to resubmit the project in the subsequent semester/year as per University regulations.

The unsuccessful candidates may:

- Revise and improve the existing project based on the recommendations of the evaluation board, or
- Undertake a new project topic with the approval of the Project Guide and Head of the Department.

The resubmitted project shall be evaluated following the same procedure prescribed for regular project evaluation, including project report submission, demonstration/presentation, and viva voce examination.

Absence in Project Evaluation / Viva Voce Examination

Candidates who are absent for the Project Evaluation, Demonstration, Presentation, or Viva Voce

Examination shall be treated as absent for the Project Work Examination and shall reappear in the subsequent semester/year as per University regulations.

Such candidates may continue the same project with necessary modifications or undertake a new project with the approval of the Project Guide and Head of the Department.

Suggested Areas for Project Work

Students may undertake projects in areas such as:

- Artificial Intelligence and Machine Learning
- Data Science and Big Data Analytics
- Cloud Computing
- Cyber Security and Digital Forensics
- Internet of Things (IoT)
- Blockchain Applications
- Mobile Application Development
- Web Application Development
- Computer Vision and Image Processing
- Natural Language Processing
- AR/VR Applications
- Network Administration and Security
- Software Engineering
- Database Systems
- Smart Healthcare Systems
- Smart Agriculture Applications
- E-Governance Solutions
- FinTech Applications
- Educational Technology
- Industry 4.0 Applications
- Startup and Innovation Projects
- Social Impact Applications
- Interdisciplinary Research Projects

Expected Learning Outcomes

Upon successful completion of the Project Work, students will be able to:

1. Identify, formulate, and analyze complex Information Technology problems.
2. Apply advanced computing knowledge, tools, and technologies to design and develop effective solutions.
3. Conduct independent research and critically evaluate outcomes.
4. Develop and implement software systems that satisfy user and organizational requirements.
5. Demonstrate professional communication skills through technical reports, presentations, and project demonstrations.
6. Work effectively as an individual and as a member of a team with ethical and professional responsibility.
7. Engage in self-directed learning and adapt to emerging technologies and industry requirements.
8. Exhibit innovation, creativity, leadership, and lifelong learning competencies.

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV		SEC-III	4	2	25	75	100
Course Title		Professional Competency Skill Enhancement Course					

Guidelines for Professional Competency Skill Enhancement Course

Term Paper and Seminar Presentation

Introduction

The Professional Competency Skill Enhancement Course is designed to improve students' professional knowledge, technical competency, communication skills, presentation abilities, research aptitude, and self-learning capabilities. The course provides opportunities for students to explore advanced and emerging technologies beyond the regular curriculum through independent study, technical report preparation, seminar presentation, and viva voce examination.

The course encourages students to analyze current trends, technological innovations, industry practices, and research developments in Information Technology and related disciplines.

Objectives

The course aims to:

1. Develop self-learning and independent study skills among students.
2. Enhance technical knowledge in advanced and emerging technologies.
3. Improve research, analytical, and critical thinking abilities.
4. Strengthen technical writing and documentation skills.
5. Develop presentation, communication, and professional competencies.
6. Encourage continuous learning and awareness of current technological developments.
7. Prepare students for higher studies, research, entrepreneurship, and industry requirements.

General Guidelines

1. Each student shall be assigned an advanced technology topic by a faculty supervisor.
2. The topic shall be relevant to Information Technology and may be selected from emerging areas such as:
 - Artificial Intelligence
 - Machine Learning
 - Deep Learning
 - Data Science
 - Big Data Analytics
 - Cloud Computing
 - Cyber Security
 - Blockchain Technology
 - Internet of Things (IoT)
 - Augmented Reality (AR)
 - Virtual Reality (VR)
 - Robotics
 - Edge Computing
 - Quantum Computing
 - Digital Forensics
 - Computer Vision
 - Natural Language Processing

- Smart Systems
 - Industry 4.0
 - Green Computing
 - FinTech Technologies
 - Other emerging technologies approved by the supervisor
3. Students shall conduct an extensive literature survey and collect information from:
 - Books
 - Research Journals
 - Conference Proceedings
 - Technical Reports
 - Standards and White Papers
 - Reputed Online Resources
 4. Students shall prepare a comprehensive Term Paper based on the assigned topic.
 5. The Term Paper shall ordinarily contain **30 to 50 pages** excluding appendices and references.
 6. The report shall be submitted in soft-bound format along with a soft copy in PDF format.
 7. Students shall present the assigned topic during the scheduled seminar sessions.
 8. The seminar presentation shall normally include:
 - Introduction
 - Background Study
 - Literature Review
 - Technical Concepts
 - Current Developments
 - Applications
 - Advantages and Limitations
 - Future Scope
 - Conclusion
 - References
 9. Students shall use appropriate presentation tools and audio-visual aids during the seminar.
 10. The faculty supervisor shall monitor the progress and guide students throughout the preparation process.
 11. Students shall ensure originality in the preparation of the term paper and avoid plagiarism and unethical practices.
 12. Proper citations and references shall be provided for all sources used.

Term Paper Format

The Term Paper shall normally contain:

1. Title Page
2. Bonafide Certificate
3. Declaration
4. Acknowledgement
5. Abstract
6. Table of Contents
7. List of Figures
8. List of Tables
9. Introduction
10. Literature Survey
11. Technical Background
12. Core Concepts and Architecture
13. Recent Developments
14. Applications and Case Studies
15. Challenges and Limitations
16. Future Trends
17. Conclusion
18. References / Bibliography
19. Appendices (if any)

Evaluation Scheme

External Evaluation (75 Marks)

Component	Marks
Term Paper Evaluation	30
Seminar Presentation	25
Viva Voce Examination	20
Total	75 Marks

Assessment Component	Marks
Internal Assessment (CIA)	25
External Evaluation (ESE)	75
Grand Total	100 Marks

Viva Voce Board

The Viva Voce Examination shall be conducted by:

- External Examiner
- Head of the Department
- Internal Examiner / Faculty Supervisor

The evaluation process shall be similar to the Project Viva Voce Examination.

Expected Learning Outcomes

Upon successful completion of the course, students will be able to:

1. Demonstrate in-depth understanding of advanced and emerging technologies.
2. Conduct literature surveys and critically analyze technical information.
3. Prepare professional technical reports and scholarly documents.
4. Communicate technical concepts effectively through seminar presentations.
5. Develop research aptitude, analytical thinking, and problem-solving skills.
6. Exhibit professional competency, self-learning ability, and lifelong learning attitudes.
7. Enhance confidence in technical discussions, presentations, and viva voce examinations.