SEMESTER 5

PERIOD: AUGUST 2023-DECEMBER 2023

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Information Technology, Programme: Information Technology

Vision
To evolve into a centre of excellence in information technology by creation and exchange of knowledge through leading edge research, innovation and services, which will in turn contribute towards solving complex societal problems and thus building a peaceful and prosperous mankind.

Mission
To impart high quality technical education, research training, professionalism and strong ethical values in the young minds for ensuring their productive careers in industry and academia so as to work with a commitment to the betterment of mankind.

Programme Educational Objectives (PEO)
Graduates of Information Technology program shall

PEO 1: Have strong technical foundation for successful professional careers and to evolve as key- players/ entrepreneurs in the field of information technology.

PEO 2: Excel in analyzing, formulating and solving engineering problems to promote life-long learning, to develop applications, resulting in the betterment of the society.

PEO 3: Have leadership skills and awareness on professional ethics and codes.

Programme Outcomes (PO)
Information Technology Program Students will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental

considerations.
PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6.The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7.Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9.Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11.Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO)
Information Technology Program Students will be able to:

PSO1: Acquire skills to design, analyze and develop algorithms and implement those using high- level programming languages.

PSO2: Contribute their engineering skills in computing and information engineering domains like network design and administration, database design and knowledge engineering.

PSO3: Develop strong skills in systematic planning, developing, testing, implementing and providing IT solutions for different domains which helps in the betterment of life.

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S I N o	Subject Code	Name	Faculty in-charge	Week
1	101004/IT500A	WEB APPLICATION DEVELOPMENT	Dr.Nikhila T Bhuvan	WEEK 1
2	101004/IT500B	OPERATING SYSTEM CONCEPTS	Mr.Ajith Jacob	WEEK 2
3	101004/IT500C	DATA COMMUNICATION AND NETWORKING	Ms.Jeshmol	WEEK 3
4	101004/IT500D	FORMAL LANGUAGES AND AUTOMATA THEORY	Dr.Vidhya P M	WEEK 4
5	101902/IT500E	MANAGEMENT FOR SOFTWARE ENGINEERS	Ms.Divya James	WEEK 5
6	101908/CO500F	DISASTER MANAGEMENT	Ms.Taniya	WEEK 6
7	101004/IT500A	WEB APPLICATION DEVELOPMENT	Dr.Nikhila T Bhuvan	WEEK 7
8	101004/IT500B	OPERATING SYSTEM CONCEPTS	Mr.Ajith Jacob	WEEK 8
9	101004/IT500C	DATA COMMUNICATION AND NETWORKING	Ms.Jeshmol	WEEK 9

10	101004/IT500D	FORMAL LANGUAGES AND AUTOMATA THEORY	Dr.Vidhya P M	WEEK 10
11	101902/IT500E	MANAGEMENT FOR SOFTWARE ENGINEERS	Ms.Divya James	WEEK 11
12	101908/CO500F	DISASTER MANAGEMENT	Ms.Taniya	WEEK 12

1. **Assignment Schedule**

101004/IT500A Web Application Development

COURSE INFORMATION SHEET

PROGRAMME: **Information Technology**	DEGREE: **B.TECH**
COURSE:**Web Application Development**	SEMESTER:**Fifth** CREDITS: **4**
COURSE CODE: 101004/IT500A REGULATION:**2021**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: **Programming**	CONTACT HOURS: **3L,1T hours/ Week**
CORRESPONDING LAB COURSE CODE (IF ANY):100004/IT522A	LAB COURSE NAME:**Web Application Development Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Module 1: INTRODUCTION TO WEB DESIGNING Web Design Basics: Who is the Site For?, Why People Visit your Website?, What Information Your Visitors Need?, Site maps, wireframes, Getting your message across using design, Visual hierarchy, grouping and similarity, Designing Navigation, Search Engine Optimization (SEO), Analytics, Domain Names & Hosting, Ftp & Third party tools. HTML5: Introduction to HTML5, Basic Structure for HTML, Basic HTML tags -Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, Internal inking, meta elements, New HTML5 Form input Types, input and data list elements, autocomplete Attribute, Page-Structure Elements	8
II	Module 2: STYLE WITH CSS Introduction to CSS: Introduction to CSS, Block and Inline Elements, Inline Styles, using internal CSS, using external CSS, How CSS rules cascade, inheritance, why use external style sheets? CSS3 Basics: CSS selectors, color: foreground color, background color, contrast, opacity; text: Typeface terminology, Specifying Typefaces, font -size, font -weight, font -style, text-transform, text-decoration, line-height, letter-spacing, word-spacing, text-align, vertical-align, text-indent, text-shadow; responding to users; box: box dimensions, limiting width, limiting height, overflow; border margin and padding, centering content, change inline/blocks, hiding boxes, box shadows, rounded corners; list tables and forms: list-style, table properties, styling forms, styling text input Layout and positioning: layout: key concepts in positioning elements, controlling the position of elements: relative positioning, absolute positioning, fixed positioning, z -index, float, clear, creating multi column layout with float, fixed width layout, liquid layout, layout grids, Images: controlling size of images in CSS, aligning images using CSS, centering images using CSS, background images, gradients, Media Queries	9
III	Module 3: INTRODUCTION TO JAVASCRIPT JavaScript: How JavaScript makes the webpages more interactive, examples of JavaScript in browser, Basic JavaScript instructions: statements, comments, variable, data types, arrays, expressions, operators; functions methods and objects: function,	9

	anonymous function, variable scope, object, this, arrays are objects, browser object model, document object model, Global objects: string, number, math, date. Decision making and Loops: decision making: if statement, if...else statement, switch statement, loops:key loop concepts, for loops, while loops, do while loops; DOM: Document Object Model (DOM), the DOM tree as a model of a web page, working with DOM tree, accessing elements, nodelists, selecting elements: using class attribute, tag name, CSS selectors; repeating actions for an entire nodelist, looping through a nodelist, traversing the DOM, adding or removing html content, update text and markup, adding/removing elements Event handling: different event types and ways to bind an event to an element: using DOM event handlers, using event listeners, using parameters with event listeners; the event object, event delegation, user interface events, event bubbling	
IV	Module 4: JAVASCRIPT ADVANCED ECMA Script: ECMA Script versions, ES5 Features, ES6 introduction, Var Declarations and Hoisting, let declaration, Constant declaration, function with default parameter values, default parameter expressions, unnamed parameters, the spread operator, arrow functions, object destructuring, array destructuring, sets and maps, Array.find(), Array.findIndex(), template strings, Javascript classes, callbacks, promises, async/await AJAX: What is Ajax? , Why use Ajax?, How Ajax works?, Handling Ajax request and response, data formats: XML, JSON; Working with JSON data, Loading HTML with Ajax, Loading XML with Ajax, Loading JSON with Ajax, working with data from other servers JQuery : What is JQuery ?, A basic JQuery example, Why use JQuery ?, finding elements, JQuery selection, getting element content, updating elements, changing content, inserting elements, adding new content, getting and setting attributes, getting and sett ing CSS properties, using .each(), events, event object, effects, animating CSS properties, using animation, traversing the DOM, working with forms, JavaScript libraries, JQuery and Ajax	10
V	Module 5: BACK END DEVELOPMENT Web Servers: Introduction, HTTP Transactions, Multitier Application Architecture, Client - Side Scripting versus Server-Side Scripting, Accessing Web Servers. Server Side Scripting with Node.js: Getting to know node, node.js changed JavaScript forever, features of node, when to use and not use node, asynchronous callbacks, the NoSql movement, node and MongoDB in the wild, Hello World in Node, package.json, modules, Built-in Modules: FS Module, HTTP Module, Events; Node Package Manager(npm), web server using http, node.js with express, middleware, routing in express, CRUD operations in express, web server using express, making it live on Heroku Node.js with MongoDB: basics of MongoDB, MongoDB CRUD Operations, Building a data model with MongoDB and Mongoose, Defining simple mongoose schemas, build node express app with MongoDB	9
TOTAL HOURS		45

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, "Internet and World Wide Web How To Program", 5/E, Pearson Education, 2012. 2. Jon Duckett , "HTML and CSS: Design and Build Websites", Wiley 3. Jon Duckett , "JavaScript and JQuery : Interactive Front –End Web Development", Wiley 4. Nicholas C. Zakas, "Understanding ECMAScript 6: The Definitive Guide for JavaScript Developers"
R	1. Alex Young, Marc Harter, "Node js in practice", Manning. 2. Json Krol , "Web Development with MongoDB and node js", Packt 3. Krishna Rungta , "Node JS: learn in one day

COURSE PRE-REQUISITES: Basics of Programming

COURSE OBJECTIVES:

Web Application Development course is intended to deliver the elementary concepts of Web Application Development with HTML, CSS, JavaScript, JQuery, Node JS and MongoDB thereby equipping them to develop real time web applications.

COURSE OUTCOMES: After the completion of the course the student will be able to

CO1	Identify HTML5 elements in webpages (Cognitive Knowledge Level 2:Understand)
CO2	Implement Cascading Stylesheet to add style in HTML pages (Cognitive Knowledge Level 3: Apply)
CO3	Apply JavaScript to add functionality to web pages (Cognitive Knowledge Level 3: Apply)
CO4	Use Ajax & JQuery to enhance the functioning of web pages (Cognitive Knowledge Level 3: Apply)
CO5	Develop web applications with HTML, CSS, JavaScript, Node JS and MongoDB (Cognitive Knowledge Level 3: Apply)

CO-PO AND CO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2		2								3		3
CO2	1	2	2		2								3		3

CO3	2	2	1		2								3		3
CO4	2	2	1		3							1	3		3
CO5	2	3	1	1	3							2	3	2	3

JUSTIFICATIONS FOR CO-PO/PSO MAPPING

MAPPING	**LOW /MEDIUM/HIGH**	**JUSTIFICATION**
CO1-PO1	L	The knowledge in designing methodologies helps in designing solutions for engineering fundamentals.
CO1-PO2	M	The knowledge in designing methodologies helps in designing solutions for engineering sciences.
CO1-PO3	M	The knowledge in designing components helps in designing system components.
CO1-PO5	M	The knowledge in HTML5 elements helps in Creating, selecting, and applying appropriate techniques, resources, and modern engineering and IT tools
CO1-PSO1	H	The knowledge in HTML5 elements helps in acquiring skills to design and develop in high level programming languages.
CO1-PSO3	H	The knowledge in HTML5 elements helps in developing strong skills in design and implementing IT solutions in different domains.
CO2-PO1	L	The knowledge in designing styles methodologies helps in designing solutions for engineering fundamentals.
CO2-PO2	M	The knowledge in designing styles methodologies helps in designing solutions for engineering sciences.
CO2-PO3	M	The knowledge in designing style components helps in designing system components.
CO2-PO5	M	The knowledge in CSS elements helps in Creating, selecting, and applying appropriate techniques, resources, and modern engineering and IT tools
CO2-PSO1	H	The knowledge in CSS helps in acquiring skills to design and develop in high level programming languages
CO2-PSO3	H	The knowledge in CSS elements helps in developing strong skills in design and implementing IT solutions in different domains.
CO3-PO1	M	The knowledge in JavaScript programming helps in designing solutions for complex engineering problems.
CO3-PO2	M	The knowledge in JavaScript programming helps in formulating and analyzing complex engineering problems for engineering sciences.
CO3-PO3	L	The knowledge in JavaScript programming helps to design solutions for complex engineering problems.
CO3-PO5	M	The knowledge in JavaScript Programming helps in Creating, selecting, and applying appropriate techniques, resources, and modern engineering and IT tools
CO3-PSO1	H	The knowledge in JavaScript helps in acquiring skills to design and develop in

		high level programming languages
CO3-PSO3	H	The knowledge in JavaScript elements helps in developing strong skills in design and implementing IT solutions in different domains.
CO4-PO1	M	The knowledge in Ajax & JQuery helps in designing solutions for complex engineering problems.
CO4-PO2	M	The knowledge in Ajax & JQuery helps in formulating and analyzing complex engineering problems for engineering sciences.
CO4-PO3	L	The knowledge in Ajax & JQuery helps to design system components.
CO4-PO5	M	The use of Ajax & JQuery helps in Creating, selecting, and applying appropriate techniques, resources, and modern engineering and IT tools
CO4-PO12	L	The use of Ajax & JQuery helps to recognize the need for broadest changes in context of technology.
CO4-PSO1	H	The use of Ajax & JQuery helps in acquiring skills to design and develop in high level programming languages
CO4-PSO3	H	The knowledge in Ajax & JQuery helps in developing strong skills in design and implementing IT solutions in different domains.
CO5-PO1	M	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps in designing engineering specialization for complex engineering problems.
CO5-PO2	H	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps in formulating and analyzing complex engineering problems for engineering sciences.
CO5-PO3	L	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps to design system components.
CO5-PO4	L	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps in research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
CO5-PO5	H	The use of HTML, CSS, JavaScript, Node JS and MongoDB helps in Creating, selecting, and applying appropriate techniques, resources, and modern engineering and IT tools
CO5-PO12	M	The use of HTML, CSS, JavaScript, Node JS and MongoDB helps to recognize the need for broadest changes in context of technology.
CO5-PSO1	H	The use of HTML, CSS, JavaScript, Node JS and MongoDB helps in acquiring skills to design and develop in high level programming languages
CO5-PSO2	M	The use of Node JS and MongoDB contribute engineering skills in database design.
CO5-PSO3	H	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps in developing strong skills in design and implementing IT solutions in different domains.

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SNO	DESCRIPTION	PROPOSED ACTIONS	PO	PSO
1	Web application testing improvise the performance	Provide learning material	7,11	1,2,3

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

SNO	DESCRIPTION	PO	PSO
1	Authentication, Authorization, Personalization, OWASP	1,3,4	1,2,3

WEB SOURCE REFERENCES:

1	https://dataman.bioinformatics.ic.ac.uk/computer_skills/lectures/htmlcss.pdf
2	https://github.com/PacktPublishing/HTML-CSS-and-JavaScript-for-Beginners---A-Web-Design-Course/find/master
3	https://buildmedia.readthedocs.org/media/pdf/htmlguide/latest/htmlguide.pdf
4	http://projanco.com/Library/Ajax%20Programming%20for%20the%20Absolute%20Beginner.pdf
5	https://www.tutorialspoint.com/jquery/jquery_tutorial.pdf

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✔ CHALK & TALK	✔ STUD. ASSIGNMENT	✔ WEB RESOURCES
✔ LCD/SMART BOARDS	✔ STUD. SEMINARS	✔ ADD-ON COURSES

ASSESSMENT METHODOLOGIES-DIRECT

✔ ASSIGNMENTS	✔ STUD. SEMINARS	✔ TESTS/MODEL EXAMS	✔ UNIV. EXAMINATION
✔ STUD. LAB PRACTICES	✔ STUD. VIVA	✔ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

✔ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	✔ STUDENT FEEDBACK ON FACULTY (TWICE)

✔ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by

Dr.Nikhila T Bhuvan

Approved by
Dr.Neeba E A
(HOD)

Course Plan

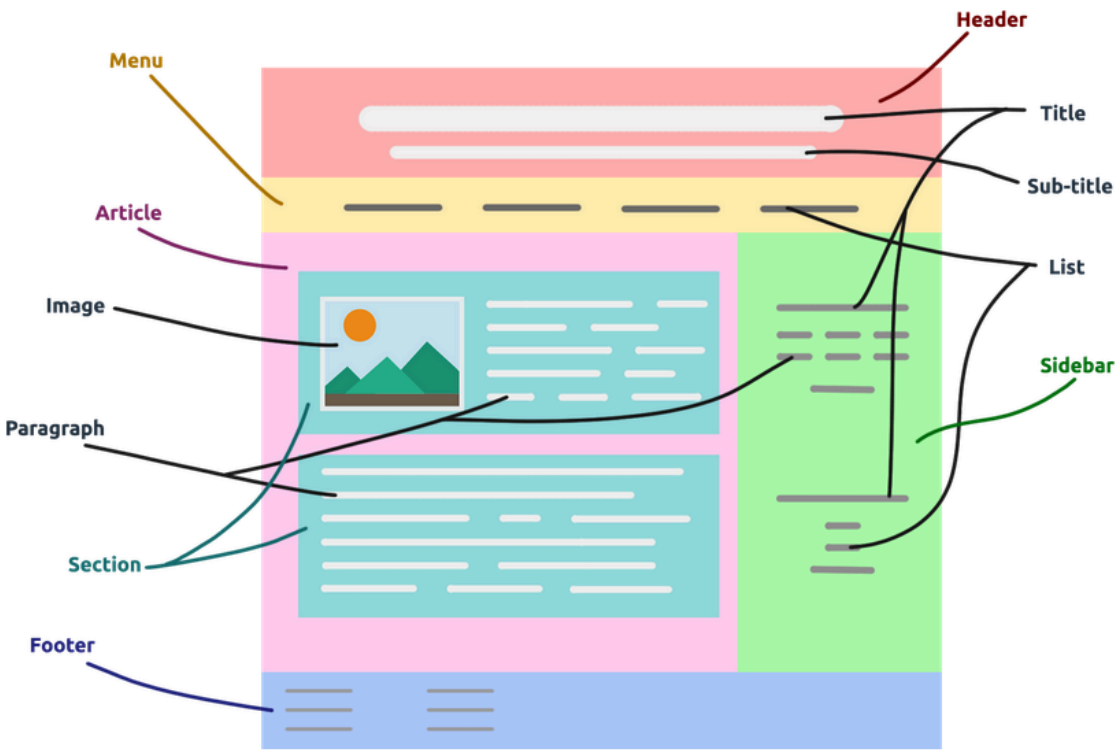
No	Topics	No of Lectures (in hours)
1	Introduction to web designing	8
1.1	Web Design Basics: Who is the Site For?, Why People Visit your Website, What Information Your Visitors Need?, Site maps, wireframes, Getting your message across using design, Visual hierarchy, grouping and similarity, Designing Navigation, Search Engine Optimization (SEO), Analytics, Domain Names & Hosting, Ftp & Third party tools	2
1.2	HTML5: Introduction to HTML5, Basic Structure for HTML, Basic HTML tags -Headings, Linking, Images, Special Characters and Horizontal Rules	2
1.3	Lists, Tables, Forms, Internal Linking, meta elements, New HTML5 Form input Types	2
1.4	input and data list elements, autocomplete Attribute, Page-Structure Elements	2
2	Style with CSS	9
2.1	Introduction To CSS: Introduction to CSS, Block and Inline Elements, Inline Styles, Using internal CSS, Using external CSS, How CSS rules cascade, inheritance, why use external style sheets?	2
2.2	CSS3 Basics: CSS selectors, color: foreground color, background color, contrast, opacity; text: Typeface terminology, Specifying Typefaces, font -size, font -weight, font -style, text-transform, text - decoration, line -height, letter-spacing, word -spacing, text-align, vertical-align, text-indent, text -shadow; responding to users; box: box dimensions, limiting width, limiting height, overflow; border margin and padding, centering content, change inline/blocks, hiding boxes, box shadows, rounded corners	2
2.3	list tables and forms: list-style, table properties, styling forms, styling text input	1

2.4	Layout and positioning: layout: key concepts in positioning elements, controlling the position of elements: relative positioning, absolute positioning, fixed positioning, z -index, float, clear, creating multi column layout with float, fixed width layout, liquid layout, layout grids,	2
2.5	Images: controlling size of images in CSS, aligning images using CSS, centering images using CSS, background images, gradients, Media Queries	2
3	Introduction To JavaScript	9
3.1	JavaScript: How JavaScript makes the webpages more interactive, examples of JavaScript in browser, Basic JavaScript instructions: statements, comments, variable, data types, arrays, expressions, operators; functions methods and objects: function, anonymous function, variable scope, object, this, arrays are objects, browser object model, document object model, Global objects: string, number, math, date;	2
3.2	Decision making and Loops: decision making: if statement, if...else statement, switch statement, loops: key loop concepts, for loops, while loops, do while loops;	2
3.3	DOM: Document Object Model (DOM), the DOM tree as a model of a web page, working with DOM tree, accessing elements, nodelists, selecting elements: using class attribute, tag name, CSS selectors; repeating actions for an entire nodelist, looping through a nodelist,	2
3.4	traversing the DOM, adding or removing html content, update text and markup, adding/removing elements	1
3.5	Event handling: different event types, three ways to bind an event to an element, using DOM event handlers, using event listeners, using parameters with event listeners, the event object, event delegation, user interface events, event bubbling	2
4	JavaScript Advanced	10
4.1	ECMA Script: ECMA Script versions, ES5 Features, ES6 introduction, Var Declarations and Hoisting, let declaration, Constant declaration, function with default parameter values, default parameter expressions, unnamed parameters, the spread operator, arrow functions, object destructuring, array destructuring, sets and maps, Array.find, Array. findIndex, template strings	2
4.2	JavaScript classes, callbacks, promises, async/await	1
4.3 4.4	AJAX: What is Ajax?, Why use Ajax?, How Ajax works?, Handling Ajax request and response, data formats: XML, JSON; Working with JSON data, Loading HTML with Ajax	2

4.5	Loading XML with Ajax, Loading JSON with Ajax, working with data from other servers	1
4.6	JQUERY : What is JQuery ?, A basic JQuery example, Why use JQuery ?, finding elements, JQuery selection, getting element content, updating elements, changing content, inserting elements, adding new content, getting and setting attributes	2
4.7	getting and setting CSS properties, using .each(), events, event object, effects, animating CSS properties, using animation, traversing the DOM, working with forms, JavaScript libraries, JQuery and Ajax	2
5	Back End Development	9
5.1	Web Servers: Introduction, HTTP Transactions, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, Accessing Web Servers.	2
5.2	Server Side Scripting with Node.js: Getting to know node, node.js changed JavaScript forever, features of node, when to use and not use node, asynchronous callbacks, the NoSql movement, node and MongoDB in the wild, Hello World in Node, package.json, modules,	2
5.3	Built-in Modules: FS Module, HTTP Module, Events; Node Package Manager(npm), web server using http, node.js with express, middleware, routing in express, CRUD operations in express, web server using express, making it live on Heroku	2
5.4	Node.js with MongoDB: basics of MongoDB, MongoDB CRUD Operations, Building a data model with MongoDB and Mongoose	2
5.5	Defining simple mongoose schemas, build node express app with MongoDB	1

Tutorial-1

1. Design a simple webpage with the attached format that promotes an item/entity



Tutorial-2

1. Getting elements in jQuery
2. Updating elements using jQuery
3. inserting elements using jQuery

Assignment 1

1. Can id and class property be used on styling the same tag. Explain with the help of an example.
2. Write notes on styling links in a webpage

3. Write notes on the background properties like:

•background-attachment

•background-position

•background (shorthand property)

4. Compare and <table>tags.With the help of reasoning and examples justify why is preferred over <table>

Assignment 2

1.Explain the concepts of AJAX (Asynchronous JavaScript and XML) and how it is used to make asynchronous requests. Compare the traditional XMLHttpRequest with the newer Fetch API, and provide examples of making API calls.

2.What is Multitier Application Architecture?

3. Differentiate between Client- Side Scripting versus Server-Side Scripting.

4.Explain the key concepts of Node.js and discuss its role in server-side JavaScript development. Highlight the event-driven, non-blocking I/O model, the CommonJS module system, and the use of the V8 JavaScript engine. Provide examples to illustrate these concepts.

Group Project as Assignment 2:

All group should have a ppt for the presentation

Group 1:
Compare the traditional XMLHttpRequest with the newer Fetch API, and provide examples of making API calls. Implement the same program to retrieve Patient id, Country and diagnosed condition with JSON data using Fetch API
Fetch from the given link: https://raw-tutorial.s3.eu-west-1.amazonaws.com/patients.json

Neha Thomas
Liya
Ayin
Lakshmi
Johan
Fathima

Group 2

Create a web application to demonstrate the use of :

1. fs.appendFile()
2. fs.open()
3. fs.writeFile()
4. fs.unlink()

Shon
Robin
Meghna
Anand
Janice
Rocky

Group 3

Create a web application to demonstrate the installation of node Js

Richard
Neeraj
Jaseer
Eric
Gowri
Juvana

100004/IT500B

OPERATING SYSTEM CONCEPTS

1

COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE AND BUSINESS SYSTEMS	**DEGREE: BTECH**
COURSE: **OPERATING SYSTEMS CONCEPTS**	SEMESTER: V CREDITS: 4
COURSE CODE: **100004/IT500B** REGULATION: 2021	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: SYSTEM SOFTWARE	CONTACT HOURS: **3+1(Tutorial) hours/Week.**
CORRESPONDING LAB COURSE CODE (IF ANY):CSL 204	LAB COURSE NAME: 100004/IT522S OPERATING SYSTEM AND NETWORK PROGRAMMING LAB

SYLLABUS:

1

UNIT	DETAILS	HOURS
I	**Operating Systems**: Introduction, Functions of OS, Types of OS (Batch, Multi programmed, Time-sharing and Real time systems) –System calls – System Programs –– System structure (Simple structure, Layered approach, Microkernel system structure, Modules)– Kernel, Shell.	7
II	**Process Management:** Process concept, Process State, PCB, Operations on processes, Multithreading-Benefits. **Process Scheduling:** Basic concepts, Preemptive Scheduling, Dispatcher, Scheduling criteria, Scheduling Algorithms (FCFS, SJF, Priority scheduling, Round Robin Scheduling, Multi level queue scheduling, Multi level feedback queue scheduling). **Inter process communication** (Shared memory, message passing, pipes and socket).	11
III	**Process Synchronization**: Race Conditions - Critical Sections – Mutual Exclusion - Busy Waiting - Sleep and Wakeup - Semaphores – Monitors (Introduction). **Deadlocks**: Deadlock characteristics - conditions for deadlock - prevention – avoidance (Safe state, Resource –Allocation Graph**,** Banker's algorithm) - deadlock detection – recovery from dead lock.	11
IV	**Memory Management**: Basics - Swapping -Memory Allocation (fixed partitions, variable partitions) Fragmentation - Paging - Segmentation - Virtual memory concepts – Demand paging - Page replacement algorithms (FIFO, Optimal, LRU) – Allocation of frames - Thrashing.	9
V	**Storage Management:** File System: Introduction, File concept – File Attributes, File Operations, File Types, File structure- File access methods (Sequential Access, Direct Access, Indexed Access)– File allocation methods (Contiguous, linked and indexed allocation), Directory structure (Single-Level, Two-Level, Tree-Structured, Acyclic Graph, General Graph)– Directory implementation (Linear list, Hash table). Disk Management: Introduction, Disk Scheduling algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK)	6
	TOTAL HOURS	45

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION

T	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, ' Operating System Concepts' 9th Edition, Wiley India 2015.Samanta D., Classic Data Structures, Prentice Hall India.
R1	Andrew S Tanenbaum, "Modern Operating Systems" , 4th Edition, Prentice Hall, 2015.
R2	William Stallings, "Operating systems", 6th Edition, Pearson, Global Edition, 2015.
R3	Garry Nutt, Nabendu Chaki, Sarmistha Neogy, "Operating Systems", 3rd Edition, Pearson Education.
R4	D.M.Dhamdhere, "Operating Systems", 2nd Edition, Tata McGraw Hill, 2011.
R5	Sibsankar Haldar, Alex A Aravind, "Operating Systems", Pearson Education.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
EST 102	Programming in C (EST 102)	Fundamentals of C programming	S2
CST 201	Data Structures	Basics of Data Structures	S3

COURSE OBJECTIVES:

1	To understand the overall working of computer system, tradeoffs between performance and functionality and the division of jobs between hardware and software.
2	To introduce the concepts of memory management, device management, process management, file management and security & protection mechanisms available in an operating system.
3	To understand the fundamentals about any operating system design so that they can extend the features of operating system to detect and solve many problems occurring in operating system and to manage the computer resources appropriately

COURSE OUTCOMES:

Students will be able to

101009/IT400A.1	Explain the concepts and functionality of operating systems.	Cognitive Knowledge Level: Understand
101009/IT400A.2	Describe the concepts of process management and process synchronization and apply them to solve problems.	Cognitive Knowledge Level: Apply
101009/IT400A.3	Illustrate deadlock and deadlock – prevention and avoidance techniques.	Cognitive Knowledge Level: Apply
101009/IT400A.4	Illustrate the memory management techniques.	Cognitive Knowledge Level: Apply
101009/IT400A.5	Explain the file system and its implementation	Cognitive Knowledge Level: Understand
101009/IT400A.6	Use the disk scheduling algorithms to solve problems.	Cognitive Knowledge Level: Apply

CO-PO AND CO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
101009/IT400A.1	3	1	1	-	-	-	-	-	-		-	2	3	-	2
101009/IT400A.2	3	3	3	2	1	-	-	-	-		-	2	2	-	2

101009 /IT400 A.3	3	3	3	2	1	-	-	-	-		-	2	2	-	2
101009 /IT400 A.4	3	3	3	2	1	-	-	-	-		-	2	2	-	2
101009 /IT400 A.5	3	2	2	1	-	-	-	-	-		-	2	2	-	2
101009 /IT400 A.6	3	3	3	2	1	-	-	-	-		-	2	2	-	2

1-LOW, 2-MEDIUM, 3-HIGH

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	LOW/MEDIUM/HIGH	Justification
101009/IT400A.1-PO1	HIGH	Knowledge about the structure, functions and relevance of OS in computing devices will be helpful in designing new operating systems for various applications
101009/IT400A.1-PO2	MEDIUM	Knowledge about the structure, functions and relevance of OS in computing devices helps in analyzing complex engineering problems and solve them by good designs of OS.
101009/IT400A.1-PO3	HIGH	The knowledge of the functions and structure of OS in various computing devices helps to design efficient OSs for new devices.
101009/IT400A.1-PO12	MEDIUM	The knowledge about the functions, structure and relevance of OS helps to engage in lifelong learning taking into account the various technological needs of the era and propose new OS as a solution for various computing needs.
101009/IT400A.1-PSO1	HIGH	The knowledge of the functions and structure of OS in various computing devices helps to understand the core concepts of computer OS development and thereby design new OS to manage and solve complex engineering problems.

101009/IT400A.1-PSO3	MEDIUM	The knowledge of the functions and structure of OS in various computing devices are fundamental to CS and can be used in research and other innovative ideas to meet societal needs.
101009/IT400A.2-PO1	MEDIUM	The knowledge of process management and scheduling can be applied to solve complex engineering problems.
101009/IT400A.2-PO2	MEDIUM	The knowledge of process management and scheduling helps to use them appropriately in the design of process management functions of Operating systems which helps to reach substantiated conclusions of a complex problem.
101009/IT400A.2-PO3	HIGH	The knowledge of process management and scheduling can be applied to design solutions and algorithms related to process in complex OS design problems.
101009/IT400A.2-PO4	MEDIUM	The knowledge of process management and scheduling help us to implement efficient algorithms for process management and thereby perform analysis and interpretation of results to reach valid conclusions.
101009/IT400A.2-PO4	LOW	The knowledge of process management and scheduling help to design efficient algorithms related to process management in OS and communicate them to the engineering community. .
101009/IT400A.2-PO12	LOW	The knowledge of process management and scheduling help to easily adapt to technological changes and thereby conduct lifelong learning.
101009/IT400A.2-PSO1	MEDIUM	The knowledge of process management and scheduling can be applied to design solutions to process related problems in the design of OS. They belong to the core concepts of CS.
101009/IT400A.2-PSO3	MEDIUM	The knowledge of process management and scheduling can be applied to design efficient operating systems thereby helping the society do tasks in an easy and efficient manner.
101009/IT400A.3-PO1	HIGH	The knowledge of process synchronization mechanisms using various tools is important in the design of new OS and hence can be applied to solve complex engineering problems by the new OS design.

101009/IT400A.3-PO2	MEDIUM	The knowledge of process synchronization mechanisms using various tools helps to use them appropriately in the design of OS and their use can be analyzed for further research.
101009/IT400A.3-PO3	HIGH	The knowledge of process synchronization mechanisms using various tools can be applied to design solutions related to process management and thus use them to solve complex engineering problems.
101009/IT400A.3-PO4	MEDIUM	The knowledge of process synchronization mechanisms using various tools helps us to implement efficient algorithms using them and perform analysis and interpretation of implementation results to reach valid conclusions.
101009/IT400A.3-PO5	LOW	The knowledge of process synchronization mechanisms using various tools helps the engineers design efficient algorithms in the design of OS and thereby use them in various devices which are useful to the society and the same can be communicated as research results to the engineering community.
101009/IT400A.3-PO12	MEDIUM	The knowledge of process synchronization mechanisms using various tools helps to use them in the design of new OS s and thereby engage in lifelong learning,
101009/IT400A.3-PSO1	MEDIUM	The knowledge of process synchronization mechanisms using various tools can be applied to design solutions to complex engineering problems.
101009/IT400A.3-PSO3	MEDIUM	The knowledge of process synchronization mechanisms using various tools helps to design innovative OS useful to the society.
101009/IT400A.4-PO1	HIGH	The knowledge of deadlock management methods using good algorithms is important in the design of new OS and hence can be applied to solve complex engineering problems by the new OS design.
101009/IT400A.4-PO2	MEDIUM	The knowledge of deadlock management methods using good algorithms helps to use them appropriately in the design of OS and their use can be analyzed for further research.
101009/IT4	HIGH	The knowledge of deadlock management methods

00A.4-PO3		using good algorithms can be applied to design solutions related to process management and thus use them to solve complex engineering problems.
101009/IT400A.4-P5	MEDIUM	The knowledge of deadlock management methods using good algorithms helps us to implement efficient systems using them and perform analysis and interpretation of implementation results to reach valid conclusions.
101009/IT400A6.4-PO10	LOW	The knowledge of deadlock management methods using good algorithms helps the engineers design efficient methods in the design of OS and thereby use them in various devices which are useful to the society and the same can be communicated as research results to the engineering community.
101009/IT400A.4-PO12	MEDIUM	The knowledge of deadlock management methods using good algorithms helps to use them in the design of new OS s and thereby engage in lifelong learning,
101009/IT400A.4-PSO1	MEDIUM	The knowledge of deadlock management methods using good algorithms can be applied to design solutions to complex engineering problems.
101009/IT400A.4-PSO3	MEDIUM	The knowledge of deadlock management methods using good algorithms helps to design innovative OS useful to the society.
101009/IT400A.5-PO1	HIGH	The knowledge of memory management algorithms and techniques is important in the design of new OS and hence can be applied to solve complex engineering problems by the new OS design.
101009/IT400A.5-PO2	MEDIUM	The knowledge of memory management algorithms and techniques helps to use them appropriately in the design of OS and their use can be analyzed for further research.
101009/IT400A.5-PO3	HIGH	The knowledge of memory management algorithms and techniques can be applied to design solutions related to memory related problems in OS and thus use them to solve complex engineering problems.
101009/IT400A.5-PO4	MEDIUM	The knowledge of memory management algorithms and techniques helps us to implement efficient methods to

		manage memory efficiently using them and perform analysis and interpretation of implementation results to reach valid conclusions.
101009/IT400A.5-PO12	MEDIUM	The knowledge of memory management algorithms and techniques helps to use them in the design of new OS s and thereby engage in lifelong learning,
101009/IT400A.5-PSO1	MEDIUM	The knowledge of memory management algorithms and techniques can be applied to design solutions to complex engineering problems.
101009/IT400A.5-PSO3	MEDIUM	The knowledge of memory management algorithms and techniques helps to design innovative OS useful to the society.
101009/IT400A.6-PO1	HIGH	The knowledge of security aspects and algorithms for file and storage management in Operating Systems is important in the design of new OS and hence can be applied to solve complex engineering problems by the new OS design.
101009/IT400A.6-PO2	MEDIUM	The knowledge of security aspects and algorithms for file and storage management in Operating Systems helps to use them appropriately in the design of OS and their use can be analyzed for further research.
101009/IT400A.6-PO3	HIGH	The knowledge of security aspects and algorithms for file and storage management in Operating Systems can be applied to design solutions related to security of OS and thus use them to solve complex engineering problems.
101009/IT400A.6-PO4	MEDIUM	The knowledge of security aspects and algorithms for file and storage management in Operating Systems helps us to implement efficient algorithms using them and perform analysis and interpretation of implementation results to reach valid conclusions.
101009/IT400A.6-PO10	LOW	The knowledge of security aspects and algorithms for file and storage management in Operating Systems helps the engineers design efficient algorithms in the design of OS and thereby use them in various devices which are useful to the society and the same can be communicated as research results to the engineering

		community.
101009/IT400A.6-PO12	MEDIUM	The knowledge of security aspects and algorithms for file and storage management in Operating Systems helps to use them in the design of new OS s and thereby engage in lifelong learning,
101009/IT400A.6-PSO1	MEDIUM	The knowledge of security aspects and algorithms for file and storage management in Operating Systems can be applied to design solutions to complex engineering problems.
101009/IT400A.6-PSO3	MEDIUM	The knowledge of security aspects and algorithms for file and storage management in Operating Systems helps to design innovative OS useful to the society.

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

Sl.No	Description	PO mapping	Proposed Actions
1	OS Kernel Design	PO1,PO3,PSO2	Learning Materials provided

WEB SOURCE REFERENCES:

1	https://nptel.ac.in/courses/106/105/106105214/
2	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/
3	https://www.scs.stanford.edu/21wi-cs140/

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✔ CHALK & TALK	✔ STUD. ASSIGNMENT	✔ WEB RESOURCES	
✔ LCD/SMART BOARDS	✔ STUD. SEMINARS	☐ ADD-ON COURSES	

ASSESSMENT METHODOLOGIES-DIRECT

✔ ASSIGNMENTS	☐ STUD. SEMINARS	✔ TESTS/MODEL EXAMS	✔ UNIV. EXAMINATION
✔ STUD. LAB PRACTICES	✔ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

✔ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	✔ STUDENT FEEDBACK ON FACULTY (ONCE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by **Approved by**

Ajith Jacob **HOD**

100004/IT500B OPERATING SYSTEM CONCEPTS

Course Contents and Lecture Schedule

No	Topic	No. of Lectures
1	**Module 1 : Operating Systems**	**7 Hours**
1.1	Introduction - Functions of OS.	1 Hour
1.2	Types of OS (Batch, Multi Programmed, Time - sharing and Real time systems).	2 Hours
1.3	System Calls.	1 Hour
1.4	System Programs.	1 Hour
1.5	System Structure (Simple structure, Layered approach, Microkernel system structure, Modules).	1 Hour

1.5	Kernel & Shell.	1 Hour
2	**Module 2 : Process Management**	**11 Hours**
2.1	Process Concept - Process State - PCB.	2 Hours
2.2	Operations on processes.	1 Hour
2.3	Multithreading - Benefits.	1 Hour
2.4	Process Scheduling: Basic concepts.	1 Hour
2.5	Pre-emptive Scheduling - Dispatcher.	1 Hour
2.6	Scheduling Criteria.	1 Hour
2.7	Scheduling Algorithms (FCFS, SJF, Priority Scheduling, Round Robin Scheduling, Multi-level queue scheduling, Multi-level feedback scheduling).	3 Hours
2.8	Inter Process Communication - Shared memory, message passing, pipes and socket.	1 Hour
3	**Module 3 : Process Synchronization**	**11 Hours**
3.1	Race Conditions - Critical Sections.	1 Hour
3.2	Mutual exclusion with busy waiting.	2 Hours
3.3	Sleep and Wakeup.	1 Hour
3.4	Semaphores - Monitors (introduction).	2 Hours
3.5	Deadlocks: Deadlock characteristics - conditions for deadlock.	1 Hour
3.6	Deadlock prevention.	1 Hour
.7	Deadlock avoidance (Safe state, Resource-allocation graph, Banker's algorithm).	2 Hours
3.8	Deadlock detection & recovery from dead lock.	1 Hour
4	**Module 4 : Memory Management**	**10 Hours**
4.1	Basics – swapping.	1 Hour
4.2	Memory Allocation (fixed partitions, variable partitions) - Fragmentation.	1 Hour
4.3	Paging.	2 Hours
4.4	Segmentation.	1 Hour

4.5	Virtual memory concepts & demand paging.	1 Hour
4.6	Page replacement algorithms (FIFO, Optimal, LRU).	2 Hours
4.7	Allocation of frames - Thrashing.	2 Hours
5	**Module 5 : Storage Management**	**6 Hours**
5.1	Introduction, File concept - File Attributes - File Operations - File Types - File structure.	1 Hour
5.2	File access methods (Sequential Access, Direct Access, Indexed Access)- File allocation methods (Contiguous, linked and indexed allocation).	1 Hour
5.3	Directory structure (Single-Level, Two-Level, Tree- Structured, Acyclic Graph, General Graph) - Directory implementation (Linear list, Hash table).	2 Hours
5.4	Disk management: Introduction - Disk scheduling algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK).	2 Hours

TUTORIAL QUESTIONS

1. Consider the following set of processes with CPU burst given in milliseconds

Processes	Arrival time	Burst time
P0	0	4
P1	2	3
P2	4	1
P3	5	2

Assume quantum time for RR is 2

i) Draw Gantt chart for FCFS, pre-emptive SJF and RR
ii) What is the Average Turn- around time for each of these scheduling algorithms
iii) What is the Total Waiting time for each of these scheduling algorithms?

2. Consider the following process with cpu burst time, given in millisecond.

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Processes are arrived in P1, P2, P3, P4, P5 order at time
i) Draw Gantt chart to show execution using FIFO, SJF, non-preemptive priority(smaller number implies higher priority) and Round robin (time quantum=1) scheduling.
ii) Calculate waiting time and turnaround time for each scheduling algorithm.

3. Consider the following set of processes, with the length of the cpu burst time in given milliseconds.

Process	Burst time	Arrival time
P1	8	0
P2	4	1
P3	9	3
P4	5	4
P5	3	2

i) Draw Gantt chart to show execution using FIFO, pre-emptive SJF, non-preemptive priority and Round robin (time quantum=2) scheduling.
ii) Calculate waiting time anf turn around time for each scheduling.

4.

Consider the following snapshot of a system with five processes P1, P2, P3, P4, P5 and four resources A,B,C and D

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	1	0	2	2	3	2	5	2	3	0	0	1
P2	0	2	1	2	3	4	1	2				
P3	2	4	5	0	2	7	7	3				
P4	3	0	0	0	5	5	0	7				
P5	4	2	1	3	6	2	1	4				

Using Banker's algorithm, answer the following questions: -

i) How many resources of type A, B, C, D are there?
ii) What are the contents of need matrix?
iii) Find if the system is in safe state? If it is, find the safe sequence.

5. 2 Consider the following snapshot of a system

Process	Allocation	Max	Available
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Answer the following questions using Bankers algorithm

a. What is the content of "***Need***" matrix?

b. Is the system in a safe state? Justify your answer.

c. If a request from P1 arrive for (0 4 2 0), can the request be granted immediately

6. Consider a system with four processes P1, P2, P3, P4, and four types of resources R1, R2, R3, R4. The maximum no: of instances of resources of each type are 5, 7, 7 and 7 respectively. What will be the order of processing of jobs if the allocated matrix and the maximum claim (that each process can claim) matrix are as given below.

	Allocated Matrix				**Maximum Claim**			
	R1	**R2**	**R3**	**R4**	**R1**	**R2**	**R3**	**R4**
P1	2	1	3	2	3	5	6	4
P2	0	0	1	2	1	3	4	6
P3	1	2	1	1	1	4	3	2
P4	1	1	0	2	2	3	1	2

7. Consider a system with 5 processes numbered from P0 to P4 with only three types of resources A, B, C each with instances 10, 5, 7 respectively. At time t_0, the snapshot of the demand and allocation of resources is as shown below. Using Bankers' Safety Algorithm, check whether < P1, P3, P4, P2, P0 > is a safe sequence. Write the contents of Work and finish data structures at every pass.

Process	Allocation			Max			Available		
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

ASSIGNMENT QUESTIONS

1. Explain System Structure (Simple structure, Layered approach, Microkernel system structure, Modules) and Kernel & Shell.
2. Consider the following set of processes that arrive at time 0 with the length of the CPU burst time given in milliseconds.

Process	Burst Time
P1	24
P2	3
P3	3

Schedule the process using Round Robin Scheduling Algorithm.

3. Find the average waiting time and average turnaround time for the processes given in the table below using:- i)SRT scheduling algorithm ii) Priority scheduling algortithm

Process	Arrival Time (ms)	CPU Burst Time (ms)	Priority
P1	0	5	3
P2	2	4	1
P3	3	1	2
P4	5	2	4

Define the terms
a) Degree of Multiprogramming
b) Turnaround time
c) Throughput
d) Waiting time

4. Consider the following set of processes with CPU burst given in milliseconds

Processes	Arrival time	Burst time
P0	0	4
P1	2	3
P2	4	1
P3	5	2

Assume quantum time for RR is 2

i) Draw Gantt chart for FCFS, pre-emptive SJF and RR
ii) What is the Average Turn- around time for each of these scheduling algorithms
iii) What is the Total Waiting time for each of these scheduling algorithms?

101004/IT500C Data Communication and Networking

COURSE INFORMATION SHEET

PROGRAMME: **Information Technology**	DEGREE: **B.TECH**
COURSE: **Data Communication and Networking**	SEMESTER: **Fifth** CREDITS: 4
COURSE CODE: **101004/IT500C** REGULATION:**2021**	COURSE TYPE: CORE
COURSE AREA/DOMAIN: Computer Networks	CONTACT HOURS: 4 hours / Week
CORRESPONDING LAB COURSE CODE (IF ANY): **No**	LAB COURSE NAME: **NA**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Module 1: OVERVIEW OF DATA COMMUNICATION AND NETWORKS Introduction: - Types of Computer Networks, Network Software - Protocol Hierarchies, Connection oriented and Connection less hierarchies, Reference Models - ISO-OSI Reference Model, TCP/IP Reference Model – Comparison of OSI and TCP/IP reference models. Physical Layer: - Guided Transmission Media– Twisted Pair, Coaxial and Fiber Optics, Wireless Transmission- Radio and Microwave transmission, Communication Satellites – GEO, MEO, LEO. Comparison of Network hardware - Repeaters, Routers, Bridges, Gateways, and Hub.	8
II	Module 2: DATA TRANSMISSION AND ENCODING TECHNIQUES Data and signals, Analog Signals, Digital Signals - Transmission Impairments,Data Rate Limits: Channel Capacity, Nyquist Bit Rate, Shannon Capacity, Performance parameters - Bandwidth, Throughput, Delay & Jitter. Digital-To-Digital Conversion: Line Coding Schemes: Unipolar, Polar, Bipolar - Block Coding, Scrambling, Analog-To-Digital Conversion: Pulse Code Modulation, Delta	10

	Modulation - Digital-To-Analog Conversion: ASK, FSK, PSK.	
III	Module 3: DIGITAL TRANSMISSION Transmission Modes: Parallel and Serial Transmission, Asynchronous, Synchronous, Isochronous Transmission Multiplexing - TDM, FDM, WDM - Spread spectrum-The concept of spread spectrum – frequency hopping spread spectrum – direct sequence spread spectrum – code division multiple access.	7
IV	Module 4: LINK LAYER COMMUNICATION Data Link Layer – design issues - Error Detection: Parity Check, Checksum, CRC, Error Correction: Hamming code - Flow Control: Stop-and-Wait, Go-Back-N, and Selective-Repeat - Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled Access: Reservation, Polling, Token Passing, Ethernet- Ethernet Cabling, Encoding, Frame Format, Binary Exponential Back Off Algorithms.	10
V	Module 5: NETWORK LAYER Network Layer Design Issues, Routing Algorithm – Optimality principle - Flooding - Distance vector routing – Link state routing –Multicast Routing - Congestion Control Algorithms – General principles – Congestion prevention policies – Choke packets – Random Early Detection- Quality of Service requirements- Buffering, Traffic shaping Leaky bucket algorithm. Basic functions of Transport layer and Application layer (Basic understanding only).	10
	TOTAL HOURS	60

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION

T	1. Andrew S. Tanenbaum, Computer Networks, Prentice Hall, 4th Edition, 2003 2. Behrouz A. Forouzan, Data Communications and Networking, 5/e, Tata McGraw Hill, 2017. 3. William Stallings, 'Data and Computer Communications', 8/e Pearson, 2007.
R	1. William Stallings, Computer Networking with Internet Protocols, Prentice-Hall, 2004. 2. Fred Halsall, Computer Networking and the Internet, 5/e. 3. F. Kurose and K. W. Ross, Computer Networking: A Top-Down Approach Featuring Internet, 6/e, Pearson Education, 2012. 4 L. L. Peterson and B. S. Davie, Computer Networks, A systems approach, 5/e, Morgan Kaufmann, 2011. 1.

COURSE PREREQUISITES: NIL

COURSE OBJECTIVES:

- To equip the Engineering Graduates to learn basic concepts in data communication and computer networking,
- To know fine-tuneperformance parameters used in data transmission.
- To understand the concepts of data transmission and apply signal encoding techniques in data transmission.

COURSE OUTCOMES: After the completion of the course the student will be able to

CO 1	Discuss the basic concepts used in data communication and computer networking.
CO 2	Identify the concepts of data transmission and apply signal encoding techniques in data transmission.
CO	Compare different transmission modes, multiplexing, and Spread Spectrum techniques.

3	
CO 4	Describe the design issues and protocols in the data link layer.
CO 5	Summarize the routing algorithms and congestion control techniques in the network layer.

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	2	1	_	_	_	_	_	_	_	_	2	_	-	-
CO2	3	3	2	1	2	_	_	_	_	_	_	2	_	2	-
CO3	2	3	1	2	2	_	_	_	_	_	_	2	_	2	-
CO4	2	3	3	2	1	_	_	_	_	_	_	2	_	2	2
CO5	2	2	2	1	1	_	_	_	_	_	_	2	_	2	2

JUSTIFICATIONS FOR CO-PO/PSO MAPPING

MAPPING	LOW/MEDIUM/HIGH	JUSTIFICATION
CO1-PO1	H	The knowledge of basic concepts used in data communication and computer networking.
CO1-PO2	M	To Apply the knowledge acquired to describe the concepts of data communication systems.
CO1-PO3	L	To know about the network design considerations and components of networking that meet the specified needs.
CO1-PO12	M	Understanding various concepts and generating network design and communication aspects.
CO2-PO1	H	Identify the basic concepts of data transmission techniques.
CO2-PO2	H	Understanding the concepts of time and frequency domain they can design appropriate communication systems.

CO2-PO3	M	Identify the concepts of data transmission and apply signal encoding techniques in data transmission.
CO2-PO4	L	Apply various techniques and find solutions in data transmission encoding techniques in data transmission.
CO2-PO5	M	Evaluate the performance of data transmission and improve its limitations
CO2-PO12	M	Understanding the need and ability to engage in independent and life-long learning in the data transmission of technological change.
CO2-PSO2	M	Understanding the basic concepts of data transmission and apply signal encoding techniques in data transmission
CO3-PO1	M	Identify various transmission modes, multiplexing, and Spread Spectrum techniques.
CO3-PO2	H	Analyse the different transmission modes and compare with multiplexing and demultiplexing.
CO3-PO3	L	Apply various transmission nodes and techniques for efficient data communication
CO3-PO4	M	Apply various techniques and find solutions based on Spread Spectrum techniques.
CO3-PO5	M	Understanding the limitations of Data communication and networking.
CO3-PO12	M	Information acquired from transmission modes, multiplexing, and Spread Spectrum techniques provides lifelong learning in the design of network
CO3-PSO2	M	Students could apply the knowledge of Spread spectrum techniques and protocols in the field of network design and Implementation.
CO4-PO1	M	Students will be obtaining basic knowledge of design issues and protocols in the data link layer.
CO4-PO2	H	Analyze complex problems and reaching substantiated conclusions in data link layer
CO4-PO3	H	Design system components or processes that meet the specified needs

		with appropriate consideration for data communication and networking
CO4-PO4	M	Apply the solutions of the design issues and protocols in the data link layer and synthesis of the information to provide valid conclusions.
CO4-PO5	L	Students could apply the knowledge of protocol concepts for simulating the network .
CO4-PO12	M	Students could apply the knowledge of wireless networking concepts for lifelong learning in the context of technological change.
CO4-PSO2	M	Students could apply the knowledge of design issues and protocols in the data link layer.
CO4-PSO3	M	Developing a protocol in the data link layer based on the knowledge.
CO5-PO1	M	Students will be obtaining basic knowledge about the network layer.
CO5-PO2	M	Analyze complex problems and reaching substantiated conclusions in network layer
CO5-PO3	M	The students could study on routing algorithms and congestion control techniques
CO5-PO4	L	Apply the solutions of the congestion and provide the best path in the network
CO5-PO5	L	Apply the knowledge of routing algorithms concepts for simulating in the network layer
CO5.PO12		Students could apply the knowledge of Congestion control concepts for lifelong learning in the context of technological change.
CO5-PSO2	M	Students could apply the knowledge of Congestion control techniques and protocols in the field of network design and Implementation.
CO5-PSO3	M	Develop and implement the routing algorithms and congestion control techniques in the network layer.

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

1	Network programming - Lab sessions

WEB SOURCE REFERENCES:

1	en.wikipedia.org/wiki/
2	www.w3schools.com/
3	www.w3.org/
4	http://computing.dcu.ie/~humphrys/ca651/index.html
5	http://www.cs.ccsu.edu/~stan/classes/CS490/Slides/Networks4-Ch4-4.pdf 6
6	http://ecourses.vtu.ac.in/nptel/courses/Webcourse-contents/IIT-MADRAS/ComputerNetworks/pdf/

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✔ CHALK & TALK	✔ STUD. ASSIGNMENT	✔ WEB RESOURCES
✔ LCD/SMART BOARDS	✔ STUD. SEMINARS	✔ ADD-ON COURSES

ASSESSMENT METHODOLOGIES-DIRECT

✔ ASSIGNMENTS	✔ STUD. SEMINARS	✔ TESTS/MODEL EXAMS	✔ UNIV. EXAMINATION
STUD. LAB PRACTICES	☐ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

✔ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	✔ STUDENT FEEDBACK ON FACULTY (TWICE)

☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by **Approved by**

Ms. Jeshmol P J **(HOD)**

Course Plan

No	Topic	No. of Lectures
1	**OVERVIEW OF DATA COMMUNICATION AND NETWORKS**	**8 Hours**
1.1	Introduction: - Types of Computer Networks, Network Software-Protocol Hierarchies, Connection oriented and Connection less hierarchies	2 Hours
1.2	Reference Models - ISO-OSI Reference Model, TCP/IP Reference Model – Comparison of OSI and TCP/IP reference models	3 Hours
1.3	Physical Layer: - Guided Transmission Media– Twisted Pair, Coaxial and Fiber Optics, Wireless Transmission- Radio and Microwave transmission, Communication Satellites – GEO, MEO,LEO. Comparison of Network hardware- Repeaters, Routers, Bridges, Gateways, and Hub.	3 Hours
2	**DATA TRANSMISSION AND ENCODING TECHNIQUES**	**10 Hours**
2.1	Data and signals, Analog Signals, Digital Signals - Transmission Impairments,Data Rate Limits: Channel Capacity, Nyquist Bit Rate, Shannon Capacity, Performance parameters - Bandwidth, Throughput, Delay & Jitter.	4 Hours
2.2	Digital-To-Digital Conversion: Line Coding Schemes: Unipolar, Polar, Bipolar - Block Coding, Scrambling,	3 Hours
2.3	Analog-To-Digital Conversion: Pulse Code Modulation, Delta Modulation - Digital-To-Analog Conversion: ASK, FSK, PSK.	3 Hours
3	**DIGITAL TRANSMISSION**	**7 Hours**
3.1	Transmission Modes: Parallel and Serial Transmission, Asynchronous, Synchronous, Isochronous Transmission	2 Hours
3.2	Multiplexing - TDM, FDM, WDM	2 Hours
3.3	Spread spectrum-The concept of spread spectrum – frequency hopping spread spectrum – direct sequence spread spectrum – code division multiple access	3 Hours
4	**LINK LAYER COMMUNICATION**	**10 Hours**
4.1	Data Link Layer – design issues	2 Hours
4.2	Error Detection: Parity Check, Checksum, CRC, Error Correction:	3 Hours

	Hamming code	
4.3	Flow Control: Stop-and-Wait, Go-Back-N, and Selective-Repeat	2 Hours
4.4	Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled Access: Reservation, Polling, Token Passing. Ethernet-Ethernet cabling, Encoding, Frame Format ,Binary Exponential back off Algorithm	3 Hours
5	**NETWORK LAYER**	**10 Hours**
5.1	Network Layer Design Issues, Routing Algorithm – Optimality principle - Flooding	2 Hours
5.2	Distance vector routing, Link state routing	2 Hours
5.3	Multicast Routing	1 Hours
5.4	Congestion Control Algorithms – General principles	1 Hours
5.5	Congestion prevention policies – Choke packets – Random Early Detection	2 Hours
5.6	Quality of Service requirements- Buffering, Traffic shaping – Leaky bucket algorithm.	1 Hours
5.7	Basic functions of Transport layer and Application layer	1 Hours

Assignment Questions

Assignment-1

1. Mention the various devices used in different layers of the TCP/IP reference model..
2. Define a Protocol Data Unit (PDU)..

3. What is Nyquist criteria for channel bandwidth?.
4. Differentiate between analog and digital signals used in transmission.
5. What are the features of WAN..
6. Explain the role of routers in Networks..
7. A periodic composite signal contains frequencies from 10 to 30 KHz, each with and amplitude of 10 V. Draw the frequency spectrum.
8. A signal travels from point A to point B. At point A, the signal power is 100 W. At point B, the power is 90 W. What is the attenuation in decibels?
9. The attenuation of a signal is −10 dB. What is the final signal power if it was originally 5W?
10. A line has a signal-to-noise ratio of 1000 and a bandwidth of 4000 KHz. What is the maximum data rate supported by this line?
11. We measure the performance of a telephone line (4 KHz of bandwidth). When the signal is 10 V, the noise is 5 mV. What is the maximum data rate supported by this telephone line?
12. A signal with 200 milliwatts power passes through 10 devices, each with an average noise of 2 microwatts. What is SNR? What is the SNRdB?
13. If the peak voltage value of a signal is 20 times the peak voltage value of the noise, whatis the SNR? What is the SNRdB?
14. What is the theoretical capacity of a channel in each of the following cases?

a. Bandwidth: 20 KHz SNRdB = 40 b. Bandwidth: 1 MHz SNRdB = 20

15. We have a channel with 4 KHz bandwidth. If we want to send data at 100 Kbps, what is the minimum SNRdB? What is SNR?
16. What is the transmission time of a packet sent by a station if the length of the packet is 1 million bytes and the bandwidth of the channel is 200 Kbps?
17. What is the length of a bit in a channel with a propagation speed of 2 × 108 m/s if the channel bandwidth is

a. 1 Mbps? b. 10 Mbps? c. 100 Mbps?

18. How many bits can fit on a link with a 2 ms delay if the bandwidth of the link is . 1 Mbps? b. 10 Mbps? c. 100 Mbps?

Assignment- 2

1. Explain in detail about Ethernet (including Ethernet cabling, Frame format and Binary Exponential Back Off Algorithm).
2. Describe Network Layer Design Issues.
3. Functions of Transport Layer and Application Layer
4. Explain Multicast Routing

5. **Tutorial Questions**

1. Explain in detail about comparison between various Network hardwares- Repeaters, Routers, Bridges, Gateways, and Hub.

2. Differentiate in detail about Communication Satellites –GEO, MEO, LEO.
3. Give a comparative analysis of different kinds of satellite communication.
4. The power we use at home has a frequency of 60 Hz. The period of this sine wave can be determined.
5. Assume that we need to download a text document at the rate of 100 pages per sec. What is the required bit rate of the channel?
6. A signal travels through an amplifier and its power is increased 10 times p2= 10p1.
7. Consider a noiseless channel with a Bandwidth of 3000Hz transmitting a signal with two levels. Find max bit rate
8. Consider the same noiseless channel transmitting a signal with 4 signal levels.
9. We need to send 265 Kbps over a noiseless channel with a bandwidth of 20KHz.How many signal levels do we need.
10. A Telephone line normally has a BW of 3000 Hz assigned for data communication. SNR is usually 3162. Find Channel Capacity?
11. The SNR is given indBs.Assume that SNRdb=36 and the channel BW is 2 MHz. Find Channel Capacity?
12. What is the propagation time if the distance between the two points is 12000km. Assume that PS to be 2.48108 m/s in cable?

100004-IT500D FORMAL LANGUAGES AND AUTOMATA THEORY

COURSE INFORMATION SHEET

PROGRAMME**: INFORMATION TECHNOLOGY**	DEGREE: **B. TECH**

COURSE: **Formal Language and Automata Theory**	SEMESTER: **FIVE** CREDITS: 4
COURSE CODE: **100004-IT500D** REGULATION: **2020**	COURSE TYPE: CORE
COURSE AREA/DOMAIN: Theoretical Computer Science	CONTACT HOURS: 3(L)+1(T) / Week
CORRESPONDING LAB COURSE CODE (IF ANY): **No**	LAB COURSE NAME: **NA**

SYLLABUS

Unit	Details	Hours
I	**Module 1: Finite Automata** Family of formal languages – Finite automata – Type 3 formalism - Deterministic finite automata (DFA) – Language acceptance - Non-deterministic finite automata (NFA) – Finite automata with epsilon transitions – Applications - Finite automata with output - NFA to DFA conversions - Equivalence theorem between DFA and NFA - Minimization of DFA.	**9**
II	Module 2: Regular Languages & Regular Expressions Regular languages and Regular expressions: Myhill-Nerode theorem - Conversion of DFA's to Regular expressions by eliminating states - Conversion of Regular expressions to Automata – Closure properties of Regular languages – Pumping lemma for Regular languages - Applications of the Pumping lemma.	**10**
III	Module 3: Type 2 Formalism & Pushdown Automata Type 2 formalism: Context free grammars (CFG) and languages – Parse trees – Ambiguity in grammars – Pushdown automata (PDA) – Acceptance by final state and empty stack – Equivalence of PDA's and CFG's – Deterministic push down automata (DPDA) – Simplification of CFG - Pumping lemma for CFG's – Chomsky normal form – Greibach normal form.	**10**
IV	Module 4: Type 1 Formalism Closure properties of context free languages – Decision properties of	**9**

	CFL's - Type 1 formalism: Context sensitive grammar – Linear bounded automata. Type 0 formalism: Turing machine (TM) - Recursively enumerable language (REL) – Multitape TM – Non-deterministic TM – Properties of TM.	
V	**Module 5: Undecidability and Universal Turing Machine** Halting problem of TM – Recursive languages - Unrestricted grammars - Universal Turing Machine (UTM) – Tractability - Undecidable problems - Introduction to P and NP class problems.	**7**

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	1.J. E. Hopcroft, R. Motwani and J. D. Ullman, "Introduction to Automata Theory Languages and computation", 3rd edition Pearson, 2008. 2.Michael Sipser, "Introduction to the Theory of Computation", 3rd edition (or 1st edition), Course Technology Inc, 2013.
R	1. Harry R. Lewis, Christos H. Papadimitriou, "Elements of the Theory of Computation", Prentice-hall Publisher, 2nd edition, 1998. 2. K. Krithivasan and R. Rama; Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, 2009. 3. John C. Martin, "Introduction to Languages and the Theory of Computation", McGraw-Hill Publisher, 4th edition, 2010. Dexter C. Kozen, "Automata and Computability", Springer.1997. Peter Linz, and Susan H. Rodger. An introduction to formal languages and automata. Jones & Bartlett Learning, 2022. 4. Harry R. Lewis, Christos H. Papadimitriou, "Elements of the Theory of Computation", Prentice-hall Publisher, 2nd edition, 1998. 5. K. Krithivasan and R. Rama; Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, 2009.

COURSE PRE-REQUISITES: Basic knowledge in Set theory, Functions and Relations.

COURSE OBJECTIVES:

CO 1: Understand the formal language hierarchy and its applications in the field of computation.
CO 2: Construct automaton for any given regular language and find its equivalent regular expressions.
CO 3: Design a context free grammar for any given context free language.
CO 4: Construct Turing machines and understand their capability.
CO 5: Analyze P, NP class and various undecidable problems.

COURSE OUTCOMES: After the completion of the course the student will be able to:

CO1	Understand Chomsky hierarchy and its applications and design automata for regular languages.
CO2	Design a context free grammar for any given context free language.
CO3	Construct Turing machines and understand their capability.
CO4	Understand the Universal Turing Machine and analyze various undecidable problems.
CO5	Understand and analyze P, NP and NP-complete problems.

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	2	_	_	_	_	_	_	_	_	_	2	_	_	_
CO2	3	1	_	_	_	_	_	_	_	_	_	3	2	_	_
CO3	1	_	3	_	2	_	_	_	_	_	_	1	2	_	_
CO4	3	2	_	_	1	_	_	_	_	_	_	2	1	_	_
CO5	3	3	_	_	_	_	_	_	_	_	_	3	1	_	_

JUSTIFICATIONS FOR CO-PO/PSO MAPPING

MAPPING	LOW/MEDIUM/	JUSTIFICATION

	HIGH	
CO1-PO1	H	The knowledge of mathematical formulation of languages will help the students to formulate mathematical solutions for engineering problems.
CO1-PO2	M	The knowledge of formal language hierarchy and its applications will help the students to apply the same to identify and analyze engineering problems.
CO1-PO12	M	Understanding the computational capabilities of different automata will help to recognize the need for independent and life-long learning in the context of technological change.
CO2-PO1	H	Construction of automaton for regular languages will help the students to formulate abstract models for complex engineering problems.
CO2-PO2	L	Knowledge of regular expressions will help the students to identify and analyze complex problems and formulate solutions using the principles of mathematics
CO2-PO12	H	Construction of regular expressions and automata for a regular language will help to recognize the need for independent and life-long learning in the context of technological change.
CO2-PSO1	M	Correlating the design of automata to real world applications will aid in formulating engineering problems with similar background and arrive at solutions.
CO3-PO1	L	Designing context free grammars for a given language will help to design and develop solutions to engineering problems obeying specific rules.
CO3-PO3	H	Knowledge of context free grammars and production rules will help the students to apply the same in designing system

		components or processes satisfying specific needs and constraints.
CO3-PO5	M	Designing of production rules for a context free language helps the student to identify and apply appropriate tools and techniques to solve real world computational problems.
CO3-PO12	L	Understanding of context free grammars and pushdown automata will help the student recognize the need for life- long learning compatible with technological changes.
CO3-PSO1	M	Evaluative study of context free grammars will help in analysis and synthesis of real time computational problems
CO4-PO1	H	Knowledge of construction of Turing Machines will help the student to apply the same to solutions of complex engineering problems.
CO4-PO2	M	Understanding the different categories of Turing machines will aid in identifying, analyzing and formulating solutions to complex engineering problems.
CO4-PO5	L	Knowledge of computational capabilities of a Turing machine will help in selecting and applying appropriate tools and techniques to solve complex engineering activities, with an understanding of limitations.
CO4-PO12	M	Study of Turing machine and its capabilities will help the student to recognize the need for life-long study competing the technological advances.
CO4-PSO1	L	Understanding the power of a Turing machine helps the student to identify solutions to real world problems while providing an implementation of the same.
CO5-PO1	H	Complexity study of the basic computational problems will help in design and development of solutions for real time computational problems.

CO5-PO2	H	Study of computational problems and their associated complexity will help to provide valid conclusions of real time computational problems
CO5-PO12	H	Knowledge of undecidable problems will help the student to recognize the need to engage in independent and life long learning in the broadest context of technological change.
CO5-PSO1	L	Students will be able to identify the complexity associated with the computational problems while providing an implementation of the same

GAPS IN THE SYLLABUS - TO MEET INDUSTRY REQUIREMENTS:

Sl. No.	DESCRIPTION	PROPOSED ACTIONS
1	Characterization of computability functions	NPTEL Video Lectures
2	Decision problems and their relationship to model of computations	NPTEL Video Lectures

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

1	Automata based programming

WEB SOURCE REFERENCES:

1	https://nesoacademy.org/cs/04-theory-of-computation
2	https://www.geeksforgeeks.org/theory-of-computation-automata-tutorials/
3	https://www.javatpoint.com/automata-tutorial
4	https://www.tutorialspoint.com/automata_theory/index.htm
5	https://tutorialspoint.dev/computer-science/theory-of-computation

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✔ CHALK & TALK	✔ STUD. ASSIGNMENT	✔ WEB RESOURCES
✔ LCD/SMART BOARDS	✔ STUD. SEMINARS	☐ ADD-ON COURSES

ASSESSMENT METHODOLOGIES-DIRECT:

ASSIGNMENTS	✔ STUD. SEMINARS	✔ TESTS/MODEL EXAMS	✔ UNIV. EXAMINATION
☐ STUD. LAB PRACTICES	☐ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT:

✔ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	✔ STUDENT FEEDBACK ON FACULTY (TWICE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by

Dr Vidhya PM

(Faculty in charge)

Approved by

Dr. Neeba E. A.

(HOD)

COURSE PLAN

No	Topic	No. of Lectures
1	**REGULAR LANGUAGES AND FINITE AUTOMATA**	**9 Hours**
1.1	Introduction to formal languages	1 Hour
1.2	Deterministic finite automata	2 Hours
1.3	Non-deterministic finite automata	2 Hours
1.4	Equivalence between DFA and NFA	1 Hour
1.5	Minimization of DFA	1 Hour
1.6	Regular expressions and languages	1 Hour
1.7	Pumping lemma and Myhill-Nerode theorem	1 Hour
2	**CONTEXT FREE LANGUAGES & PUSHDOWN AUTOMATA**	**10 Hours**
2.1	Context-free grammars (CFG) and languages (CFL)	1 Hour
2.2	Chomsky and Greibach Normal forms	1 Hour
2.3	Nondeterministic pushdown automata (PDA) and equivalence with CFG	1 Hour
2.4	Parse trees and ambiguity in CFG	2 Hours
2.5	Pumping lemma for context-free languages	1 Hour
2.6	Deterministic pushdown automata	2 Hours
2.7	Closure properties of CFLs.	2 Hours
3	**CONTEXT SENSITIVE GRAMMAR AND TURING MACHINE**	**10 Hours**
3.1	Context-sensitive grammars (CSG) and languages	1 Hour
3.2	Linear bounded automata	1 Hour

3.3	Linear bounded automata and equivalence with CFG	2 Hours
3.4	The basic model for Turing machines (TM)	2 Hours
3.5	Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages	1 Hour
3.6	Variants of Turing machines, nondeterministic TMs, and equivalence with deterministic TMs	1 Hour
3.7	Unrestricted grammars and equivalence with Turing machines	1 Hour
3.8	TMs as enumerators	1 Hour
4	**UNDECIDABILITY**	**9 Hours**
4.1	Church-Turing thesis	1 Hour
4.2	Universal Turing machine	1 Hour
4.3	The Universal and diagonalization languages	2 Hours
4.4	Reduction between languages	2 Hours
4.5	Rice Theorem	1 Hour
4.6	Undecidable problems about languages.	2 Hours
5	**BASIC INTRODUCTION TO COMPLEXITY**	**7 Hours**
5.1	Introductory ideas on Time complexity of deterministic and nondeterministic Turing machines	2 Hours
5.2	P and NP, NP- completeness	2 Hours
5.3	Cook's Theorem	1 Hour
5.4	NP -Complete problems.	2 Hours

TUTORIAL QUESTIONS (Conducted as Graded Homework)

2. Design a DFA for the language accepting strings ending with 01 over ∑= {0, 1}.
3. Draw a DFA for the language accepting strings ending with 'abb' over ∑= {a, b}.
4. Draw a DFA for the language accepting strings ending with 'abba' over ∑= {a, b}.
5. Draw a DFA for the language accepting strings ending with '0011' over ∑= {0, 1}.
6. Draw a DFA for the language accepting strings starting with 1 and ending with 0, over

   ∑= {0, 1}.
7. Draw a DFA for the language accepting strings having three consecutive 0s, over ∑=

   {0, 1}.
8. Design a DFA L(M) = {w || w Ɛ 〖{0,1}〗 ^*} and w is a string that does not contain consecutive 1s.
9. Design a DFA that accepts strings with an even no. of 0s followed by single 1.
10. Design a DFA to accept strings with fifth symbol as 1.
11. Design a DFA to accept binary numbers divisible by 3.
12. Design a DFA to accept binary numbers divisible by 3.
13. Design a DFA to accept the set of all strings starting and ending with different alphabets ∑= {a, b}.
14. Design a DFA that accepts the only input 101 ∑= {0, 1}.
15. Draw an NFA which accepts a string containing "ing" at the end of a string with ∑= {a,. . . . ., z}.
16. Design an NFA to accept strings starting and ending with 01, with ∑= {0, 1}.
17. Draw a deterministic and non-deterministic finite automate which accept 00 and 11 at the end of a string containing 0, 1 in it, e.g., 01010100 but not 000111010.

1. Draw a deterministic and non-deterministic finite automate which either starts with 01 or end with 01 of a string containing 0, 1 in it, e.g., 01010100 but not 000111010.
2. Draw a deterministic and non-deterministic finite automate which starts with 01 and ends with 01 of a string containing 0, 1 in it, e.g., 01000101 but not 000111001.
3. Draw a deterministic-finite automaton which recognize a string containing binary representation 0, 1 in the form of multiple 2, e.g., 1010 but not 01101.

20. Draw a deterministic finite automaton which recognize a string containing binary representation 0, 1 in the form of multiple 3, e.g., 1001 but not 1000.
21. Construction of a DFA for the set of string over {a, b} such that length of the string |w| is divisible by 2 i.e, |w| mod 2 = 0.
22. Construction of a DFA for the set of string over {a, b} such that length of the string |w| is not divisible by 2 i.e, |w| mod 2 = 1.
23. Construction of a DFA for the set of string over {a, b} such that length of the string |w| is divisible by 3 i.e, |w| mod 3 = 0.
24. Construction of a minimal DFA accepting a set of strings over {a, b} in which the second symbol from left-hand side is always 'b'.
25. Construction of a minimal DFA accepting set of strings over {a, b} in which every 'a' is followed by a 'b'.
26. Draw a Turing machine to find 1's complement of a binary number.
27. Draw a Turing machine to find 2's complement of a binary number.
28. Design a Turing machine to reverse a string consisting of a's and b's.
29. Design a TM to accept language = {0 1 | ≥ 1}. Describe all instantaneous descriptions (ID) with respect to constructed TM. Assume 0 as start state.

ASSIGNMENT QUESTIONS

ASSIGNMENT 1

Date: 2/11/2023 **Submission Date: 17/11/2023**

1) Explain and formally define DFA, NFA and ϵ-NFA along with their corresponding languages and extended transition functions.
2) Explain Chomsky's Hierarchy of Languages.
3) Define the following:
   - (i) Kleene star
   - (ii) Concatenation
   - (iii) Reversal
   - (iv) Union
   - (v) Language
   - (vi) Finite Automata
   - (vii) Transition diagram
   - (viii) Transition table
   - (ix) Extended transition function
4) List some of the applications of automata theory.
5) If ∑ = {a, b, c} then write ∑1, ∑2, ∑3, ∑*.
6) Discuss the applications of DFA, NFA and epsilon NFA.
7) Why do we need to convert an NFA to DFA?
8) Explain the closure properties of Regular sets.
9) Prove that regular expression is closed under homomorphism. (Refer closure properties of Regular Languages).
10) Which of the following operations are closed under regular sets? Justify your answer.
    - i) Complementation
    - ii) Set difference
    - iii) String reversal
    - iv) Intersection
11) What is a regular expression?
12) Write the properties and rules for regular expressions.
13) Discuss the applications of Regular expressions.
14) State and prove pumping lemma theorem for regular languages.
15) Discuss the applications of the pumping lemma.

ASSIGNMENT 2

Date: 2/12/2023 **Submission Date: 20/12/2023**

1) Discuss the closure properties of context free languages.
2) Discuss the decision properties of context free languages.
3) Define Context Free Grammar and Context Free Language.
4) List the applications of PDA and CFL.
5) What is a derivation tree? Give an example.
6) The following grammar generates postfix expressions with operands a and b and binary operators +, −,*and /:

$$G: E \rightarrow EE+ \mid EE- \mid EE* \mid EE/ \mid a \mid b$$

For the string $ababa-*/$, give a parse tree, a leftmost derivation, and a rightmost derivation.

7) Explain ambiguity in CFG with the help of an example.
8) List conditions required for push down automata to qualify as deterministic push down automata.
9) State and prove the pumping lemma for Context Free Languages.
10) What do you mean by useless symbol in a grammar? Show the elimination of useless symbols with an example.

101902/IT500E MANAGEMENT FOR SOFTWARE ENGINEERS

COURSE INFORMATION SHEET

PROGRAMME**: INFORMATION TECHNOLOGY**	DEGREE: **B. TECH** YEAR: **2023**
COURSE: **MANAGEMENT FOR SOFTWARE ENGINEERS**	SEMESTER: **V** CREDITS: 3
COURSE CODE: 101902/IT500E REGULATION: **2021**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: **SOFTWARE ENGINEERING**	CONTACT HOURS: 3 hours/Week
CORRESPONDING LAB COURSE CODE (IF ANY): NA	LAB COURSE NAME: NA

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Introduction:** Software engineering, Software process, Software engineering practice. **Process models:** Prescriptive process models- Specialized process models, The unified process, Personal and Team process models. **Agile development:** Agility, Agile process. Extreme programming- XP Values, The XP Process, Industrial XP, The XP Debate. Other Agile development models- Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), Agile Unified Process (AUP). Selection of an appropriate Project Approach- Choice of process Models.	8
II	**Managing software projects:** Project Management Concepts –The Management Spectrum People- Product- Process- Project. **Software Project Management** - Importance – Software projects VS other types of project – Categorizing Software projects- Stakeholders – Setting Objectives –The Business Case Project success and failure. **Management** –Activities- Management Control- Traditional VS modern project management.	5
III	**Project Evaluation**: Project portfolio management- Evaluation of individual projects- Cost benefit evaluation techniques- Risk evaluation- Programme Management- Creating a Programme- Aids to Programme Management- Benefits Management.	8

	Project Planning: Step wise Project Planning **Software Estimation:** Basis for software estimation- Software Effort estimation techniques-Bottom-up and Top-down estimation- Function Point Analysis- COCOMO II. Cost Estimation- Staffing Pattern- Schedule compression	
IV	**Activity Planning:** Objectives- Project Schedules- Projects and Activities- Sequencing and Scheduling Activities- Network Planning Models- Forward Pass- Backward pass- Identifying Critical Path and Critical Activities- Activity-on-arrow networks. **Risk Management:** Risk- Categories of Risk- Risk Identification- Risk Assessment- Risk Planning- Risk management- Risk Evaluation- PERT, Monte Carlo Simulation, Critical Chain. **Resource Allocation:** Nature of Resources- Identifying and Scheduling Resources- Creating Critical Paths- Cost Schedule- Scheduling sequence.	7
V	**Monitoring and Control:** Creating the framework- Collecting data- Review- Project Termination Review- Visualizing Progress- Gantt Chart, Slip Chart, Timeline. Cost Monitoring- Earned Value Analysis- Getting the project back to target- Change Control-Software Configuration Management- Contract management. **Managing People**: Organizational Behaviour- Selecting the right Person- Motivation- Stress-Working in Teams- Becoming a Team- Decision Making- Organization and Team Structures-Communication- Leadership. **Software Quality**: Quality Management Systems- Process Capability Models- CMMI, Six Sigma. Techniques for Enhancing Software Quality- Testing- Software Reliability- Quality Plans.	7
	TOTAL HOURS	35

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Roger S Pressman, Software Engineering: A Practitioner's Approach, Seventh edition, Tata McGraw Hill.

T	Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill
R	Pankaj Jalote, Software Project Management in Practice, Pearson Education
R	Walker Royce, Software Project Management- Addison-Wesley, 1998.
R	Sunitha E.V, Sarath K.S, Software Project Management, Jyothis Publishers 2019

Course Prerequisite: NIL

Course Objectives:

1	To impart the basic understanding of the concepts of software engineering and software development life cycle.
2	To provide the key concepts aspects of managing a software project like project evaluation, planning and monitoring along with management of people.
3	To describe the techniques for ensuring software quality.

Course Outcomes:

CO No.	Course Outcome (CO)	Bloom's Category
101902/IT500E.1	Understand about the basics of software process, software development life cycle and process models.	Understand
101902/IT500E.2	Interpret the concepts of managing software projects.	Understand
101902/IT500E.3	Make use of project evaluation techniques and choose software estimation approaches for effort and cost.	Apply
101902/IT500E.4	Explain on planning the project activities and describe the concepts of risk management and resource allocation.	Understand
101902/IT500E.5	Understand project monitoring and control, organize people and teams and describe the techniques for ensuring software quality.	Understand

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
101902/IT500E.1	2	2								1	1	2	2		
101902/IT500E.2	2	2								1	1	2			3
101902/IT500E.3	2	1								1	1	2	3		
101902/IT500E.4	2	1								1	1	2		3	
101902/IT500E.5	2	2						1	2	1	2	2			
101902/ IT500E (Overall level)	2	1.6						1	2	1	1.2	2	1		3

JUSTIFICATIONS FOR CO-PO-PSO MAPPING

Mapping	LOW/MEDIUM/HIGH	Justification
101902/IT500E.1-PO1	M	Students could apply fundamental engineering knowledge for describing software process.
101902/IT500E.1-PO2	M	Students could identify the software process models.
101902/IT500E.1-PO10	L	Knowledge in software models help students to clearly gather requirements from stakeholders.
101902/IT500E.1-P011	L	Students will be able to select process models for a given problem
101902/IT500E.1-P012	M	Students will be able to design components for solving complex problems
101902/IT500E.1-PSO1	M	Students gain knowledge in software process models.
101902/IT500E.2-PO1	M	Students acquire competency in building software projects.
101902/IT500E.2-PO2	M	Students will be able to develop software projects by setting objectives.
101902/IT500E.2-PO10	L	Students can solve design problems with knowledge in management.
101902/IT500E.2-P011	L	Students will acquire skills in developing business case.
101902/IT500E.2-P012	M	Students will be able to classify people, product, process

		and project.
101902/IT500E.2-PSO3	H	Students will be able to understand the project management spectrum and activities.
101902/IT500E.3-PO1	M	Students gain competency in cost estimation.
101902/IT500E.3-PO2	L	Students will be able to apply cost estimation techniques in developing projects.
101902/IT500E.3-PO10	L	Students acquire competency in stepwise project planning.
101902/IT500E.3-P011	L	Students will be able to identify project portfolio management.
101902/IT500E.3-P012	M	Students will be able to apply software effort estimation techniques.
101902/IT500E.3-PSO1	H	Students will be able to create a programme management.
101902/IT500E.4-PO1	M	Students will be able to identify different risk assessment techniques.
101902/IT500E.4-PO2	L	Students will gain knowledge in sequencing and scheduling activities.
101902/IT500E.4-PO10	L	Students gain competency in identifying risks and management of risks.
101902/IT500E.4-P011	L	Students will be to identify and schedule resources.
101902/IT500E.4-P012	M	Students will be to identify critical path and critical activities.
101902/IT500E.4-PSO2	H	Students will be able to plan the activities, manage the risk and allocate resources.
101902/IT500E.5-PO1	M	Students will be able to monitor and control the project.
101902/IT500E.5-PO2	M	Students will be able to manage the people.
101902/IT500E.4-PO8	L	Students acquire knowledge in quality management systems.
101902/IT500E.4-P09	M	Students will be able to evaluate the process capability models.
101902/IT500E.4-P010	L	Students will be able to work in teams.
101902/IT500E.4-P011	M	Students will be able to develop reliable software applications.
101902/IT500E.4-P012	M	Students will be able to have an awareness on software configuration management.

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

Si NO	DESCRIPTION	PROPOSED ACTIONS	RELEVANCE WITH POs	RELEVANCE WITH PSOs
1	Familiarization of different testing strategies.	NPTEL	11,12	1

WEB SOURCE REFERENCES:

1	*http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Soft%20Engg/New_index1.html*
2	*http://www.cl.cam.ac.uk/~lp15/papers/Notes/SE-I.pdf*
3	*http://www2.imm.dtu.dk/courses/02161/2012/slides/week01ln.pdf*
4	*http://www.dcs.ed.ac.uk/teaching/cs1/CS1/Ah/Notes/IntroSoftwareEng.pdf*
5	Object Oriented System Development Using UML, Java And Patterns - Course (nptel.ac.in)
6	Software Testing - Course (nptel.ac.in)
7	Software Engineering - Course (nptel.ac.in)

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✔ CHALK & TALK	✔ STUD. ASSIGNMENT	✔ WEB RESOURCES
☐ LCD/SMART BOARDS	✔ STUD. SEMINARS	☐ ADD-ON COURSES

ASSESSMENT METHODOLOGIES - DIRECT

✔ ASSIGNMENTS	✔ STUD. SEMINARS	✔ TESTS/MODEL EXAMS	✔ UNIV. EXAMINATION
✔ STUD. LAB PRACTICES	✔ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES		☐ OTHERS	

ASSESSMENT METHODOLOGIES - INDIRECT

✔ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	☐ STUDENT FEEDBACK ON FACULTY (ONCE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by **Approved by**

Ms. Divya James **(HOD)**

COURSE PLAN

No	Topic	No. of Lectures
1	**Introduction**	**8 Hours**
1.1	Software engineering, Software process, Software engineering practice	1
1.2	**Process models**: Prescriptive process models- Specialised process models, The unified process, Personal and Team process models.	3
1.3	**Agile development:** Agility, Agile process. Extreme programming- XP Values, The XP Process, Industrial XP, The XP Debate. Other Agile development models- Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), Agile Unified Process (AUP). Selection of an appropriate Project Approach- Choice of process Models.	4
2	**Managing software projects**	**5 Hours**
2.1	Project Management Concepts –The Management Spectrum- People- Product- Process- Project.	1
2.2	**Software Project Management** - Importance – Software projects VS other types of project – Categorizing Software projects- Stakeholders – Setting Objectives –The Business Case- Project success and failure.	3
2.3	**Management** –Activities- Management Control- Traditional VS modern project management.	1
3	**Evaluation, Planning and Estimation**	**8 Hours**
3.1	**Project Evaluation:** Project portfolio management- Evaluation of individual projects- Cost benefit evaluation techniques- Risk evaluation- Programme Management- Creating a Programme- Aids to Programme Management- Benefits Management.	3
3.2	**Project Planning**: Step wise Project Planning	2

3.3	**Software Estimation:** Basis for software estimation- Software Effort estimation techniques- Bottom-up and Top-down estimation- Function Point Analysis- COCOMO II. Cost Estimation- Staffing Pattern- Schedule compression.	3
4	**Activity Planning, Risk management and Resource allocation**	**7 Hours**
4.1	**Activity Planning:** Objectives- Project Schedules- Projects and Activities- Sequencing and Scheduling Activities- Network Planning Models- Forward Pass- Backward pass- Identifying Critical Path and Critical Activities- Activity-on-arrow networks.	3
4.2	**Risk Management:** Risk- Categories of Risk- Risk Identification- Risk Assessment- Risk Planning- Risk management-Risk Evaluation- PERT, Monte Carlo Simulation, Critical Chain.	2
4.3	**Resource Allocation:** Nature of Resources- Identifying and Scheduling Resources- Creating Critical Paths- Cost Schedule- Scheduling sequence	2
5	**Monitoring, People management, Quality**	**7 Hours**
5.1	**Monitoring and Control:** Creating the framework- Collecting data- Review- Project Termination Review- Visualizing Progress- Gantt Chart, Slip Chart, Timeline. Cost Monitoring- Earned Value Analysis- Getting the project back to target- Change control- Software Configuration Management- Contract management.	3
5.2	**Managing People:** Organizational Behaviour- Selecting the right Person- Motivation- Stress- Working in Teams- Becoming a Team- Decision Making- Organization and Team Structures- Communication- Leadership.	2
5.3	**Software Quality:** Quality Management Systems- Process Capability Models- CMMI, Six Sigma. Techniques for Enhancing Software Quality- Testing- Software Reliability- Quality Plans.	2

ASSIGNMENT QUESTIONS

Assignment 1

1.Identify the ways to select an appropriate process model.
2.Compare Traditional and Modern Project Management Practices.
3.Write short notes on:
    1. Industrial XP
    2.The XP Debate
4 Explain in detail about the management practices and activities.

Assignment 2

1.Discuss staffing pattern and schedule compression in cost estimation.
2.Explain the BASIC, INTERMEDIATE and DETAILED COCOMO MODEL and its effort estimation.
techniques.
3.Define risk. Explain the categories of risk.
4.Discuss the main approaches for the identification of risks.
5. Illustrate in detail about:
  a) Programme Management & Aids to Programme Management
  b) Benefits Management.
6.Explain in detail about software configuration management and contract management.
7.Explain the techniques for enhancing Software Quality.
8.Describe about:
  a. Software Reliability
  b. Quality plans

101908/CO500F DISASTER MANAGEMENT

COURSE INFORMATION SHEET

PROGRAMME: INFORMATION TECHNOLOGY	***DEGREE:*** BTECH

PROGRAMME: : INFORMATION TECHNOLOGY	DEGREE: **B.TECH** UNIVERSITY**: A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY**
COURSE: DISASTER MANAGEMENT	SEMESTER**: V** CREDITS: **Nil**
COURSE CODE: 101908/CO500F ***REGULATION: UG 2021***	COURSE TYPE: **NON-CREDIT**
COURSE AREA/DOMAIN: GENERAL	CONTACT HOURS: **2 hours/Week.**

SYLLABUS:

UNIT	***DETAILS***	***HOURS***
I	Systems of earth Lithosphere- composition, rocks, soils; Atmosphere-layers, ozone layer, greenhouse effect, weather, cyclones, atmospheric circulations, Indian Monsoon; hydrosphere- Oceans, inland water bodies; biosphere Definition and meaning of key terms in Disaster Risk Reduction and Management- disaster, hazard, exposure, vulnerability, risk, risk assessment, risk mapping, capacity, resilience, disaster risk reduction, disaster risk management, early warning systems, disaster preparedness, disaster prevention, disaster mitigation, disaster response, damage assessment, crisis counselling, needs assessment.	5
II	Hazard types and hazard mapping; Vulnerability types and their assessment- physical, social, economic and environmental vulnerability. Disaster risk assessment –approaches, procedures	5
III	Disaster risk management -Core elements and phases of Disaster Risk Management Measures for Disaster Risk Reduction – prevention, mitigation, and preparedness. Disaster response- objectives, requirements; response planning; types of responses. Relief; international relief organizations.	5
IV	Participatory stakeholder engagement; Disaster communication- importance, methods, barriers; Crisis counselling Capacity Building: Concept – Structural and Non-structural Measures, Capacity Assessment; Strengthening Capacity for Reducing Risk	5

V	Common disaster types in India; Legislations in India on disaster management; National disaster management policy; Institutional arrangements for disaster management in India. The Sendai Framework for Disaster Risk Reduction- targets, priorities for action, guiding principles.	5

TOTAL HOURS	**25**

TEXT/REFERENCE BOOKS:

T/R	***BOOK TITLE/AUTHORS/PUBLICATION***
R1	R. Subramanian, Disaster Management, Vikas Publishing House, 2018
R2	M. M. Sulphey, Disaster Management, PHI Learning, 2016
R3	UNDP, Disaster Risk Management Training Manual, 2016
R4	United Nations Office for Disaster Risk Reduction, Sendai Framework for Disaster Risk Reduction 2015-2030, 2015

COURSE PRE-REQUISITES:

C.CODE	***COURSE NAME***	***DESCRIPTION***	***SEM***
NIL			

COURSE OBJECTIVES:

1	The objective of this course is to introduce the fundamental concepts of hazards and disaster management.

COURSE OUTCOMES:

SNO	***DESCRIPTION***	***Bloom's Taxonomy Level***
CCO500F.1	Students will be able to define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle.	Understand (level 2)
CCO500F.2	Students will be able to distinguish between different hazard types and vulnerability types and do vulnerability assessment.	Understand (level 2)

CCO500F.3	Students will be able to identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk.	Understand (level 2)
CCO500F.4	Student will be able to explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community.	Apply (level 3)
CCO500F.5	Student will be able to identify factors that determine the nature of disaster response and discuss the various disaster response actions.	Understand (level 2)
CCO500F.6	Student will be able to explain the various legislations and best practices for disaster management and risk reduction at national and international level.	Understand (level 2)

CO-PO AND CO-PSO MAPPING

	PO1	***PO2***	***PO3***	***PO4***	***PO5***	***PO6***	***PO7***	***PO8***	***PO9***	***PO10***	***PO11***	***PO12***	***PSO1***	***PSO2***	***PSO3***
CCO500F.1		2				2				2		2			
CCO500F.2	2	3	2		2	2	3			3		2		2	
CCO500F.3	2	3	2	2	2	2	3			3		2			2
CCO500F.4	3	3	3		2	2	3					2		2	2
CCO500F.5	3	3			2	2	3					2		2	
CCO500F.6	3					2	3	3				2			

JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	***LOW/MEDIUM/ HIGH***	***JUSTIFICATION***
CCO500F.1-PO2	M	Awareness of standard terms used in disaster management will help students address practical engineering problems in

		challenging environments.
CCO500F.1-PO6	M	Awareness of standard terms used in disaster management will help students assess the societal, health, and safety issues relevant to professional engineering practice.
CCO500F.1-PO10	M	Awareness of standard terms used in disaster management will help students communicate effectively with the engineering community and society during an emergency.
CCO500F.1-PO12	M	Awareness of standard terms used in disaster management will help students pursue independent and life-long learning in the broadest context of technological change post-pandemic.
CCO500F.2-PO1	M	Various mathematical and numerical tools are used in vulnerability assessment.
CCO500F.2-PO2	H	Extensive research and a basic understanding of mathematics are needed to conduct vulnerability assessments.
CCO500F.2-PO3	M	Assessing vulnerability helps the stakeholders to design a practical disaster management framework.
CCO500F.2-PO5	M	Complex analytical and numerical modeling tools are used in vulnerability assessment.
CCO500F.2-PO6	M	Awareness of different hazard types and vulnerabilities will help the students to assess the societal, health, and safety issues relevant to the professional engineering practice.
CCO500F.2-PO7	H	Assessing vulnerability is essential in improving the capacity to reduce the risks related to disasters.
CCO500F.2-PO10	H	The students will identify the vulnerable community/society/individuals and communicate with them effectively.
CCO500F.2-PO12	M	Awareness of disasters and vulnerability will help students pursue independent and life-long learning in the broadest context of technological change post-pandemic.

CCO500F.3-PO1	M	Various empirical and analytical methods are used in risk assessment.
CCO500F.3-PO2	H	Extensive research and a basic understanding of science, mathematics, and social sciences are needed to conduct a risk assessment.
CCO500F.3-PO3	M	Risk assessment helps the stakeholders to design a practical disaster management framework.
CCO500F.3-PO4	M	Research-based knowledge and a basic understanding of data analysis, data interpretation, and information synthesis are required to carry out a risk assessment.
CMCN301.3-PO5	M	Complex analytical and numerical modeling tools are used to assess natural hazards like floods, earthquakes, landslides, etc.
CCO500F.3-PO6	M	Awareness of risk assessment fundamentals will help the students assess the societal, health, and safety issues relevant to the professional engineering practice.
CCO500F.3-PO7	H	Understanding elements at risk and risk assessment are essential in strengthening the capacity, developing sustainable mitigation measures, and improving resilience.
CCO500F.3-PO10	H	The students will identify the community/society/individuals at risk and communicate with them effectively.
CCO500F.3-PO12	M	Awareness of future risks and risk assessment will help students pursue independent and life-long learning in the broadest context of technological change post-pandemic.
CCO500F.4-PO1	H	A basic understanding of engineering sciences and mathematics is needed to reduce disaster risks across sectors and communities.
CCO500F.4-	H	Extensive research and a basic understanding of science, mathematics, and social sciences are needed to develop risk
PO2		reduction measures.

CCO500F.4-PO3	H	A decent disaster management framework helps the stakeholders to develop risk reduction measures.
CCO500F.4-PO5	M	GIS and numerical modeling softwares can be used to analyze natural hazards like floods, earthquakes, landslides, etc.
CCO500F.4-PO6	M	Awareness of disaster risk management fundamentals will help the students assess the societal, health, and safety issues relevant to the professional engineering practice.
CCO500F.4-PO7	H	Understanding the core elements and phases of disaster risk management is essential in strengthening the capacity, developing sustainable mitigation measures, and improving resilience.
CCO500F.4-PO12	M	Awareness of disaster risk management strategies will help students pursue independent and life-long learning in the broadest context of technological change post-pandemic.
CCO500F.5-PO1	H	A basic understanding of engineering and social sciences is needed to formulate disaster response strategies.
CCO500F.5-PO2	H	Extensive research and a basic understanding of science, mathematics, and social sciences are needed to develop disaster response measures.
CCO500F.5-PO5	M	Modern tools like GIS, GPS, etc., are used to develop emergency plans for natural hazards.

CCO500F.5-PO6	M	Awareness of the fundamentals of disaster response will help the students to assess the societal, health, and safety issues relevant to the professional engineering practice
CCO500F.5-PO7	H	Understanding disaster response strategies is essential in strengthening the capacity, developing sustainable mitigation measures, and improving resilience.
CCO500F.5-PO12	M	Awareness of disaster response strategies will help students pursue independent and life-long learning in the broadest context of technological change post-pandemic.
CCO500F.6-PO1	H	Awareness of various legislations, policies, and frameworks in disaster management will help students address practical engineering problems in challenging environments.
CCO500F.6-PO6	M	Awareness of various legislations, policies, and frameworks in disaster management will help students assess the societal, health, and safety issues relevant to professional engineering practice.
CCO500F.6-PO7	H	Understanding various legislations, policies, and frameworks in disaster management is essential in strengthening the capacity, developing sustainable mitigation measures, and improving resilience.
CCO500F.6-PO8	H	A professional engineer should be aware of various legislations, policies, and frameworks in disaster management.
CCO500F.6-PO12	M	Awareness of various legislations, policies, and frameworks in disaster management will help students pursue independent and life-long learning in the broadest context of

		technological change post-pandemic.

JUSTIFICATIONS FOR CO-PSO MAPPING

MAPPING	*LOW/MEDIUM/ HIGH*	*JUSTIFICATION*
CCO500F .2-PSO 2	M	Apply the principles of analysis and implementation of systems in the process of vulnerability assessment.
CCO500F .3-PSO 3	M	Using modern design tools and product implementation in the process of risk assessment.
CCO500F .4-PSO 2	M	Application of different mechanical systems aiding the steps of risk reduction.
CCO500F .4-PSO 3	M	Novel designs for practically implementing structural solutions for risk reduction measures.
CCO500F .5-PSO 2	M	Applicability of the principles of design and mechanical systems in the various disaster response actions.

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

SlNO:	**TOPIC**	**RELEVENCE TO PO\PSO**
1	National Disaster Management Plan 2016	
2	The PM's 10-point agenda on DRR	

WEB SOURCE REFERENCES:

1	https://nptel.ac.in/courses/105/104/105104183/
2	https://nptel.ac.in/courses/124/107/124107010/

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

☑ CHALK & TALK	☑ STUD. ASSIGNMENT	☑ WEB RESOURCES	☑ LCD/SMART BOARDS
☑ STUD. SEMINARS	☐ ADD-ON COURSES		

ASSESSMENT METHODOLOGIES-DIRECT

☑ ASSIGNMENTS	☑ STUD. SEMINARS	☑ TESTS/MODEL EXAMS	☑ UNIV. EXAMINATION

☐ STUD. LAB PRACTICES	☐ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

☑ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	☑ STUDENT FEEDBACK ON FACULTY (ONCE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

COURSE PLAN

DAY	MODULE	TOPIC PLANNED
1	1	Introduction about various Systems of earth, Lithosphere-composition, rocks, Soils; Atmosphere-layers, ozone layer, greenhouse effect, weather
2	1	Cyclones, atmospheric circulations, Indian Monsoon; hydrosphere-Oceans, inland water bodies; biosphere
3	1	Definition and meaning of key terms in Disaster Risk Reduction and Management- disaster, hazard,
4	1	Exposure, vulnerability, risk, risk assessment, risk mapping, capacity, resilience, disaster risk reduction, Disaster risk management, early warning systems
5	1	Disaster preparedness, disaster prevention, disaster, Mitigation, disaster response, damage assessment, crisis counselling, needs assessment.
6	2	Various Hazard types, Hazard mapping; Different types of Vulnerability types and their assessment
7	2	Vulnerability assessment and types, Physical and social vulnerability
8	2	Economic and environmental vulnerability, Core elements of disaster risk assessment
9	2	Components of a comprehensive disaster preparedness strategy approaches, procedures
10	2	Different disaster response actions
11	3	Introduction to Disaster risk management, Core elements of Disaster Risk Management
12	3	Phases of Disaster Risk Management, Measures for Disaster Risk Reduction
13	3	Measures for Disaster prevention, mitigation, and preparedness.

14	3	Disaster response- objectives, requirements. Disaster response planning; types of responses.
15	3	Introduction- Disaster Relief, Relief; international relief organizations.
16	4	Participatory stakeholder engagement
17	4	Importance of disaster communication.
18	4	Disaster communication- methods, barriers. Crisis counselling
19	4	Introduction to Capacity Building. Concept – Structural Measures, Non-structural Measures.
20	4	Introduction to Capacity Assessment, Capacity Assessment; Strengthening, Capacity for Reducing Risk
21	5	Introduction-Common disaster types in India.
22	5	Common disaster legislations in India on disaster management
23	5	National disaster management policy, Institutional arrangements for disaster management in India.
24	5	The Sendai Framework for Disaster Risk Reduction and targets
25	5	The Sendai Framework for Disaster Risk Reduction-priorities for action, guiding principles

1. MODULE WISE SAMPLE QUESTIONS

MODULE I

1. Explain disaster risk management.
2. Explain and classify hazards with suitable examples.
3. Explain the subsystems of Earth.
4. Explain; (i) Risk (ii) Vulnerability (iii) Exposure (iii) Resilience
5. Illustrate the evidences of climate change with examples
6. Elucidate the impacts of climate change.
7. Write a short note on **Greenhouse effect.** List the greenhouse gases and mention their sources.
8. Discuss the causes of climate change.
9. Explain **Global Warming**. Enumerate the causes and suggest some methods to reduce it.
10. Discuss vulnerability in the context of Kerala floods. Also explain how we can reduce the vulnerability associated with flood hazards by disaster risk management.

MODULE II

1. What is hazard mapping? What are its objectives?
2. What is participatory hazard mapping? How is it conducted? What are its advantages?
3. Explain the applications of hazard maps.
4. Explain the types of vulnerabilities and the approaches to assess them .
5. Differentiate between hazards and disaster with examples.
6. Differentiate between preparedness and mitigation.
7. "While doing vulnerability assessment, it is essential to collect historical data on the magnitude of the hazard and the damage that it caused to specific elements." Substantiate this statement by providing a suitable example.

MODULE III

1. Explain briefly the concept of 'disaster risk'.
2. List the strategies for disaster risk management 'before', 'during' and 'after' a disaster.
3. What is disaster preparedness? Explain the components of a comprehensive disaster preparedness strategy.
4. What is disaster prevention? Distinguish it from disaster mitigation giving examples.
5. Explain the core elements of disaster risk management.
6. Explain the factors that decide the nature of disaster response.
7. Explain the different disaster response actions.
8. How important is vulnerability and risk assessment for pre-disaster management? As an administrator, what are key areas that you would focus on in a Disaster Management System?
9. Explain the standard operating procedures during normal times, alert/warning, during disaster and rehabilitation.

MODULE IV

1. What are the steps to effective disaster communication? What are the barriers to communication?
2. Explain capacity building in the context of disaster management .
3. Briefly explain the levels of stakeholder participation in the context of disaster risk reduction.
4. Explain the importance of communication in disaster management .
5. Explain the benefits and costs of stakeholder participation in disaster management.
6. How are stakeholders in disaster management identified?

7. Discuss the measures for disaster risk reduction. Elucidate the process of strengthening the capacity in terms of reducing risk.

8. Explain different levels of stakeholders.

MODULE V

1. Explain the salient features of the National Policy on Disaster Management in India.
2. Explain the guiding principles and priorities of action according to the Sendai Framework for Disaster Risk Reduction.
3. What are Tsunamis? How are they caused?
4. Explain the earthquake zonation of India.
5. Explain three objectives of national policy on disaster management.
6. Explain common disaster types in India.

Prepared by	**Approved By**
Taniya Shirley Stalin	**Dr.Neeba E A**
	(HOD IT)

Assignment 1

Take the case studies of disasters happened in india during the period of 2010-2023 (Eg:kerala floods 2018 And covid) and discuss the measures taken, issues with how those measures were implemented or failed to.. Also any alternate measures that could have been taken to avert those disasters. Prepare a documentary video/ppt about the same, and present in the form of a panel discussion. Divide the class into 13 groups comprising of 5 to 6 students.

Assignment II

Write a short note on different types of natural disasters and man-made disasters:

1. Natural disasters

   - Drought In India
   - Floods
   - Cyclones
   - Heat Wave
   - Cold Wave and Fog
   - Earthquake
   - Landslides
   - Tsunami

2. Man-made disasters

   - Industrial and Chemical Disaster
   - Stampede
   - Road Accidents
   - Rail Accidents
   - Air Accidents
   - Mine Disasters
   - Epidemic

100004/IT522S OPERATING SYSTEM AND NETWORK PROGRAMMING LAB

COURSE INFORMATION SHEET

PROGRAMME: **INFORMATION TECHNOLOGY**	DEGREE: **BTECH**
COURSE: **OPERATING SYSTEMS AND NETWORK PROGRAMMING LAB**	SEMESTER: **V** CREDITS: **2**
COURSE CODE**:** 100004/IT522S REGULATION: **2021**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: **Programming, Data Structures and Algorithms**	CONTACT HOURS: **3 hours per week**

SYLLABUS:

DETAILS
1. Familiarization of system calls (fork, exec, getpid, exit, wait, close, stat etc) in operating system. 2. Implement process scheduling algorithms (FCFS, SJF, Round-Robin, Priority) and compute average waiting time and average turn-around time. 3. Inter-process communication using mail boxes, pipes, message queues and shared memory. 4. Implementation of dining philosophers problem using threads, semaphores and shared memory. 5. Implementation of banker's algorithm. 6. Implement memory management schemes (first fit, best fit and worst fit). 7. Familiarisation of Network Programming API in Java. 8. Implementation of Medium Access Control protocols – 1) Go Back N. 2) Selective Repeat and 3) Sliding Window. 9. Implementation of an echo server. 10. Implement Client-Server communication using sockets. 11. Implementation of chat application 12. Install network simulator NS-3 in Linux operating system and simulate wired and wireless scenarios. (Familiarization only)

<u>Lab Cycle (2022-2023)</u>

1. Implement fork, exec, getpid, exit, wait, close system calls.
2. Implement Memory Allocation Methods for fixed partition using Array
   (a) First-fit (b) Worst Fit (c) Best Fit

3. Simulate the following non pre-emptive CPU scheduling algorithms to find turnaround time and waiting time.
    a. FCFS (Non-preemptive)
    b. SJF (Non-preemptive)
    c. Round Robin(Pre-emptive)
    d. Priority Scheduling(Non preemptive)
4. Inter-process communication using pipes, message queues and shared memory.
5. Implementation of dining philosophers problem using threads, semaphores and shared memory.
6. Implementation of banker's algorithm.
7. Familiarisation of Network Programming API in Java.
8. Implementation of Medium Access Control protocols

    1) Go Back N.

    2) Selective Repeat and 3) Sliding Window.
9. Implementation of an echo server.
10. Implement Client-Server communication using sockets.
11. Implementation of chat application
12. Install network simulator NS-3 in Linux operating system and simulate wired and wireless scenarios. (Familiarization only)

TEXT/REFERENCE BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, ' Operating System Concepts' 9th Edition, Wiley India 2015.
2. Samanta D., Classic Data Structures, Prentice Hall India.
3. Gottfried B.S., Programming with C, Schaum Series, Tata McGraw Hill.
4. Sumitabha Das., Unix Concepts and Applications., 4 th Edition., Tata McGraw Hill
5. Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming Cengage Learning – India Edition. 2009.
6. M.G. Venkatesh Murthy: UNIX & Shell Programming, Pearson Education.
7. Richard Blum , Christine Bresnahan : Linux Command Line and Shell Scripting Bible,2nd Edition , Wiley,2014.

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COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
EST102	Programming in C	The basics of C programming	S2

COURSE OBJECTIVES:

1	To offer students a hands-on experience on Operating System concepts using a constructivist approach and problem-oriented learning. Operating systems are the fundamental part of every computing device to run any type of software.

COURSE OUTCOMES:

SLNO	DESCRIPTION	Blooms' Taxonomy Level
101009/IT422S. 1	Illustrate the use of systems calls in Operating Systems	(Cognitive knowledge: Understand)
101009/IT422S. 2	Implement Process Creation and Inter Process Communication in Operating Systems.	Cognitive Knowledge Level: Apply
101009/IT422S. 3	Implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms.	Cognitive Knowledge Level: Apply
101009/IT422S. 4	Illustrate the concepts of Inter process communication mechanisms using pipes, message queue, sheared memory.	Cognitive Knowledge Level: Apply
101009/IT422S. 5	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems.	Cognitive Knowledge

		Level: Apply
101009/IT422S.6	Implement client server network programming operations.	Cognitive Knowledge Level: Apply

CO-PO AND CO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
101009/IT422S.1	3	2	3	-	-	-	-	1	-	1	-	2	3	3	2
101009/IT422S.2	3	2	3	-	-	-	-	1	-	1	-	2	2	2	-
101009/IT422S.3	2	2	3	2	-	-	-	1	-	1	-	2	2	2	-
101009/IT422S.4	2	2	3	2	-	-	-	1	-	1	-	2	1	2	-
101009/IT422S.5	1	1	2	2	-	-	-	1	-	1	-	1	-	2	-
101009/IT422S.6	1	1	2	2	-	-	-	1	-	1	-	1	-	2	-
101009/IT422S overall	2	2	2	2	-	2	-	1	-	1	-	2	2	2	2

1-Low (L) 2-Medium (M) 3-High (H)

JUSTIFICATIONS FOR THE MAPPING

Mapping	LOW/MEDIUM/HIGH	Justification

101009/IT 422S.1-PO 1	HIGH	The knowledge about different types of system calls and how to use them is important to solve complex engineering problems.
101009/IT 422S.1-PO 2	MEDIUM	The knowledge about different types of system calls and how to use them is important in analyzing complex engineering problems.
101009/IT 422S.1-PO 3	HIGH	The knowledge about different types of system calls and how to use them is needed to design efficient solutions to engineering problems
101009/IT 422S.1-PO 8	LOW	The knowledge about different types of system calls and how to use them makes them committed to professional ethical behaviors like honesty and integrity while doing the lab work.
101009/IT 422S.1-PO 10	LOW	The knowledge about different types of system calls and how to use them helps to illustrate them to others and thus communicate them effectively with the engineering community through their lab records
101009/IT 422S.1-PO 12	MEDIUM	The knowledge about different types of system calls and how to use them helps in life-long learning which enables them to adapt themselves to technological changes.
101009/IT 422S.1-PSO1	HIGH	The knowledge about different types of system calls and how to use them enables the students to analyze and design solutions for complex problems by understanding the concepts of Computer Science.
101009/IT 422S.1-PSO2	HIGH	The knowledge about different types of system calls and how to use them helps them to write efficient programs.
101009/IT 422S.1-PSO3	MEDIUM	The knowledge about different types of system calls and how to use them helps them to apply them in research and thereby develop innovative products useful for the society.
C **101009/IT 422S**.2-PO	HIGH	The knowledge of implementing Process Creation and Inter Process Communication in Operating Systems is important to solve complex engineering problems.

1		
101009/IT 422S.2-PO 2	MEDIUM	The knowledge of implementing Process Creation and Inter Process Communication in Operating Systems is important in analyzing complex engineering problems.
101009/IT 422S.2-PO 3	HIGH	The knowledge of implementing Process Creation and Inter Process Communication in Operating Systems helps to design efficient solutions to engineering problems
101009/IT 422S.2-PO 8	LOW	The knowledge of implementing Process Creation and Inter Process Communication in Operating Systems makes them committed to professional ethical behaviors like honesty and integrity while doing the lab work.
101009/IT 422S.2-PO 10	LOW	The knowledge of implementing Process Creation and Inter Process Communication in Operating Systems helps to illustrate the concept to others and thus communicate them effectively with the engineering community through their lab records
101009/IT 422S.2-PO 12	MEDIUM	The knowledge of implementing Process Creation and Inter Process Communication in Operating Systems helps in life-long learning which enables them to adapt themselves to technological changes.
101009/IT 422S.2-PS O1	MEDIUM	The knowledge of implementing Process Creation and Inter Process Communication in Operating Systems enables the students to analyze and design solutions for complex problems by understanding the concepts of Computer Science.
101009/IT 422S.2-PS O2	MEDIUM	The knowledge of implementing Process Creation and Inter Process Communication in Operating Systems helps them to write efficient programs while designing new OS for computing devices.
101009/IT 422S.3-PO 1	MEDIUM	The knowledge of implementing CPU Scheduling algorithms plays a role when designing new Operating systems for different applications
101009/IT	MEDIUM	The knowledge of implementing CPU Scheduling

422S.3-PO 2		algorithms is important in analyzing complex engineering problems.
101009/IT 422S.3-PO 3	HIGH	The knowledge of implementing CPU Scheduling algorithms helps to develop efficient solutions while using them for OS design
101009/IT 422S.3-PO 4	MEDIUM	The knowledge of implementing CPU Scheduling algorithms helps the students to adapt themselves to modern tool usage and use this knowledge to make comparisons and thus reach valid conclusions.
101009/IT 422S.3-PO 8	LOW	The knowledge of implementing CPU Scheduling algorithms makes them committed to professional ethical behaviors like honesty and integrity while doing the lab work.
101009/IT 422S.3-PO 10	LOW	The knowledge of implementing CPU Scheduling algorithms helps to illustrate the concept to others and thus communicate them effectively with the engineering community through their lab records
101009/IT 422S.3-PO 12	MEDIUM	The knowledge of implementing CPU Scheduling algorithms helps in life-long learning which enables them to adapt themselves to technological changes.
101009/IT 422S.3-PS O1	LOW	The knowledge of implementing CPU Scheduling algorithms enables the students to analyze and design efficient solutions for complex problems by understanding the concepts of Computer Science.
101009/IT 422S.3-PS O2	MEDIUM	The knowledge of implementing CPU Scheduling algorithms helps them to write efficient programs for process scheduling while designing new OS for computing devices.
101009/IT 422S.4-PO 1	MEDIUM	The knowledge of implementing page replacement algorithms for memory management plays an important role when designing new Operating systems for different applications
101009/IT 422S.4-PO 2	MEDIUM	The knowledge of implementing page replacement algorithms for memory management is important in analyzing complex engineering problems.
101009/IT 422S.4-PO 3	HIGH	The knowledge of implementing page replacement algorithms for memory management helps to develop efficient solutions while using them for OS design

101009/IT 422S.4-PO 4	MEDIUM	The knowledge of implementing page replacement algorithms for memory management helps the students to adapt themselves to modern tool usage and use this knowledge to make comparisons and thus reach valid conclusions
101009/IT 422S.4-PO 8	LOW	The knowledge of implementing page replacement algorithms for memory management makes them committed to professional ethical behaviors like honesty and integrity while doing the lab work.
101009/IT 422S.4-PO 10	LOW	The knowledge of implementing page replacement algorithms for memory management algorithms helps to illustrate the concept to others and thus communicate them effectively with the engineering community through their lab records
101009/IT 422S.4-PO 12	MEDIUM	The knowledge of implementing page replacement algorithms for memory management helps in life-long learning which enables them to adapt themselves to technological changes.
101009/IT 422S.4-PS O1	LOW	The knowledge of implementing page replacement algorithms for memory management enables the students to analyze and design efficient solutions for complex problems by understanding the concepts of Computer Science
101009/IT 422S.4-PS O2	MEDIUM	The knowledge of implementing page replacement algorithms for memory management helps them to write efficient programs using these algorithms while designing new OS for computing devices.
101009/IT 422S.5-PO 1	LOW	The knowledge of implementing deadlock detection and avoidance algorithms plays an important role when designing new Operating systems for different applications
101009/IT 422S.5-PO 2	LOW	The knowledge of implementing deadlock detection and avoidance algorithms is important in analyzing complex engineering problems.
101009/IT 422S.5-PO 3	MEDIUM	The knowledge of implementing deadlock detection and avoidance algorithms helps to develop efficient solutions while using them for OS design
101009/IT 422S.5-PO	MEDIUM	The knowledge of implementing deadlock detection and avoidance algorithms helps the students to adapt

4		themselves to modern tool usage and use this knowledge to make comparisons and thus reach valid conclusions
101009/IT 422S.5-PO 8	LOW	The knowledge of implementing deadlock detection and avoidance algorithms makes them committed to professional ethical behaviors like honesty and integrity while doing the lab work.
101009/IT 422S.5-PO 10	LOW	The knowledge of implementing deadlock detection and avoidance algorithms helps to illustrate the concept to others and thus communicate them effectively with the engineering community. through their lab records
101009/IT 422S.5-PO 12	LOW	The knowledge of implementing deadlock detection and avoidance algorithms helps in life-long learning which enables them to adapt themselves to technological changes.
101009/IT 422S.5-PS O2	MEDIUM	The knowledge of implementing deadlock detection and avoidance algorithms helps them to write efficient programs using these algorithms while designing new OS for computing devices.
101009/IT 422S.6-PO 1	LOW	The knowledge of implementing modules for Storage Management and Disk Scheduling in Operating Systems plays a role when designing new Operating systems for different applications
101009/IT 422S.6-PO 2	LOW	The knowledge of implementing modules for Storage Management and Disk Scheduling in Operating Systems is important in analyzing complex engineering problems.
101009/IT 422S.6-PO 3	MEDIUM	The knowledge of implementing modules for Storage Management and Disk Scheduling in Operating Systems helps to develop efficient solutions while using them for OS design
101009/IT 422S.6-PO 4	MEDIUM	The knowledge of implementing modules for Storage Management and Disk Scheduling in Operating Systems helps the students to adapt themselves to modern tool usage and use this knowledge to make comparisons and thus reach valid conclusions
101009/IT 422S.6-PO	LOW	The knowledge of implementing modules for Storage Management and Disk Scheduling in Operating Systems

8		makes them committed to professional ethical behaviors like honesty and integrity while doing the lab work.
101009/IT 422S.6-PO 10	LOW	The knowledge of implementing modules for Storage Management and Disk Scheduling in Operating Systems helps to illustrate the concept to others and thus communicate them effectively with the engineering community through their lab records
101009/IT 422S.6-PO 12	LOW	The knowledge of implementing modules for Storage Management and Disk Scheduling in Operating Systems helps in life-long learning which enables them to adapt themselves to technological changes.
101009/IT 422S.6-PS O2	MEDIUM	The knowledge of implementing modules for Storage Management and Disk Scheduling in Operating Systems helps them to write efficient programs using these algorithms while designing new OS for computing devices.

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SN O	DESCRIPTION	PROPOSED ACTIONS	RELEVANC E WITH POs	RELEVANC E WITH PSOs
1	Readers Writers Problem implementation	Lab Sessions	PO3	PSO2

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

SL N O	DESCRIPTION	PROPOSED ACTIONS	RELEVANCE WITH POs	RELEVANCE WITH PSOs
1	Thread Management using pthread library	Learning materials/	PO3, PO4	PSO2

		sessions		

WEB SOURCE REFERENCES:

1	https://www.cse.iitb.ac.in/~mythili/os/
2	https://sites.google.com/cse.iitm.ac.in/os-2020/home

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✔ CHALK & TALK	✔ HOME ASSIGNMENT	✔ WEB RESOURCES
LCD/SMART BOARDS	STUD. SEMINARS	ADD-ON COURSES

ASSESSMENT METHODOLOGIES-DIRECT

ASSIGNMENTS	STUD. SEMINARS	✔ TESTS/MODEL EXAMS	✔ UNIV. EXAMINATION
✔ STUD. LAB PRACTICES	✔ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
ADD-ON COURSES	OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

✔ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	✔ STUDENT FEEDBACK ON FACULTY (ONCE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by **Approved by**

Ajith Jacob **HOD, IT**
(Faculty in Charge)

100004/IT522S OPERATING SYSTEM AND NETWORK PROGRAMMING LAB

Course Contents and Lab Schedule

Cycle	Name of Experiment
I	1. Familiarization of system calls (fork, exec, getpid, exit, wait, close, stat etc) in operating system. 2. Implement process scheduling algorithms (FCFS, SJF, Round-Robin, Priority) and compute average waiting time and average turn-around time. 3. Inter-process communication using mail boxes, pipes, message queues and shared memory. 4. Implementation of dining philosophers problem using threads, semaphores and shared memory. 5. Implementation of banker's algorithm. 6. Implement memory management schemes (first fit, best fit and worst fit).
II	1. Familiarization of Network Programming API in Java. 2. Implementation of Medium Access Control protocols – 1) Go Back N. 2) Selective Repeat and 3) Sliding Window. 3. Implementation of an echo server. 4. Implement Client-Server communication using sockets. 5. Implementation of chat application. 6. Install network simulator NS-3 in Linux operating system and simulate wired and wireless scenarios. (Familiarization only).

Lab Cycle (2023-2024)

1. Familiarization of different types of Operating Systems Windows, Linux etc.
2. Implement fork, exec, getpid, exit, wait, close system calls.
3. Simulate the following non pre-emptive CPU scheduling algorithms to find turnaround time and waiting time.

   a. Implement FCFS (Non-preemptive) scheduling algorithm and compute average waiting time and average turn-around time.

Input

Process id	Arrival Time	Burst Time
P1	0	9
P2	1	4
P3	2	5
P4	3	7
P5	4	3

   b. Implement SJF (Non-preemptive) scheduling algorithm and compute average waiting time and average turn-around time.

Input

Process id	Arrival Time	Burst Time
P1	2	1
P2	1	5
P3	4	1
P4	0	6
P5	2	3

c. Implement Round Robin(Pre-emptive) scheduling algorithm and compute average waiting time and average turn-around time. Tq=2 sec

Process id	Arrival Time	Burst Time
P1	0	9
P2	1	4
P3	2	5
P4	3	7
P5	4	3

d. Implement Priority Scheduling(Non preemptive) scheduling algorithm and compute average waiting time and average turn-around time.

Input

Process id	Priority	Arrival Time	Burst Time
P1	5	0	9
P2	3	1	4
P3	1	2	5
P4	2	3	7
P5	4	4	3

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4. Inter-process communication using pipes, message queues and shared memory.
5. Implementation of dining philosopher's problem using threads, semaphores and shared memory.
6. Implementation of Medium Access Control protocols –

   1) Go Back N. 2) Selective Repeat and 3) Sliding Window.
7. Implementation of banker's algorithm. Find out the safe sequence.

Processes	**Allocation A B C**	**Max A B C**	**Available A B C**
P0	1 1 2	4 3 3	2 1 0

P1	2 1 2	3 2 2	
P2	4 0 1	9 0 2	
P3	0 2 0	7 5 3	
P4	1 1 2	1 1 2	

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8. Implement Memory Allocation Methods for fixed partition using Array
   (b) First-fit (b) Worst Fit (c) Best Fit
9. Familiarization of Socket programing using java.
10. Write a Socket program to implement chat application
11. Write a Socket program to implement echo server operations.
12. Write a Socket program implement Client-Server communication to find out the factorial of the given inputted number (Client).
13. Write a Socket program to check the inputted number (client) is palindrome or not.
14. Write a Socket program to check the inputted number (client) is Prime or not.
15. Write a Socket program implement Client-Server communication using sockets.
16. Install network simulator NS-3 in Linux operating system and simulate wired and wireless scenarios. (Familiarization only)

OPEN QUESTIONS

Basic Programs

1. Write a Java program to find the area of a circle.
2. Write a Java program to find the sum of digits of a number.
3. Write a Java program to find the reverse of n numbers (Use Multiple loops).
4. Write a Java program to find the frequency of a given character in a string.

2: Arrays

5. Write a Java program to multiply two given matrices.
6. Write a Java program to find the largest element in a matrix and its transpose.

3: Graphics Programming

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time. No light is on when the program starts.

4: Data Structures

1. Write a Java program that implements a binary search algorithm.
2. Write a Java program to test if a given string contains the specified sequence of char values. b) Write a Java program to search color in given ArrayList of colors. c) Write a Java program to search if a hashmap contains a mapping for the specified key, specified value
3. Bank want to automate the process of managing their accounts- the bank provides following facilities: Opening a new account, Deposit amount,Withdraw amount,View the account details. The account holder has to provide with following information while opening account:account number,account type- savings, current, Account holders name, address, current balance etc
4. The payroll system of an organization keeps track of salaries of employees; the employee may be a permanent employee, daily wager, as per their status they will get bonus and increments.
5. Write a file handling program in Java with reader/writer. Replace a given word in a file with another word.
6. Write a Java program that implements the binary search algorithm.

7. Write a Java program that implements a multi-threaded program which has three threads. First thread generates a random integer every 1 second. If the value is even, second thread computes the square of the number and prints. If the value is odd the third thread will print the value of cube of the number.

ADVANCED QUESTIONS

1. Read a number through command line arguments. If user enters minus number throw NegativeNumberException which is a user defined exception.
2. Create BankAccount with 500 Rs Minimum Balance, Deposit Amount, Withdraw Amount and Also Throws LessBalanceException. - Class Called LessBalanceException Which returns the Statement that Says WithDraw Amount(_Rs) is Not Valid. Write a Java Program that has a Class Which Creates Account, perform Deposite Money and Tries to WithDraw more Money Which Generates a LessBalanceException. Take Appropriate Action for the Same
3. Write a program for java online test (Minimum 3 questions). And display score.
4. Implement an ATM using GUI & MySQL.
5. Develop a GUI Based application to check whether the given number is prime or not.
6. Develop a GUI Based application to find the sum of the digits of a number.
7. Develop a GUI Based application to check if a given number is armstrong or not.
8. Develop a Java program to implement binary search.
9. Develop a Java program to implement a stack.
10. Develop a Java program to implement a queue.
11. Develop a Java program to implement a circular queue.
12. Develop a GUI Based application to determine if a given word is palindrome or not.
13. Develop a GUI Based application to count the number of words in a given file.

100004/IT522T Web Application Development Lab

Course Information Sheet

PROGRAMME: **Information Technology**	DEGREE: **BTECH**
COURSE: Web Application Development Lab	SEMESTER: **V** CREDITS**: 2**
COURSE CODE: 100004/IT522T REGULATION: 2021	COURSE TYPE: CORE
COURSE AREA/DOMAIN: Programming	CONTACT HOURS: 3 Lab hours/Week
CORRESPONDING LAB COURSE CODE (IF ANY):	LAB COURSE NAME: NA

SYLLABUS

1. Install, setup Integrated Development Environment (IDE) for web development.
2. Create a web page with all possible elements of HTML5
3. Create a web page with all types of Cascading style sheets
4. Create a Responsive Web page with HTML and CSS
5. Create Responsive web page with Bootstrap
6. Programs to demonstrate JavaScript array, object and functions
7. Client Side Scripts for Form Validation using JavaScript
8. Programs to familiarise ES6 concepts
9. Programs to demonstrate DOM and event handling.
10. Programs using AJAX with HTML, XML and JSON data
11. Programs to familiariSe JQuery.
12. Create a website with HTML, CSS and Javascript (implement Ajax)
13. Programs to familiarize Server Side Scripting using Node JS
14. Programs using MongoDB database with Node JS

15. Develop a web site with HTML, CSS, Javascript/JQuery, Node JS and MongoDB

TEXT/REFERENCEBOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
R1	Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, "Internet and World Wide Web How To Program", 5/E, Pearson Education, 2012
R2	Jon Duckett , "HTML and CSS: Design and Build Websites", Wiley
R3	Jon Duckett , "JavaScript and JQuery: Interactive Front–End Web Development", Wiley
R4	Nicholas C. Zakas, "Understanding ECMAScript 6: The Definitive Guide for JavaScript Developers"
R5	Alex Young, Marc Harter, "Node js in practice", Manning
R6	JsonKrol , "Web Development with mongodb and node js", Packt
R7	Krishna Rungta , "Node JS: learn in one day"

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
100004/IT500A	Basics of Programming, Web Application Development	Programming Fundamentals	S5

COURSE OBJECTIVES:

Web Application Development Lab is intended to deliver hands -on experience of Web Application Development with HTML, CSS, JavaScript, JQuery, Node JS and Mongo DB thereby equipping them to develop real time web applications

COURSE OUTCOMES:

After the completion of the course the student will be able to

CO_No	Course Outcome(CO)	Bloom's Category
CO1	Infer the structure of HTML elements in a webpage	level 2: Understand
CO2	Build Webpages using HTML and CSS	level 6: Create
CO3	Utilize JavaScript to add functionality to webpages	level 6: Create
CO4	Implement different Ajax &JQuery functionalities in Web development	level 6: Create
CO5	Develop a web applications using Node JS and MongoDB	level 6: Create

CO-PO AND CO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	2	-	-	-	-	-	-	-	-	3	-	3
CO2	1	2	-	2	-	-	-	-	-	-	-	-	3	-	3
CO3	2	2	-	2	-	-	-	-	-	-	-	-	3	-	3
CO4	2	2	-	3	-	-	-	-	-	-	-	-	3	-	3
CO5	2	3	1	3	-	-	-	-	-	-	-	2	3	2	3

JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	LOW/MEDIUM /HIGH	JUSTIFICATION
CO1-PO1	L	The knowledge in designing methodologies helps in designing solutions for engineering fundamentals.
CO1-PO2	M	The knowledge in designing methodologies helps in designing solutions for engineering sciences.
CO1-PO4	M	The knowledge in designing components helps in designing system components.
CO1-PSO1	H	The knowledge in HTML5 elements helps in acquiring skills to design and develop in high level programming languages.
CO1-PSO3	H	The knowledge in HTML5 elements helps in developing strong skills in design and implementing IT solutions in different domains.
CO2-PO1	L	The knowledge in designing styles methodologies helps in designing solutions for engineering fundamentals.
CO2-PO2	M	The knowledge in designing styles methodologies helps in designing solutions for engineering sciences.
CO2-PO4	M	The knowledge in designing style components helps in designing system components.
CO2-PSO1	H	The knowledge in CSS helps in acquiring skills to design and develop in high level programming languages
CO2-PSO3	H	The knowledge in CSS elements helps in developing strong skills in design and implementing IT solutions in different domains.
CO3-PO1	M	The knowledge in JavaScript programming helps in designing solutions for complex engineering problems.
CO3-PO2	M	The knowledge in JavaScript programming helps in formulating and

		analyzing complex engineering problems for engineering sciences.
CO3-PO4	M	The knowledge in JavaScript programming helps to design solutions for complex engineering problems.
CO3-PSO1	H	The knowledge in JavaScript helps in acquiring skills to design and develop in high level programming languages
CO3-PSO3	H	The knowledge in JavaScript elements helps in developing strong skills in design and implementing IT solutions in different domains.
CO4-PO1	M	The knowledge in Ajax &JQuery helps in designing solutions for complex engineering problems.
CO4-PO2	M	The knowledge in Ajax &JQuery helps in formulating and analyzing complex engineering problems for engineering sciences.
CO4-PO4	H	The knowledge in Ajax &JQuery helps to design system components.
CO4-PO12	L	The use of Ajax &JQuery helps to recognize the need for broadest changes in context of technology.
CO4-PSO1	H	The use of Ajax &JQuery helps in acquiring skills to design and develop in high level programming languages
CO4-PSO3	H	The knowledge in Ajax &JQuery helps in developing strong skills in design and implementing IT solutions in different domains.
CO5-PO1	M	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps in designing engineering specialization for complex engineering problems.
CO5-PO2	H	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps in formulating and analyzing complex engineering problems for engineering sciences.
CO5-PO3	L	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps to design system components.
CO5-PO4	H	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps in research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the

		information to provide valid conclusions.
CO5-PO12	M	The use of HTML, CSS, JavaScript, Node JS and MongoDB helps to recognize the need for broadest changes in context of technology.
CO5-PSO1	H	The use of HTML, CSS, JavaScript, Node JS and MongoDB helps in acquiring skills to design and develop in high level programming languages
CO5-PSO2	M	The use of Node JS and MongoDB contribute engineering skills in database design.
CO5-PSO3	H	The knowledge in HTML, CSS, JavaScript, Node JS and MongoDB helps in developing strong skills in design and implementing IT solutions in different domains.

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

Sl.No	Description	PO mapping	Proposed Actions
1	OWASP	PO1,PO3,PO4, PSO1,POS2,PSO3	Learning Materials provided

WEB SOURCE REFERENCES:

1	https://www.w3schools.com/html/
2	https://www.w3schools.com/html/css/default.asp
3	https://www.w3schools.com/html/js/default.asp
4	https://www.w3schools.com/xml/ajax_intro.asp
5	https://www.tutorialpoint.com/mongodb/index.html

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✔ CHALK & TALK	✔ STUD. ASSIGNMENT	✔ WEB RESOURCES

✔ LCD/SMART BOARDS	✔ STUD. SEMINARS	✔ ADD-ON COURSES

ASSESSMENT METHODOLOGIES-DIRECT

✔ ASSIGNMENTS	☐ STUD. SEMINARS	✔ TESTS/MODEL EXAMS	✔ UNIV. EXAMINATION
☐ STUD. LAB PRACTICES	✔ STUD. VIVA	✔ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

✔ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	✔ STUDENT FEEDBACK ON FACULTY (ONCE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by **Approved by**

Vidhya Vijayan **HOD**

100004/IT522T WEB APPLICATION DEVELOPMENT LAB

Course Contents and Lab Schedule

No	Topic	Week No
1	Install, setup Integrated Development Environment (IDE) for web development.	Week 1
2	Create a web page with all possible elements of HTML5.	Week 2
3	Create a web page with all types of Cascading style sheets.	Week 3
4	Create a Responsive Web page with HTML and CSS.	Week 4
5	Create Responsive web page with Bootstrap.	Week 5
6	Programs to demonstrate JavaScript array, object and functions.	Week 6
7	Client Side Scripts for Form Validation using JavaScript.	Week 7
8	Programs to familiarize ES6 concepts.	Week 8
9	Programs to demonstrate DOM and event handling.	Week 9
10	Programs using AJAX with HTML, XML and JSON data.	Week 10
11	Programs to familiarize JQuery.	Week 11
12	Create a website with HTML, CSS and JavaScript (implement Ajax).	Week 12
13	Programs to familiarise Server Side Scripting using Node JS.	Week 13
14	Programs using MongoDB database with Node JS.	Week 14
15	Develop a web site with HTML, CSS, Javascript/JQuery, Node JS and MongoDB.	Week 15

Lab Cycle

1. WEBSITE USING HTML

Create a website which demonstrates the usage of following HTML tags:

- Headings
- Paragraphs
- Image
- Lists
- Anchor
- Forms

2. WEBSITE USING HTML AND CSS

Develop a website for Online Bus Ticket Booking having pages:

a) Home Page:
- Navbar
- Banner image
- Contents
- Footer

b) Ticket Booking
- Book Ticket
- Booking Details

c) About Us

3. Develop a **RESPONSIVE WEBSITE WITH BOOTSTRAP** for Online Bus Ticket Booking.

4. JAVASCRIPT ARRAY, OBJECT AND FUNCTIONS

a)Write a Javascript program to find the sum of array elements using function

b)Write a Javascript program to sort a list of elements using Bubble Sort.

c)Write a Javascript program to calculate grades of students and average grade of a class(use prompt to get input)

5. ES6 concepts

a. Write an ES6 program to find the maximum, minimum, sum and average of numbers in array which is accept from user's keyboard using for loop, arrow functions.

b. Write an ES6 program to reverse a string using for loop, arrow functions.

c. Write a simple ES6 program that receive an array of numbers and return a newarray with distinct elements.

6. FORM VALIDATION USING JAVASCRIPT

Write the client side scripts for Validating HTML Registration (Form Validation) Using JavaScript.

7. DOM & EVENT HANDLING

a) Write a JS program to implement the event bubbling

b) Write a JS program to find the sum of two number in the button click event.

c) Create a button named 'change color' and change its foreground color to red when mouse over and its back ground color changes to green when mouse out of Button .Use DOM Event listener property.

8. AJAX with HTML, XML and JSON data

Write a program using AJAX to retrieve Book title, Author and Price with HTML, XML and JSON data

9. JQuery

Implement JQuery inserting elements (.before(),.after(), .prepend() and .append()).

10. Develop a web site with HTML, CSS, Javascript/JQuery, Node JS and MongoDB.

(Groupwise microproject)

a) Student Management System

b) Library Management System

c) Hospital Management System

d) Supply Chain Management System

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Open Experiments

Q1. **Write an HTML program to create the following table :**

Class	Subject 1	Subject 2	Subject 3
BCA I	Visual Basic	PC Software	Electronics
BCA II	C++	DBMS	English
BCA III	Java	Multimedia	CSA