FMTH0301/Rev.5.2

Course Plan

Semester: **4 - Semester**	Year: **2019**
Course Title: **Microprocessor and Embedded Systems**	Course Code: **CS150**
Total Contact Hours: **60**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mr. Y SHEKAR	Last Modified Date: 04-10-2018
Checked By: Mr. Y SHEKAR	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Identify the general computing system and the embedded system, also recognize the classification of embedded systems.
2. Analyze the architecture of the processor and its programming aspects (assembly level).
3. Explain the ability to interface external devices with micro controllers.
4. Design real time embedded systems using the concepts of RTOS
5. Design and implement microcontroller based embedded systems.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Title: Microprocessor and Embedded Systems	Semester: 4 - Semester
Course Code: CS150	Year: 2019

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1. Identify the general computing system and the embedded system, also recognize the classification of embedded systems.	**2**													**3**
2. Analyze the architecture of the processor and its programming aspects (assembly level).		**1**												
3. Explain the ability to interface external devices with micro controllers.			**2**											
4. Design real time embedded systems using the concepts of rtos.	**3**													**3**
5. Design and implement microcontroller based embedded systems.		**3**												**3**

Course Content

Course Code: CS150	Course Title: Microprocessor and Embedded Systems	
L-T-P: 4-0-0	Credits: 4	Contact Hrs: 60
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 60		Exam Duration: 3 hrs

Content	Hrs
Unit - 1	
Chapter No. 1 - Embedded Computing-8051 Architecture Embedded Computing: Introduction, Microprocessor, Microcontroller, Complex Systems & Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples. The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts.	15.00 hrs
Unit - 2	
Chapter No. 2 - Assembly Language Programming Basic Assembly Language Programming Concepts : The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic, Jump and Call Instructions, Further Details on Interrupts.	7.00 hrs
Unit - 3	
Chapter No. 3 - Applicatioins Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.	8.00 hrs
Unit - 4	
Chapter No. 4 - Basic Design Using a Real-Time Operationg System Basic Design Using a Real-Time Operating System :Introduction to RTOS ,Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Memory Management, Interrupt Routines in an RTOS Environment An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host	16.00 hrs

and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.	
Unit - 5	
Chapter No. 5 - Introduction to advanced architectures Introduction to advanced architectures: ARM Processor, memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.	7.00 hrs

Chapterwise Plan

Course Code and Title: **CS150 / Microprocessor and Embedded Systems**	
Chapter Number and Title: **1 - Embedded Computing-8051 Architecture**	Planned Hours: **15.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Discuss about characteristics and challenges of embedded system.	CO1	L2
2	Explain the design process of Embedded System.	CO2	L3,L6
3	Illustrate the Design of Embedded System using UML.	CO1	L2
4	Explain the architecture of 8051 Micro-controller	CO1, CO2	L1
5	Understand Timers for time delays and serial communication with 8051	CO2	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1.Introduction to embedded system	19-11-2018	19-11-2018

2.Microcomputer Architecture, Bus System and Memory, Operating system Software	22-11-2018	22-11-2018
3.Microprocessor : ALU, Registers, Flags, Pins	24-11-2018	24-11-2018
4.Difference between MC & MP,Architecture,features,	26-11-2018	26-11-2018
5.Complex Systems: Custom Design systems, Characteristics of Embedded Systems	28-11-2018	28-11-2018
6.Embedded System Design Process	29-11-2018	29-11-2018
7.Formalisms for system design	01-12-2018	01-12-2018
8.Design Examples: Model Train Controller, Reqirurement, Specification.	05-12-2018	05-12-2018
9.Architecture and Features of 8051	06-12-2018	06-12-2018
10.I/O Ports and Circuits of 8051	08-12-2018	08-12-2018
11.External Memoryof 8051	10-12-2018	10-12-2018
12.Timers and Countersof 8051	12-12-2018	12-12-2018
13.Serial Data Input/ outputof 8051	13-12-2018	13-12-2018
I4.Interruptsof 8051	15-12-2018	15-12-2018
15.Revision	17-12-2018	17-12-2018

Review Questions

Sl.No. - Questions	TLOs	BL
1.Define embedded system. Mention Characteristics of Embedded systems	1	Level-1
2.Summarize Challenges of Embedded systems	2	Level-2

3.Explain architecture of 8051 and list features.	3	Level - 2
4.Analyze various modes of timer of 8051 microcontroller.	3,4	Level-3
5.Describe various modes of serial communication in 8051	5	Level-2

Course Code and Title: **CS150 / Microprocessor and Embedded Systems**	
Chapter Number and Title: **2 - Assembly Language Programming**	Planned Hours: **7.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain Assembly Language Programming Process and Tools.	CO2	L1
2	Discuss Addressing modes in 8051	CO2	L2
3	Discuss data transfer instructions	CO2	L2
4	Discuss Arithmetic, Logical and Branching instructions	CO2	L2
5	Demonstrate Programs with 8051 for developing application	CO2	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Basic Assembly Language Programming Concepts	19-12-2018	19-12-2018
2. The Assembly Language Programming Process	20-12-2018	20-12-2018
3. Programming Tools and Techniques	22-12-2018	22-12-2018
4. Programming the 8051	24-12-2018	24-12-2018
5. Data Transfer and Logical Instructions	27-12-2018	27-12-2018
6. Arithmetic Operations, Decimal Arithmetic,	29-12-2018	29-12-2018
7. Jump and Call Instructions, Further Details on Interrupts.	2-01-2019	2-01-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. explain about basic assembly language programming process	TLO1,2	Level-2
Describe Programming Tools and Techniques,.,	2	Level-2
Perform Data Transfer and Logical Instructions with Examples	3	Level -3
Explain JUMP and CALL Instructions with Examples	4	Level-2
Perform Decimal Arithmetic using DA A with examples,	5	Level-3

Course Code and Title: **CS150 / Microprocessor and Embedded Systems**	
Chapter Number and Title: **3 - Applications**	Planned Hours: **10.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Discuss keyboard interfacing with 8051.	CO3	Level -2
2	Demonstrate the Interfacing SSD and LCD with 8051	CO3	Level -3
3	Design the program for reading data from ADC interfacing with 8051	CO3	Level -3
4	Develop the program for generating wave form using DAC interfacing with 8051	CO3	Level -3
5	Demonstrate program for serial communication in 8051 at desired baud rate	CO3	Level -3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1.Interfacing with keyboards: 1-row key board	3-01-2019	3-01-2019
2.4x4 keyboard interfacing ckt and programming	5-01-2019	5-01-2019
3.Displays: 7-seg LED	7-01-2019	7-01-2019

4.LCD interfacing ckt and programs	9-01-2019	9-01-2019
5.D/A Conversion	10-01-2019	10-01-2019
6.A/D Conversion	12-01-2019	12-01-2019
7.Multiple Interrupts	19-01-2019	19-01-2019
8.Serial-Data Communication	21-01-2019	21-01-2019
9.Serial-Data Communication.	23-01-2019	23-01-2019
10.Revision	24-01-2019	24-01-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1.Discuss a program for interfacing 4x4keyboard	1,2	Level-1
2.Demonstrate the interfacing SSD	2, 3	Level-3
3.Explain the program for serial communication in mode1.	3,4	Level - 2
4.Discuss a program for interfacing LCD.	4	Level-3
5.Generate a sine wave form using DAC interfacing with 8051	4, 5	Level-6

Course Code and Title: **CS150 / Microprocessor and Embedded Systems**	
Chapter Number and Title: **4 - Basic Design Using a Real-Time Operationg System**	Planned Hours: **16.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Describe RTOS architecture	CO4	L2
2	Describe RTOS architecture	CO4	L2
3	Illustrate Methods of inter task communication	CO4	L2
4	Understanding ISRs in RTOS Environment	CO4	L2
5	Explain Debugging techniques for embedded systems	CO4	L1

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
Introduction to RTOS	26-01-2019	26-01-2019
Principles, Semaphores	28-01-2019	28-01-2019
Semaphores and Queues	30-01-2019	30-01-2019
Hard Real Time Scheduling Considerations	31-01-2019	31-01-2019
Memory Management, Interrupt routines in an RTOS Environment	02-02-2019	02-02-2019
Example like mc-os(open Source);	04-02-2019	04-02-2019
An Embedded Software Development Tools: Host and Target machines	06-02-2019	06-02-2019
Linker/Locators for Embedded Software	07-02-2019	07-02-2019
Getting Embedded Software into the Target System	09-02-2019	09-02-2019
Debugging Techniques: Testing on Host Machine	11-02-2019	11-02-2019
Using Laboratory Tools	16-02-2019	16-02-2019
Debugging Techniques	20-02-2019	20-02-2019
Revision	21-02-2019	21-02-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1.Describe architecture of RTOS.	1,2	Level-1
2.Explain how inter task communication takes place in RTOS using message Queue	2	Level-2
3.Analyze the use of various software tools in ES development.	3	Level - 4
4.Determine memory management in RTOS	3, 4	Level-3
5.Explain the Rules of handling interrupt service in RTOs.	4, 5	Level-2

Course Code and Title: **CS150 / Microprocessor and Embedded Systems**	
Chapter Number and Title: **5 - Introduction to advanced architectures**	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Discuss processor and programming model of ARM processor	CO5	L-2
2	Discuss instruction Level Parallelism in Advanced processor	CO5	L-3
3	Describe I2C and CAN Bus protocols for networked embedded systems	CO5	L-2
4	Describe Internet Enabled Embedded systems	CO5	L-2
5	Design example of elevator controller	CO5	L-3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
Processor and memory organization of ARM &SHARC	23-02-2019	23-02-2019
Instruction level parallelism,	4-03-2019	4-03-2019
Networked embedded systems: Bus protocols,	6-03-2019	6-03-2019
I2C bus and CAN bus,	09-03-2019	09-03-2019
Internet – Enabled Systems,	11-03-2019	11-03-2019
Design Examples – Elevator Controller	13-03-2019	13-03-2019

Review Questions

Sl.No. - Questions	TLOs	BL
Explain programming model SHARC processor.	1	Level-1

Write about Instruction Level Parallelism Advanced Processors	2, 3	Level-2
Explain bus protocol for CAN Bus.	3, 4	Level - 4
Explain bus protocol for 12C Bus.	4	Level-3
Write notes on internet enabled systems	4, 5	Level-2

Question Paper Title: Microprocessor and Embedded Systems		
Total Duration (H:M): 3:00	**Course: Microprocessors &Embedded Systems**	**Maximum Marks: 70**
Note: ANSWER ALL QUESTIONS IN PART A ANSWER ANY 5 QUESTIONS FROM PART B		

PART A				
Q.No.	**Questions**	**Marks**	**CO**	**BL**
1	Draw the sequence diagram for a set-Speed command received by the train.	2.00	CO1	L2
2	What is an addressing mode? Discuss the four addressing modes supported by 8051 MC.	2.00	CO2	L1
3	Discuss the bits in which registers must be set to 1 to have timer 0 count input pulses on pin T0 in timer mode 0.	2.00	CO2	L2
4	What is the execution time of a single cycle instruction for a 6 megahertz crystal?	2.00	CO2	L3
5	What are the steps in interfacing peripherals with the micro processor? Interface 4*7 segment LEDs to display as a BCD counter.	2.00	CO3	L3
6	What is the maximum access time of ROMs such that it does not require wait states when 8051 operates at 12 MHz?	2.00	CO3	L3

7	Differentiate cross assembler & cross compiler	2.00	CO5	L2
8	Why do we host system for most of the development? What are the software tools needed for the host?	2.00	CO4	L2
9	What is the meaning of these ARM condition codes? i) EQ ii) NE iii) MI iv) VS v) GE vi) LT	2.00	CO4	L2
10	Write short notes on internet enabled embedded systems	2.00	CO5	L2

PART B				
Q.No.	**Questions**	**Marks**	**CO**	**BL**
11	Draw the ES design process and briefly explain it	5	1,2	Level-1
12	Explain various characteristics of design a ES	5	2,3	Level-2
13	Explain Arithmetic & Logical instructions with examples	10	3,4	Level-2
14	Write about JUMP & CALL Instructions using examples	5	4	Level-3
15	Explain ADC interfacing with 8051	7	5	Level-2
16	Perform LCD interfacing with 8051	8	5,6	Level-2
17	Explain about Semaphore With a suitable example	5	5	Level-3
18	Analyze memory management of RTOS	10	6	Level-4

FMTH0301/Rev.5.2

Course Plan

Semester: **4 - Semester**	Year: **2019**
Course Title: **Operating Systmes**	Course Code: **CS105**
Total Contact Hours: **60**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mr. Sandeep Chintham	Last Modified Date: 04-10-2018
Checked By: Mr. Sandeep Chintham	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Exemplify the basic principles used in the design of operating systems and explain the basic elements of computer system.

2. Analyze critical-section problem and assess how computing resources (such as cpu, disk, memory etc...) are managed by the operating system

3. Summarize techniques for achieving synchronization in an operation system and develop the dead lock prevention system and recovery process from the file structures

4. Compare the common algorithms used for both pre-emptive and non-preemptive scheduling of tasks in operating systems, such a priority, performance comparison, and fair-share schemes.

5. Summarize the full range of considerations in the design of file systems and security issues

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Title: Operating Systmes	Semester: 4 - Semester
Course Code: CS105	Year: 2019

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1. Exemplify the basic principles used in the design of operating systems and explain the basic elements of computer system.	**3**													
2. Analyze critical-section problem and assess how computing resources (such as cpu, disk, memory etc...) are managed by the operating system		**2**												
3. Summarize techniques for achieving synchronization in an operation system and develop the dead lock prevention system and recovery process from the file structures	**3**													**3**
4. Compare the common algorithms used for both pre-emptive and non-preemptive scheduling of tasks in operating systems, such a priority, performance comparison, and fair-share schemes.	**2**													**3**
5. Summarize the full range of considerations in the design of file systems and security issues	**1**	**3**												**3**

Course Content

Course Code: CS105	Course Title: Operating Systems	
L-T-P: 4-0-0	Credits: 4	Contact Hrs: 60
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 60		Exam Duration: 3 hrs

Content	Hrs
Unit – 1	
Chapter No. 1 - Computer Basic elements, Instruction execution, Interrupts, memory hierarchy, Multiprocessor and Multi-core organisation ,I/O communication techniques	3.00 hrs
Chapter No. 2 - Operating objectives and functions, Evolution of OS, Virtual Machines ,Microsoft windows overview, Linux VServer Virtual Machine Architecture	2.00 hrs
Chapter No. 3 - Process description and control process states, process description, process control	2.00 hrs
Chapter No. 4 - Processes and Threads Multi-core and multi-threading. Case studies - Windows Thread and SMP Management, UNIX.	2.00 hrs
Unit – 2	
Chapter No. 5 - Principles of concurrency mutual exclusion, semaphores, monitors, Bounded buffer problem, Readers/Writers problem	6.00 hrs
Chapter No. 6 - Deadlocks Deadlocks – prevention- avoidance – detection, Dining Philosopher's problem	4.00 hrs
Chapter No. 9 - Scheduling Types of scheduling – scheduling algorithms. Case studies - Windows scheduling, Linux scheduling	6.00 hrs
Unit – 3	
Chapter No. 7 - Memory management Memory management requirements, partitioning, paging, and segmentation;	6.00 hrs

Chapter No. 8 - Virtual memory Virtual memory -Hardware and control structures, Operating system software, Linux memory management Case studies - Windows memory management, UNIX.	8.00 hrs
Unit – 4	
Chapter No. 10 - I/O I/O devices, organization of I/O functions; OS design issues, I/O buffering disk scheduling, RAID, Disk cache	8.00 hrs
Unit – 5	
Chapter No. 11 - File File management – organization, directories, file sharing, record blocking, and secondary storage management. Case studies - UNIX File Management, Linux Virtual File System, and Windows File System	7.00 hrs
Chapter No. 12 - Security Threats, Attacks, and Assets, Intruders, Malicious Software Overview - Viruses, Worms, and Bots	2.00 hrs

Text Books (List of books as mentioned in the approved syllabus)

1. William Stallings, Operating Systems Internals and Design Principle, 8, Prentice Hall of India, 2014

2. Silberschatz and Peter Galvin, Operating System Concepts, 9, John Wiley & Sons,, 2013

References

1. Andrew S. Tannenbaum and Albert S. Woodhull, Operating System Design and Implementation, 3, Prentice Hall of India, 2009

2. Dhamdhere, D.M, Operating System, 2, McGraw Hill

3. Silberschatz Abraham, Operating System Principles, 7

4. Madnick Stuart and John J Donovan , Operating Systems, 4, Pearson Education

Evaluation Scheme

Term Work Scheme

Assessment	Weightage in Marks
Mid Term1	20
Mid Term2	20
Assignment 1	10
Assignment 2	10
Term End Exam	70
Total	**130**

Course Unitization for Minor Exams and Semester End Examination

Topics / Chapters	Teaching Credits	No. of Questions in Mid Term1	No. of Questions in Mid Term2	No. of Questions in Assignment 1	No. of Questions in Assignment 2	No. of Questions in Term End Exam
Unit I						
1 – INTRODUCTION	11.00	2.00	--	5.00	--	1.00
Unit II						
2 – CONCURRENCY, DEADLOCKS AND SCHEDULING	16.00	2.00	--	5.00	--	2.00
Unit III						
3 – MEMORY MANAGEMENT	14.00	1.00	1.00	2.50	2.50	2.00
Unit IV						
4 – IO MANAGEMENT	8.00	--	2.00	--	5.00	2.00

Unit V						
5 – FILE ORGANIZATION AND SECURITY	9.00	--	2.00	--	5.00	1.00

Note

1. Each Question carries 10 marks and may consists of sub-questions.
2. Answer 5 full questions of 10 marks out of 8 questions in Theory.

Date: **Head of Department**

Chapterwise Plan

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **1 - Computer**	Planned Hours: **3.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Describe the basic elements of a computer system and their interrelationship.	CO1	L2
2	Explain the steps taken by a processor to execute an instruction and understand the concept of interrupts and how and why a processor uses interrupts.	CO1	L2
3	describe the levels of a typical computer memory hierarchy and explain the basic characteristics of multiprocessor and multicore – organizations	CO1	L2
4	Explain the I/O communication techniques.	CO1	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Computer system overview-basic elements, Instruction execution, Interrupts	19/11/2018	19/11/2018
2. Interrupts, memory hierarchy, Multiprocessor and Multi-core organization	20/11/2018	20/11/2018
3. ,I/O communication techniques	22/11/2018	22/11/2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Discuss about a firmware? NULL	TLO1	L2
2. Describe different memory hierarchy levels NULL	TLO3	L2
3. Explain instruction cycle with interrupts NULL	TLO2	L2
4. Describe various I/O communication techniques. NULL	TLO4	L2

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **2 - Operating**	Planned Hours: **2.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Describe key functions of an operating system (OS)	CO1	L2
2	Explain the evolution of operating systems for early simple batch systems to modern complex systems.	CO1	L2
3	Describe virtual machines and virtualization	CO1	L2
4	Analyze the basic structure of Windows 7.	CO1	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. objectives and functions, Evolution of OS	26/11/2018	26/11/2018
2. Virtual Machines ,Microsoft windows overview,	27/11/2018	27/11/2018
3. Linux VServer Virtual Machine Architecture	28/11/2018	28/11/2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Define an Operating system? List its main functions	TLO1	L2
2. Explain objectives and functions of operating system.	TLO1	L2
3. Describe virtual machines and virtualization	TLO3	L2
4. Sketch and explain basic structure of Windows7	TLO4	L4
5. Explain in brief about evolution of operating systems	TLO2	L2
6. Explain the term System call? List two systems calls related file processing.	TLO1	L2

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **3 - Process description and control**	Planned Hours: **2.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Analyze process and process image	CO1	L4
2	Explain the concept of a process state.	CO1	L2
3	describe the purpose of the data structures and data structure elements used by an OS to manage processes	CO1	L2
4	Analyze the requirements for process control by the OS	CO1	L5

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. process states	29-11-2018	29-11-2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain role of process image in operating system.	TLO1	L4
2. Discuss about the Process Control Block?	TLO4	L5
3. Explain about life cycle of a process.	TLO2	L2
4. Identify factors are effected over process termination	TLO3	L2

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **4 - Processes and Threads**	Planned Hours: **2.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Analyze the characteristics of thread	CO1	L4
2	Compare user level and kernel level threads	CO1	L4
3	Analyze multi-core and multithreading	CO1	L4
4	Summarize thread models and thread issues	CO1	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Multi-core and multi-threading	03-12-2018 – 04-12-2018	03-12-2018 – 04-12-2018
2. Case studies - Windows Thread and SMP Management,	05-12-2018 –	05-12-2018 –

UNIX.	06-12-2018	06-12-2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Exemplify multithreading?	TLO3	L4
2. Explain characteristics of thread.	TLO1	L4
3. Explain thread model and thread issues.	TLO4	L2
4. Compare user level and kernel level threads	TLO2	L4

Course Code and Title: **CS105 / Operating Systmes**	
Chapter Number and Title: **5 - Principles of concurrency**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Describe basic concepts related to concurrency, such as race conditions, and mutual exclusion requirements	CO2	L2
2	Explain hardware approaches to supporting mutual exclusion.	CO3	L2
3	Explain semaphores and monitors	CO3	L4
4	Determine the solution to bounded buffer and readers/writers problem.	CO3	L5

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Principles of concurrency	10-12-2018	10-12-2018
2. mutual exclusion	11/12 -12-2018	11/12 -12-2018

3. semaphores	13/12/2018	13/12/2018
4. monitors	17/12/2018	17/12/2018
5. Bounded buffer problem	18/12/2018	18/12/2018
6. Readers/Writers problem	19/12/2018	19/12/2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Mention the purpose of process synchronization? Explain the mechanisms to implement process synchronization	TLO1	L2
2. Define semaphore? Explain different types of semaphores.	TLO3	L4
3. Explain mutual exclusion.	TLO2	L2
4. Discuss bounded buffer and readers/writers problems and Solve a problem using semaphore	TLO4	L5

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **6 - Deadlocks**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain the conditions for deadlock occurrence	CO3	L2
2	Describe deadlock prevention strategies related to each of the conditions for deadlock occurrence.	CO3	L2
3	Apply deadlock avoidance and detection strategies	CO3	L3
4	Solve the dining philosophers problem	CO3	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Deadlocks condition	20/12/2018	20/12/2018
2. Deadlocks – prevention	24/12/2018	24/12/2018
3. Deadlocks – avoidance	27/12/2018	27/12/2018
4. Deadlock detection, Dining Philosopher's problem	31/12/2018	31/12/2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Define deadlock and list out reasons for causing deadlock situation ?	TLO1	L2
2. What is dead lock? Explain dead lock detection mechanisms.	TLO3	L3
3. Solve Dining Philosophers problem using semaphores.	TLO4	L3
4. Define deadlock prevention and describe deadlock prevention strategies related to each of the conditions for deadlock.	TLO2	L2

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **7 - Memory management**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain the principal requirements for memory management.	CO2	L2
2	Analyze the reason for memory partitioning and explain the various techniques that are used	CO2	L4
3	Summarize the concept of paging	CO2	L2
4	Summarize the concept of segmentation	CO2	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Memory management requirements	02/01/2019	02/01/2019
2. partitioning-Fixed	03/01/2019	03/01/2019
3. partitioning-dynamic	07/01/2019	07/01/2019
4. paging	08/01/2019	08/01/2019
5. segmentation	09/01/2019	09/01/2019
6. address translation	10/01/2019	10/01/2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. List advantages and disadvantages of contiguous memory allocation	TLO1	L2
2. Explain various contiguous memory allocation schemes.	TLO1	L2
3. Define paging? Explain in detail about its implementation.	TLO3	L2
4. Discuss external fragmentation? Explain the technique used to overcome it.	TLO2	L4
5. Explain in detail about Segmentation and its implementation.	TLO4	L2

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **8 - Virtual memory**	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Describe the hardware and control structures that support virtual memory	CO2	L2
2	Explain TLB and paging levels.	CO2	L2
3	Describe page replacement algorithms	CO2	L2
4	Explain the virtual memory management mechanisms in UNIX, Linux and Windows 7.	CO2	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Virtual memory -Hardware and control structures	21-01-2019	21-01-2019
2. Operating system software -FIFO	22-01-2019	22-01-2019
3. Operating system software -LRU	22-01-2019	22-01-2019
4. Operating system software -Optimal	23-01-2019	23-01-2019
5. Operating system software -Clock	23-01-2019	23-01-2019
6. Case studies : Linux memory management	24-01-2019	24-01-2019
7. Case studies : Windows memory management	28-01-2019	28-01-2019
8. Case studies : Unix memory management	29-01-2019	29-01-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Discuss Free space management.	TLO1	L2
2. Describe different paging levels.	TLO2	L2

3. Describe page replacement algorithms with suitable examples	TLO3	L2
4. Describe the virtual memory management mechanisms in UNIX	TLO4	L2

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **9 - Scheduling**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain the differences among long-term, medium-term, and short-term scheduling.	CO4	L2
2	Discuss different CPU scheduling algorithms	CO4	L2
3	Assess the performance of different scheduling policies.	CO4	L5
4	Analyze the scheduling technique used in traditional UNIX	CO4	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Types of scheduling	30-01-2019	30-01-2019
2. scheduling algorithms -FCFS ,SJF	30-01-2019	30-01-2019
3. scheduling algorithms-SRT ,Round robin	31-01-2019	31-01-2019
4. scheduling algorithms -Priority ,Multi level Feedback	04-02-2019	04-02-2019
5. Windows scheduling	06-02-2019	06-02-2019
6. Linux scheduling	07-02-2019	07-02-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. List and explain various scheduling Criteria.	TLO1	L2

2. Explain scheduling in windows7	TLO2	L2
3. Analyze the scheduling technique used in operating system	TLO4	L4
4. Assess the performance of different scheduling policies.	TLO3	L5

Course Code and Title: **CS105 / Operating Systems**	
Chapter Number and Title: **10 - I/O**	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain key issues in the design of OS support for I/O.	CO2	L2
2	Analyze the performance implications of various I/O buffering alternatives.	CO2	L3
3	Analyze the performance issues involved in magnetic disk access.	CO2	L4
4	Explain the concept of RAID and its levels	CO2	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. I/O devices	11-02-2019	11-02-2019
2. organization of I/O functions	11-02-2019	11-02-2019
3. OS design issues	12-02-2019	12-02-2019
4. I/O buffering	13-02-2019	13-02-2019
5. disk scheduling -FIFO ,SSTF SCAN	14-02-2019	14-02-2019
6. disk scheduling -C-SCAN ,LOOK ,C-LOOK	18-02-2019	18-02-2019
7. RAID	20-02-2019	20-02-2019
8. Disk Cache	20-02-2019	20-02-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Apply any two disk scheduling algorithms (SCAN & C-CSAN) for following I/O request here 98, 183, 37, 122, 14, 124, 65, 67 (assume initial head position is at 52).	TLO3	L4
2. Discuss RAID levels in detail and the problems associated with RAID.	TLO4	L2
3. List and explain important parameters regarding disk operations	TLO1	L2
4. Explain IO buffering in detail.	TLO2	L3

Course Code and Title: **CS105 / Operating Systmes**	
Chapter Number and Title: **11 - File**	Planned Hours: **7.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Describe the basic concepts of files and file systems.	CO5	L2
2	Analyze the principal techniques for file organization and access	CO5	L4
3	Explain the concept of file directories, file sharing and record blocking.	CO5	L2
4	Describe the principal design issues for secondary storage management	CO5	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. organization	11-02-2019	11-02-2019
2. directories	26-02-2019	26-02-2019
3. file sharing, record blocking	27-02-2019	27-02-2019
4. secondary storage management - Contiguous File	28-02-2019	28-02-2019

Allocation		
5. Chained Allocation ,Indexed allocation	05-03-2019	05-03-2019
6. Free Space Management	06-03-2019	06-03-2019
7. Case studies - UNIX File Management, Linux Virtual File System, and Windows File System	07-03-2019	07-03-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Discuss the file system implementation in UNIX.	TLO1	L2
2. Explain various file accessing methods	TLO2	L4
3. Explain Swap-space management	TLO3	L2
4. Discuss about file allocation methods	TLO4	L2

Course Code and Title: **CS105 / Operating Systmes**	
Chapter Number and Title: **12 - Security**	Planned Hours: **2.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Assess the key security issues that relate to operating systems.	CO5	L5
2	Summarize the design issues for file system security	CO5	L2
3	Distinguish among various types of intruder behaviour patterns.	CO5	L2
4	Explain the types of intrusion techniques used to breach computer security.	CO5	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Threats	11-03-2019	11-03-2019

2. Attacks, and Assets	11-03-2019	11-03-2019
3. Intruders	11-03-2019	11-03-2019
4. Viruses	12-03-2019	12-03-2019
5. Worms and Bots	12-03-2019	12-03-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain the fields in each log record?	TLO1	L5
2. Define System threats? Explain threat monitoring	TLO2	L2
3. Define virus and explain in detail about type of viruses.	TLO3	L2
4. Explain in detail about intrusion detection system	TLO4	L2

Question Paper Title: OPERATING SYSTEMS		
Total Duration (H:M): 3:00	**Course: OPERATING SYSTEMS (CS105)**	**Maximum Marks: 70**
Note: ANSWER ALL QUESTIONS IN PART A ANSWER ANY 5 QUESTIONS FROM PART B		

PART A				
Q.No.	**Questions**	**Marks**	**CO**	**BL**
1	Name the process invoked when the operating system starts. Mention its role	2.00	CO1	L1
2	Draw the diagram showing CPU switch from process to process	2.00	CO2	L2
3	Define mutual exclusion.	2.00	CO3	L1
4	What are monitors? Mention its usage	2.00	CO2	L2

5	Explain deadlock avoidance.	2.00	CO3	L2
6	List the functions of operating system	2.00	CO1	L2
7	Define semaphore	2.00	CO3	L2
8	Define process state.	2.00	CO2	L3
9	Define segmentation.	2.00	CO4	L2
10	List the levels of RAID	2.00	CO5	L2

PART B				
Q.No.	**Questions**	**Marks**	**CO**	**BL**
11	sider the following set of processes, with the length of the CPU burst given in milliseconds like {Process, Burst Time, Priority}={(P1, 10, 3),(P2,1,1), (P3,2,3), (P4, 1, 4), (P5, 5,2)}. The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0. a) Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: SJF and Round Robin (quantum=1). b) What is the turnaround time of each process for the scheduling algorithms like: FCFS and Priority? c) Which of the algorithms results in the minimum waiting time (over all processes)?	10.00	CO4	L5
12	a) Define “System Calls”. List and explain various types of system calls. b) Draw the diagram that reflects multistep processing of a user program.	10.00	CO1	L2

13	a) Define paging. Explain the paging model of logical and physical memories. b) Consider the reference string: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5 Calculate the page faults in FIFO replacement algorithm when the number of frames are 2, 3, 4, 5, 6. Justify the statement "If number of frames increases then page faults wills decreases". Is this true or false? Mention your comments.	10.00	CO3	L5
14	a) Explain the Perterson's solution to critical-section problem. b) List and explain the necessary conditions to form a deadlock	10.00	CO2	L1
15	What is disk scheduling? Explain various disk scheduling algorithms in detail	10.00	CO4	L2
16	a)List and explain various principles of protection. b) Explain file management.	10.00	CO5	L2
17	a) What is fragmentation? Explain various fragmentation methods with illustrations. b) Explain about memory hierarchy.	10.00	CO4	L2
18	Write a short note on the following: a) Virtual memory b) Computer viruses	10.00	CO5	L2

FMTH0301/Rev.5.2

Course Plan

Semester: **4 - Semester**	Year: **2019**
Course Title: **Theory of Computation**	Course Code: **106**
Total Contact Hours: **60**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mr. NagendarYamsani	Last Modified Date: 04-10-2018
Checked By: Mr. NagendarYamsani	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Apply the grammars and languages to abstract computer machines and analyze the lemma's, hypothesis for various languages

2. Design the logic and solutions to decidable and undecidable problems through computability theory

3. Design deterministic, non-deterministic and push down automata's and turing machines

4. Identify and explain different types of chomsky hierarchy of languages and their capabilities

5. Apply interconversion of languages to grammars and grammars to automata

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Title: Theory of Computation	Semester: 4 - Semester
Course Code: 106	Year: 2019

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1. Apply the grammars and languages to abstract computer machines and analyze the lemma's, hypothesis for various languages	**3**	**3**												
2. Design the logic and solutions to decidable and undecidable problems through computability theory			**3**											
3. Design deterministic, non-deterministic and push down automata's and turing machines	**3**													**3**
4. Identify and explain different types of chomsky hierarchy of languages and their capabilities	**3**													
5. Apply interconversion of languages to grammars and grammars to automata		**3**												

Course Content

Course Code: 106	Course Title: Theory of Computation	
L-T-P: 4-0-0	Credits: 4	Contact Hrs: 60
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 60		Exam Duration: 3 hrs

Content	Hrs
Unit - 1	
Chapter No. 1 - Fundamentals Fundamentals: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automation and non-deterministic finite automaton, transition diagrams and Language recognizers.Finite Automata: NFA with Î transitions - Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without Î transitions, NFA to DFA conversion	14.00 hrs
Unit - 2	
Chapter No. 2 - Minimisation Minimization: Minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required)	12.00 hrs
Unit - 3	
Chapter No. 3 - Grammar Formalism & Context Free Grammars Grammar Formalism: Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, interconversion, Context-free grammar, derivation trees, sentential forms. Rightmost and leftmost derivation of strings.Context Free Grammars: Ambiguity in context-free grammars. Minimisation of Context-Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context-Free Languages. Enumeration of properties of CFL (proofs omitted)	16.00 hrs
Unit - 4	
Chapter No. 4 - Push Down Automata & Turing Machine	14.00 hrs

Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA.Turing Machine: Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (proofs not required).	
Unit - 5	
Chapter No. 5 - Computability Theory Computability Theory: Chomsky hierarchy of languages, linear bounded automata and context-sensitive language, LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turing reducibility, Definition of P and NP problems.	8.00 hrs

Text Books (List of books as mentioned in the approved syllabus)

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, 2, Pearson Education, 2008

2. Michael Sipser, Introduction to Theory of Computation, 2, Cengage Learning, 2012

References

1. Daniel I. A. Cohen, Introduction to Computer Theory, 2, Wiley, 2007

2. John Martin, INTRODUCTION TO LANGUAGES AND THE THEORY OF COMPUTATION, 3, McGraw-Hill, 2007

3. K.l.P. MISHRA, N. CHANDRASEKARAN, Theory of Computer Science: Automata, Languages and Computation, 3, Phi Learning, 2008

4. Ev Krishnamurthy, Sk Sen, Introductory Theory Of Computer Science, 2, Affiliated East-West Press Pvt Ltd, 2004

Evaluation Scheme

Term Work Scheme

Assessment	Weightage in Marks
Mid Term1	20
Mid Term2	20
Assignment 1	10
Assignment 2	10
Term End Exam	70

Total	130

Course Unitization for Minor Exams and Semester End Examination

Topics / Chapters	Teaching Credits	No. of Questions in Mid Term1	No. of Questions in Mid Term2	No. of Questions in Assignment 1	No. of Questions in Assignment 2	No. of Questions in Term End Exam
Unit I						
1 - Fundamentals	14.00	2.00	--	3.00	--	2.00
Unit II						
2 - Minimisation	12.00	2.00	--	3.00	--	2.00
Unit III						
3 - Grammar Formalism & Context Free Grammars	16.00	1.00	1.00	2.00	2.00	1.00
Unit IV						
4 - Push Down Automata & Turing Machine	14.00	--	2.00	--	3.00	2.00
Unit V						
5 - Computability Theory	8.00	--	2.00	--	3.00	1.00

Note

1. Each Question carries 20 marks and may consists of sub-questions.
2. Mixing of sub-questions from different chapters within a unit (only for Unit I and Unit II) is allowed in Minor I, II and Theory.
3. Answer 5 full questions of 20 marks each (two full questions from Unit I, II and one full questions from Unit III) out of 8 questions in Theory.

Date: **Head of Department**

Chapterwise Plan

Course Code and Title: **106 / Theory of Computation**	
Chapter Number and Title: **1 - Fundamentals**	Planned Hours: **14.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain the fundamentals of strings, languages and its operations	CO1	L2
2	Illustrate automata for a language acceptance	CO1	L2
3	Design the automata for the acceptance of a language	CO3	L6
4	Match the equivalence of NFA to DFA, automata to language	CO5	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Introduction, Strings, Alphabet, Language, Operations	19-11-2018	19-11-2018
2. Finite state machine, definitions	20-11-2018	20-11-2018
3. finite automaton model	22-11-2018	22-11-2018
4. acceptance of strings, and languages	26-11-2018	26-11-2018
5. Deterministic Finite Automaton	27-11-2018	27-11-2018
6. Non Deterministic Finite Automaton	28-11-2018	28-11-2018
7. Transition Diagrams	29-11-2018	29-11-2018
8. Language Recognizers	30-11-2018	30-11-2018
9. NFA with Î transitions	03-12-2018	03-12-2018
10. Significance of NFA	04-12-2018	04-12-2018
11. acceptance of languages for NFA	05-12-2018	05-12-2018
12. Conversions and Equivalence	06-12-2018	06-12-2018
13. Equivalence between NFA with and without Î transitions	07-12-2018	07-12-2018
14. NFA to DFA conversion	10-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain Levi's theorem on string concatenation operaion?	TLO1	L2
2. Summarize the characteristics of automata with a neat abstract diagram	TLO2	L2
3. Construct a FA to accepts binary strings which are having even number of 0's and odd number of 1's	TLO3	L6
4. Distinguish NFA and DFA	TLO4	L2

Course Code and Title: **106 / Theory of Computation**	
Chapter Number and Title: **2 - Minimization**	Planned Hours: **12.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Illustrate minimization of FSM	CO3	L2
2	Explain Moore and Melay Machines	CO3	L2
3	Compute to automata to regular expression and vice versa	CO5	L3
4	Explain Pumping lemma on regular sets, closure properties of regular sets	CO1	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
15. minimization of FSM	12-12-2018	12-12-2018
16. minimization of FSM (alternate method)	13-12-2018	13-12-2018
17. equivalence between two FSM's	14-12-2018	14-12-2018
18. Finite Automata with output- Moore Machines	17-12-2018	17-12-2018

19. Finite Automata with output- Melay Machines	18-12-2018	18-12-2018
20. Inter conversion of Moore and Melay Machines	19-12-2018	19-12-2018
21. Regular Sets, Regular Expressions	20-12-2018	20-12-2018
22. Identity Rules	21-12-2018	21-12-2018
23. Constructing finite Automata for a given regular expressions	24-12-2018	24-12-2018
24. Conversion of Finite Automata to Regular expressions	27-12-2018	27-12-2018
25. Pumping lemma of regular sets	28-12-2018	28-12-2018
26. closure properties of regular sets	31-12-2018	31-12-2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain the procedure for minimization of FSM	TLO1	L2
2. Classify automata with outputs with examples	TLO2	L2
3. Convert the regular expression 0*(1+0)*10*01 into Finite automata	TLO3	L3
4. Explain the application of pumping lemma for regular sets or languages	TLO4	L2

Course Code and Title: **106 / Theory of Computation**	
Chapter Number and Title: **3 - Grammar Formalism & Context Free Grammars**	Planned Hours: **16.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain regular grammar and inter conversion of grammar to finite automata	CO5	L2
2	Illustrate derivation trees of CFG .	CO1	L2
3	Solve the minimization of CFG	CO3	L3
4	Apply the pumping lemma to test a grammar is CFG.	CO1	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
27. Regular grammars	03-01-2019	03-01-2019
28. right linear and left linear grammars	04-01-2019	04-01-2019
29. equivalence between regular linear grammar and FA	07-01-2019	07-01-2019
30. inter conversion of regular grammar and FA	08-01-2019	08-01-2019
31. Context free grammar, derivation trees	09-01-2019	09-01-2019
32. Sentential forms. Right most derivation of strings. Leftmost derivation of strings.	10-01-2019	10-01-2019
33. Ambiguity in context free grammars	11-01-2019	11-01-2019
34. Minimization of Context Free Grammars (introduction)	21-01-2019	21-01-2019
35. Minimization of Context Free Grammars (elimination of useless symbols and productions)	22-01-2019	22-01-2019
36. Minimization of Context Free Grammars (elimination of NULL productions)	23-01-2019	23-01-2019
37. Minimization of Context Free Grammars (elimination of UNIT productions)	24-01-2019	24-01-2019
38. Chomsky normal form	25-01-2019	25-01-2019
39. Greiback normal form for non recursive CFG	28-01-2019	28-01-2019
40. Greiback normal form for recursive CFG	29-01-2019	29-01-2019
41. Pumping Lemma for Context Free Languages	30-01-2019	30-01-2019
42. Enumeration of properties of CFL	31-01-2019	31-01-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Match the regular grammar to accepts the binary strings which are start by 0 and end with 10	TLO1	L2
2. Explain the procedure to test the context free grammar is ambiguous or not with an example	TLO2	L2

3. Eliminate the productions in a grammar G whose productions are S ->aS | AB, A->Ɛ , B-> Ɛ, D->b	TLO3	L3
4. Solve that L={anbncn | n>=1}is not context free	TLO4	L3

Course Code and Title: **106 / Theory of Computation**	
Chapter Number and Title: **4 - Push Down Automata & Turing Machine**	Planned Hours: **14.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Construct a PDA for the given CFG	CO5	L6
2	Explain DCFL, DPDA, and interconversion of CFL to PDA	CO5	L2
3	Design TM for the given language or grammar	CO3	L6
4	Explain computable functions Church's hypothesis, counter machine, types of Turing machines	CO2	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
43. Push down automata, definition, model	04-02-2019	04-02-2019
44. acceptance of CFL	05-02-2019	05-02-2019
45. Acceptance by final state	06-02-2019	06-02-2019
46. acceptance by empty state and its equivalence	07-02-2019	07-02-2019
47. Equivalence of CFL and PDA	08-02-2019	08-02-2019
48. CFL and PDA interconversion	11-02-2019	11-02-2019
49. Introduction to DCFL	12-02-2019	12-02-2019
50. Introduction to DPDA	13-02-2019	13-02-2019
51. Turing Machine, definition, model, design of TM	14-02-2019	14-02-2019
52. Computable functions	15-02-2019	15-02-2019

53. recursively enumerable languages	18-02-2019	18-02-2019
54. Church's hypothesis	19-02-2019	19-02-2019
55. counter machine	20-02-2019	20-02-2019
56. types of Turing machines	21-02-2019	21-02-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Construct the PDA for the CFG S->0S0 | 1S1 | 0 | 1	TLO1	L6
2. Classify PDA into DPDA and NPDA with examples	TLO2	L2
3. Design TM for L ={anb2n | n > 0}	TLO3	L6
4. Illustrate Church's hypothesis\n\n\n\n	TLO4	L2

Course Code and Title: **106 / Theory of Computation**	
Chapter Number and Title: **5 - Computability Theory**	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Classify Chomsky hierarchy of languages	CO4	L4
2	Explain LBA model for CSG	CO5	L2
3	Illustrate Post Correspondence Problem, Universal Turing Machine	CO2	L2
4	Apply Turing reducibility, P and NP problems	CO2	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
57. Chomsky hierarchy of languages	25-02-2019	25-02-2019
58. linear bounded automata	26-02-2019	26-02-2019
59. context sensitive language, LR(0) grammar	27-02-2019	27-02-2019
60. decidability of problems	28-02-2019	28-02-2019

61. Universal Turing Machine	01-03-2019	01-03-2019
62. undesirability of posts, Correspondence problem	05-03-2019	05-03-2019
63. Turing reducibility	06-03-2019	06-03-2019
64. Definition of P and NP problems, NP complete and NP hard problems.	07-03-2019	07-03-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Classify Chomsky hierarchy of languages with examples	TLO1	L4
2. Explain the relation between LBA and CSG	TLO2	L2
3. Explain Universal Turing Machine	TLO3	L2
4. Explain the importance of NP Complete problems	TLO4	L3

Question Paper Title: End Exam		
Total Duration (H:M): 3	**Course: Theory of Computation (106)**	**Maximum Marks: 70**
Note:		

PART-A				
Q.No.	**Questions**	**Marks**	**CO**	**BL**
1	Define language, string?	2.00	CO1,	L1
2	Classify automata into DFA and NDFA	2.00	CO4,CO5,	L2
3	State pumping lemma for Regular language	2.00	CO3,	L1
4	Construct the grammar for the language L={ aba , bab , bba,aab}.	2.00		L6
5	Define DCFL (deterministic context free language), DPDA(deterministic pushdown automata).	2.00	CO4,	L1
6	Explain Finite Automata. Give an example	2.00	CO4,	L2
7	List the closure properties of regular sets?	2.00	CO5,	L1

8	What is the machine that accepts the language WW_R ?	2.00	CO1,	L3
9	Define P and NP problems	2.00	CO2,	L2
10	Illustrate Church's hypothesis?	2.00	CO1,CO3,	L3

PART_B				
Q.No.	**Questions**	**Marks**	**CO**	**BL**
11a	Design DFA accepting the language whose binary interpretation is divisible by 3 over the alphabet {0, 1}?	6.00	CO1,CO4,	L6
11b	Explain elements Finite Automata with block diagram	4.00	CO1,CO5,	L2
12a	Differentiate DFA and NFA? For the following NFA, find the equivalent DFA.	5.00	CO4,	L4
12b	Construct NFA without ε -moves for the below mentioned NFA with ε -moves.	5.00	CO4,	L6
13	Construct the minimum state automaton equivalent to the following transition diagram	10.00	CO4,	L6
14a	Show that the set L = {ap |p is a prime } is not regular	5.00	CO3,	L4
14b	Write Short Notes on the following with suitable example: a) Right Linear Grammar b) Left Linear Grammar c) Parse Trees d) Context free grammar.	5.00	CO5,	L2

15a	Convert the following CFG into to CNF. G = ({S, A, B}, {a, b}, {S → ASB | AB, A → aAS | a | aA , B → SbS | bb | Sb | bS | b | aAS | a | aA}, S)	6.00	CO1,	L2
15b	List enumeration properties of CFL	5.00	CO5,	L1
16a	Construct a PDA accepting the set of all strings over {0,1} with equal number of 0's and 1's	5.00	CO1,CO4,	L6
16b	summarize similarities and dissimilarities between PDA and FA	4.00	CO5,	L2
17a	Construct a TM for the language L={0n12n | n>0}	6.00	CO1,CO4,	L6
17b	Explain Counter Machine	4.00	CO2,	L2
18a	Classify Chomsky hierarchy of languages with their automata	5.00	CO5,	L3
18b	Distinguish P and NP problems with examples	5.00	CO2,	L3

FMTH0301/Rev.5.2

Course Plan

Semester: **4 - Semester**	Year: **2019**
Course Title: **Web Technologies**	Course Code: **CS107**
Total Contact Hours: **60**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mr. Sampath Kumar Tallapally	Last Modified Date: 04-10-2018
Checked By: Mr. Sampath Kumar Tallapally	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Create a website using html5 and add dynamic functionality to it by using javascript, css&xhtml
2. Implement three tier architecture using servlets and jsp.
3. Organizing jsp for dynamic web development applications
4. Apply jdbc knowledge to make connection to various connections
5. Recite ejb and struts' for web development applicationsand build dynamic websites on real world problems.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Title: Web Technologies	Semester: 4 - Semester
Course Code: CS107	Year: 2019

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1. 1. create a website using html5 and add dynamic functionality to it by using javascript, css&xhtml	**3**	**3**	**3**	**2**		**2**	**2**	**2**					**2**	**3**
2. 2. implement three tier architecture using servlets and jsp.	**3**	**3**	**3**			**2**		**2**					**3**	**3**
3. 3. organizing jsp for dynamic web development applications	**3**	**3**	**3**	**2**		**2**				**2**			**3**	**3**
4. 4. apply jdbc knowledge to make connection to various connections	**3**	**3**	**3**		**1**	**2**	**2**						**3**	**3**
5. 5. recite ejb and struts' for web development applications	**3**	**3**	**3**		**1**					**2**			**3**	**3**
6. 6. build dynamic websites on real world problems.	**3**	**3**	**3**				**2**						**3**	**3**

Course Content

Course Code: CS107	Course Title: Web Technologies	
L-T-P: 4-0-0	Credits: 4	Contact Hrs: 60
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 60		Exam Duration: 3 hrs

Content	Hrs
Unit – 1	
Chapter No. 1 - Intoduction to WT,HTML and XML Introduction to web technologies, Need of it, different types available,Basic Tags of HTML,Tables, div, span,Forms-Controls (button,textfield,check,radio,list etc.,),Controlling Page Layout, Backgrounds, borders, colours, and text, Transformations and Animations, Media Tags,Introduction to XML, Structure of XML Document,Name Spaces in XML,DTD and Scheme.	9.00 hrs
Unit – 2	
Chapter No. 2 - Introduction to JavaScript Introduction to JavaScript, Declaring variables and arrays, Using operators and expressions Loops and decision-making constructs Alert, confirmation and prompt boxes, Regular expressions, JavaScript Functions JavaScript Objects, Event-handling jQuery introduction The jQuery ready Function, jQuery Selectors jQuery and DOM jQuery and Events, jQuery UI: jQuery UI overview Interactive Personal web Site with Validations	9.00 hrs
Unit – 3	
Chapter No. 3 - Overview of AJAX Overview of AJAX Creating an XML Http Request object interacting with a server Handling XML and JSON Angular JS Introduction Expressions Data Biding Working with Directives Controllers and Forms Design a search engine with the help of AJAX, XML and JSON	10.00 hrs
Unit – 4	
Chapter No. 4 - Introduction to the JDBC Introduction to the JDBC JDBC Drivers, Connections Statements and Result Set Introduction to Servlets Servlet Life Cycle, Servlet Types Session Management-Using Cookies Using Sessions JDBC-Servlet Design web application to store the data read from the user to the database using Servlets	10.00 hrs

Unit – 5	
Chapter No. 5 - Introduction to JSP Introduction to JSP JSP Life Cycle JSP Elements Implicit Objects Session Tracking JDBC-JSP Bean Creation JDBC-Bean Introduction to Struts Framework Design a web application to authenticate the user the data stored in the database with JSP	10.00 hrs

Chapterwise Plan

Course Code and Title: **CS107 / Web Technologies**	
Chapter Number and Title: **1 - Introduction to WT,HTML and XML**	Planned Hours: **9.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	**Design a personal webpage using HTML**	CO1	L2,L3,L4
2	**Design a personal webpage to store the details of an Individual into xml**	CO3	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Introduction to web technologies, Need of it, different types available	19/Nov/2018	19/Nov/2018
2. Basic Tags of HTML	20/11/2018	20/11/2018
3. Tables, div, span	21/11/2018	21/11/2018
4. Forms-Controls (button,textfield,check,radio,list etc.,)	22/11/2018	22/11/2018
5. Controlling Page Layout, Backgrounds, borders, colors, and text, Transformations and Animations	24/11/2018	24/11/2018
6. Media Tags	26/11/2018	26/11/2018

7. Introduction to XML, Structure of XML Document,	27/11/2018	27/11/2018
8. Name Spaces in XML	28/11/2018	28/11/2018
9. DTD and Scheme	29/11/2018	29/11/2018
10. Design a personal webpage to store the details of an Individual into xml	3/12/2018	3/12/2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Differentiate between id and class attributes in html with an example..	TLO1	L1
2. Create a web page which accepts user details for creating a website.	TLO2	L3
3. Write an XML document for storing the details of an employee with DTD.	TLO3	L3
4. When we use NameSpaces and attributes for XML tags.	TLO2	L2

Course Code and Title: **CS107 / Web Technologies**	
Chapter Number and Title: **2 - Introduction to JavaScript**	Planned Hours: **9.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Introduction to JavaScript, Declaring variables and arrays, Using operators and expressions Loops and decision-making constructs Alert, confirmation and prompt boxes, Regular expressions, JavaScript Functions	CO2	L2
2	Interactive Personal web Site with Validations	CO3	L3,L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Introduction to JavaScript, Declaring variables and arrays, Using operators and expressions	4/12/2018	4/12/2018
2. Loops and decision-making constructs	5/12/2018	5/12/2018
3. Alert, confirmation and prompt boxes, Regular expressions,	6/12/2018	6/12/2018
4. JavaScript Functions	7/12/2018	7/12/2018
5. JavaScript Objects, Event-handling	10/12/2018	10/12/2018
6. jQuery introduction	11/12/2018	11/12/2018
7. The jQuery ready Function, jQuery Selectors	12/12/2018	12/12/2018
8. jQuery and DOM	13/12/2018	13/12/2018
9. jQuery and Events, jQuery UI: jQuery UI overview	14/12/2018	14/12/2018
10. Interactive Personal web Site with Validations	17/12/2018	17/12/2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Identify the implicit objects in java script	TLO1	L1
2. Why we need JQuery-Write a short note on JQuery Selectors.	TLO2	L2
3. Write a short note on JQuery-DOM	TLO3	L3
4. Define FA with example.	TLO4	L1
5. Construct optimization of FA	TLO4	L3

Course Code and Title: **CS107 / Web Technologies**	
Chapter Number and Title: **3 - Overview of AJAX**	Planned Hours: **10.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Creating an XML Http Request object,Handling XML and JSON	CO3	L3,L4
2	**Design a search engine with the help of AJAX, XML and JSON**	CO4	L3,L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Creating an XML Http Request object	18/12/2018	18/12/2018
2. Overview of AJAX	20/12/2018	20/12/2018
3. interacting with a server	21/12/2018	21/12/2018
4. Handling XML and JSON	22/12/2018	22/12/2018
5. Angular JS Introduction	2/1/2019	2/1/2019
6. Expressions	3/1/2019	3/1/2019
7. Data Biding	4/1/2019	4/1/2019
8. Working with Directives	5/1/2019	5/1/2019
9. Controllers and Forms	6/1/2019	6/1/2019
10. Design a search engine with the help of AJAX, XML and JSON	7/1/2019	7/1/2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Descibe the methods on XMLHttpRequest with syntax.	TLO1	L1
2. How we handle data using JSON give an example.	TLO2	L1

3. Explain Data Binding in AngularJS.	TLO2	L2
4. Name the Controllers available in AngularJS.	TLO3	L3

Course Code and Title: **CS107 / Web Technologies**	
Chapter Number and Title: **4 - Introduction to the JDBC**	Planned Hours: **10.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	JDBC Drivers, Connections, Servlets Session Management- Using Cookies	CO5	L3,L4
2	**Design web application to store the data read from the user to the database using Servlets**	CO6	L3,L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Introduction to the JDBC	8/1/2019	8/1/2019
2. JDBC Drivers, Connections	9/1/2019	9/1/2019
3. Statements and Result Set	10/1/2019	10/1/2019
4. Introduction to Servlets	21/1/2019	21/1/2019
5. Servlet Life Cycle,	22/1/2019	22/1/2019
6. Servlet Types	23/1/2019	23/1/2019
7. Session Management- Using Cookies	24/1/2019	24/1/2019
8. Using Sessions	28/1/2019	28/1/2019
9. JDBC-Servlet	29/1/2019	29/1/2019
10. Design web application to store the data read from the user to the database using Servlets	30/1/2019	30/1/2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Identify the Drivers available for extracting the data from data bases	TLO1	L1
2. Name the methods used for extracting and updating a table.	TLO2	L1
3. Differentiate GenericServlet and HTTPServlet.	TLO2	L2
4. How session management is achieved in servlet explain any one..	TLO3	L3

Course Code and Title: **CS107 / Web Technologies**	
Chapter Number and Title: **5 - Introduction to JSP**	Planned Hours: **10.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Beans application, JDBC – Bean	CO5	L3
2	Design a web application to authenticate the user the data stored in the database with JSP	CO4	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Introduction to JSP	1/2/2019	1/2/2019
2. JSP Life Cycle	2/2/2019	2/2/2019
3. JSP Elements	4/2/2019	4/2/2019
4. Implicit Objects	5/2/2019	5/2/2019
5. Session Tracking	6/2/2019	6/2/2019
6. JDBC-JSP	7/2/2019	7/2/2019

7. Bean Creation	8/2/2019	8/2/2019
8. JDBC-Bean	11/2/2019	11/2/2019
9. Introduction to Struts Framework	12/2/2019	12/2/2019
10. Design a web application to authenticate the user the data stored in the database with JSP	13/2/2019	13/2/2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain the life cycle of an JSP.	TLO1	L1
2. Identify the implicit objects of JSP.	TLO2	L1
3. How to use a java bean in JSP explain with a small example.	TLO2	L2
4. Draw a neat sketch of strut architecture.	TLO3	L3

Question Paper Title: III B.Tech. II Sem. (RA13) Regular Examinations, April – 2017 WEB TECHNOLOGIES		
Total Duration (H:M): 3.-00	**Course: WEB TECHNOLOGIES (CS107)**	**Maximum Marks: 70**
Note:		

A				
Q.No.	**Questions**	**Marks**	**CO**	**BL**
1	Render syntax for unordered and ordered list.	2.00	CO2,CO3,	
2	Differentiate Static web pages and Dynamic web pages.	2.00	CO3,	
3	List various styles in CSS.	2.00	CO3,CO4,	
4	Render the life cycle of Java Servlet	2.00	CO3,CO4,	
5	Model HTTP response.	2.00	CO4,	
6	Differentiate between SAX with DOM parser.	2.00	CO3,	

7	List any two applications of Java Servlet.	2.00	CO3,	
8	Define MVC paradigm.	2.00	CO4,CO5,	
9	Describe Javax.sql. * Classes.	2.00	CO3,CO4,	
10	Define JAVA Bean.	2.00	CO4,	

B				
Q.No.	**Questions**	**Marks**	**CO**	**BL**
11	Develop an HTML script which creates a web page displaying some of the engineering colleges in Telangana in a tabular form with name, address and url of website of the college. Also A candidate should be able to select the required department which is listed as listed items from a displayed form. Candidates selection should be consolidated and displayed finally.	10.00	CO1,CO2,	
12	a) Name different types of drivers in JDBC API with a neat diagram. b) Write a JDBC programme to print the contents of an employee table.	10.00	CO2,CO3,	
13	State the objectives and purpose of using cascading style sheets. Briefly explain different types of CSS with an example.	10.00	CO3,CO4,	
14	Explain the processes of executing servlet on Tomcat Web Server. Name any five classes that are there in javax. servlet. *.	10.00	CO3,CO5,	
15	What are Java Beans? Explain the properties of a Bean.	10.00	CO3,CO4,	
16	Illustrate the standard actions and directives in JSP with suitable examples.	10.00	CO2,CO5,	
17	Discuss about XML and DTD in detail. Develop a DTD for student details including student name(first and last name),student	10.00	CO2,CO4,	

	rollno, Date of birth(date, month, year) and address(city and state).			
18	What is Session Tracking? How many ways we can achieve Session Tracking explain any one with an example.	10.00	CO4,CO5,	