

**Progressive Education Society's
Modern College of Engineering
Department of Computer Engineering**



Curriculum Booklet

**Third Year
2015 Pattern
Semester-II**



Progressive Education Society's
Modern College of Engineering
DEPARTMENT OF COMPUTER ENGINEERING



**Progressive Education Society's
Modern College of Engineering, Shivajinagar, Pune-05.
Department of Computer Engineering**

Curriculum Booklet

2015 – Pattern

**Class: TE Computer Engineering
Semester: II**



Vision of the Institute

"To create a collaborative academic environment to foster professional excellence and ethical values"

Mission of the Institute

- To develop outstanding professionals with high ethical standards capable of creating and managing global enterprises.
- To foster innovation and research by providing a stimulating learning environment.
- To ensure equitable development of students of all ability levels and backgrounds.
- To be responsive to changes in technology, socio-economic and environmental conditions.
- To foster and maintain mutually beneficial partnerships with alumni and industry.

Vision of the Department

- To achieve excellence in the field of computing through quality education.

Mission of the Department

- To develop promising professionals in the field of computing.
- To provide exposure to emerging technologies and inculcate ethics.
- To strengthen association with alumni and industry.



Objectives of the Institute

- To develop infrastructure appropriate for delivering quality education
- To develop the overall personality of students who will be innovators and future leaders capable of prospering in their work environment.
- To inculcate ethical standards and make students aware of their social responsibilities.
- Promote close interaction among industry, faculty and students to enrich the learning process and enhance career opportunities.
- Encourage faculty in continuous professional growth through quality enhancement programs and research and development activities.
- Foster a healthy work environment which allows for freedom of expression and protection of the rights of all stakeholders through open channels of communication

Program Educational Objectives

The graduates of Computer Engineering Department will be,

PEO1: Capable of solving real world problems.

PEO2: Capable of working with multidisciplinary projects.

PEO3: Capable to adapt to changing technologies and life management skills.

PEO4: Able to exhibit professional and ethical responsibilities.

Program Specific Outcomes

Graduate of computer engineering program will demonstrate

- The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.
- The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.
- The ability to solve problems using engineering principles, tools and techniques.



Program Outcomes

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. 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.
- 4. 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.
- 5. 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.
- 6. 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.
- 7. 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.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. 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.
- 11. 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.
- 12. 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.



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DEPARTMENT OF COMPUTER ENGINEERING

Departmental Academic Planner: Student Activities

Year: 2020-2021

Semester: II

Sr. No.	Planned Date/Week	Academic Activity
1.	28/12/2020	Display of Time Table
2.	01/01/2021	Term Commencement
3.	01/01/2021 to 09/01/2021	Submission of daily report about number of students registered department wise to the Academic Planning Committee
4.	11/01/2021 to 16/01/2021	Orientation Program and Curriculum Booklet Circulation
5.	25/01/2021 to 30/01/2021	Mentor Mentee Meeting with GFM (I st)
6.	01/02/2021	Attendance Review I (Theory + Practical) (I st)
7.	08/02/2021 to 13/02/2021	MCQ Test – I (SE) and Unit Test – I (TE, BE).
8.	15/02/2021 to 20/02/2021	Remedial actions to be taken for low attendance category students and its follow up
9.	25/02/2021 to 02/03/2021	Mentor Mentee Meeting with GFM (II nd) Display of Results for MCQ – I and Test -I
10.	01/03/2021	Attendance Review (Theory + Practical) (II nd)
11.	15/03/2021	Parents Meet
12.	25/03/2021 to 01/04/2021	Mid Term Faculty Feedback from students
13.	08/03/2021 to 15/03/2021	MCQ Test – II (SE) and Unit Test – II (TE, BE).
14.	15/03/2021 to 20/03/2021	Remedial actions to be taken for low attendance category students and its follow-up.
15.	30/03/2021 to 06/04/2021	Mentor Mentee Meeting with GFM (III rd). Display of Results for MCQ – II and Test –II.
16.	03/05/2021 to 08/05/2021	Course Exit and End Term Feedback from Students.
17.	03/05/2021 to 08/05/2021	Graduate Exit and Student Satisfaction Survey by Students.
18.	03/05/2021 to 08/05/2021	MCQ Test - III (SE) and Unit Test - III (TE, BE).
19.	10/05/2021 to 14/05/2021	End Term Exam (Mock Oral Practical Exam as per the need of course) and Final Submission Display of Results for MCQ
20.	15/05/2021	Term End

Note: - Individual staff can take more assessment test as per their assessment tool planner.

- SPPU Examination will be scheduled as per SPPU notification.

(Prof. Dr. Mrs. S .A. Itkar)
HOD



Course Structure

Faculty of Engineering

Savitribai Phule Pune University, Pune

Savitribai Phule University of Pune Third Year Computer Engineering (2015 Course) (with effect from 2017-18)													
Semester II													
Course Code	Course	Teaching Scheme Hours / Week			Examination Scheme and Marks						Credit		
		Theory	Tutorial	Practical	In-Sem	End-Sem	TW	PR	OR	Total	TH/ TUT	PR	
310250	Design & Analysis of Algorithms	04	--	--	30	70	--	--	--	100	04		
310251	Systems Programming & Operating System (SP & OS)	04	--	--	30	70	--	--	--	100	04	--	
310252	Embedded Systems & Internet of Things (ES & IoT)	04	--	--	30	70	--	--	--	100	04	--	
310253	Software Modelling and Design	03	--	--	30	70	--	--	--	100	03	--	
310254	Web Technology	03	--	--	30	70	--	--	--	100	03	--	
310255	Seminar & Technical Communication	--	01	--	--	--	50	--	--	50	01	--	
310256	Web Technology Lab	--	--	02	--	--	25	50	--	75	--	01	
310257	SP & OS Lab	--	--	04	--	--	25	50	--	75	--	02	
310258	ES & IoT Lab	--	--	02	--	--	50	--	--	50	--	01	
Total Credit											19	04	
Total		18	01	08	150	350	150	100	--	750	23		
310259	Audit Course 4											Grade	

310259-Audit Course 4(AC4) Options:

- | | |
|--|--|
| AC4-I: Digital and Social Media Marketing | AC4-II: Green Computing |
| AC4-III: Sustainable Energy Systems | AC4-IV: Leadership and Personality Development |
| AC4-V: Foreign Language (Japanese- Module 4) | |

Abbreviations:

TW: Term Work TH: Theory OR: Oral TUT: Tutorial PR: Practical Sem: Semester



Curriculum

Name of the Subject – Design and Analysis of Algorithms

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	4	-	-

In-Sem	Theory	Total Marks	Credit
30	70	100	4

1.1 Course Objectives

1. To understand problem solving abilities using mathematical theories.
2. To apply algorithmic strategies while solving problems.
3. To develop time and space complexity of efficient algorithms.
4. To study algorithmic examples in distributed and multithreaded algorithms

1.2 Course Outcomes

- Explain the fundamentals of algorithm using design methods.
- Apply the appropriate algorithmic strategy to solve problems.
- Analyze the time and space complexity of various algorithms and problems.
- Explain the concepts of Multithreaded and Distributed Algorithms.

1.3 Syllabus

Unit	<u>Course Contents</u>	<u>Hours</u>
I	Fundamentals	09
	Fundamentals: The Role of Algorithms in Computing - What are algorithms, Algorithms as technology, Evolution of Algorithms, Design of Algorithm, Need of Correctness of Algorithm, Confirming correctness of Algorithm – sample example	
II	Models and Design	09
	Models and Design: Functional Model – Features, Recursive processes, Scope rules, Tail recursion, Checking correctness of Iterative process. Imperative Model – Basics, Specifications and Prototyping, Stepwise Refinement, Proof Rules – Basics, For loops, Goto and Exit loops, Functions and Procedures, Problem Solving using Greedy strategy - Knapsack problem, Huffman code generation algorithm.	
III	Abstract Algorithms	09
	Abstract Algorithms: Dynamic Programming, Divide and Conquer, Greedy strategy, Branch-n-Bound, Natural Algorithms –Evolutionary Algorithms and Evolutionary Computing, Introduction to Genetic Algorithm, Simulated Annealing, Artificial Neural Network and Tabu Search	
IV	Complexity Theory	09
	Complexity Theory: Counting Dominant operators, Growth rate, upper bounds, asymptotic growth, O , Ω , Θ , o and ω notations, polynomial and non-polynomial problems, deterministic and non-deterministic algorithms, P-class problems, NP-class of problems, Polynomial problem reduction NP complete problems- vertex cover and 3-SAT and NP hard problem - Hamiltonian cycle.	
V	Amortized Analysis	09
	Amortized Analysis: Amortized Analysis – Binary, Binomial and Fibonacci heaps, Dijkstra's Shortest path algorithm, Splay Trees, Time-Space tradeoff, Introduction to Tractable and Non-tractable Problems, Introduction to Randomized and Approximate algorithms, Embedded Algorithms: Embedded system scheduling (power optimized scheduling algorithm), sorting algorithm for embedded systems.	
VI	Multithreaded and Distributed Algorithms	09
	Multithreaded and Distributed Algorithms: Multithreaded Algorithms - Introduction, Performance measures, Analyzing multithreaded algorithms, Parallel loops, Race conditions. Problem Solving using Multithreaded Algorithms - Multithreaded matrix multiplication, Multithreaded merge sort. Distributed Algorithms - Introduction, Distributed breadth first search, Distributed Minimum Spanning Tree. String Matching- Introduction, The Naive string-matching algorithm, The Rabin-Karp algorithm	



1.4 TEXT Books

1. Parag Himanshu Dave, Himanshu Bhalchandra Dave, “Design And Analysis of Algorithms”, Pearson Education, ISBN 81-7758-595-9 . [T1].
2. Gilles Brassard, Paul Bratley, “Fundamentals of Algorithmics”, PHI, ISBN 978-81-203-1131-2. [T2]

1.5 Reference Books

- 1 Michael T. Goodrich, Roberto Tamassia , “Algorithm Design: Foundations, Analysis and Internet Examples”, Wiley, ISBN 978-81-265-0986-7. [R1]
- 2 Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, MIT Press; ISBN 978-0-262-03384-8. [R2]
- 3 Horowitz and Sahani, "Fundamentals of Computer Algorithms", University Press, ISBN: 978 81 7371 6126, 81 7371 61262. [R3]
- 4 Rajeev Motwani and Prabhakar Raghavan, “Randomized Algorithms”, Cambridge University Press, ISBN: 978-0-521-61390-3. [R4]
- 5 Dan Gusfield, “Algorithms on Strings, Trees and Sequences”, Cambridge University Press, ISBN:0-521-67035-7. [R5]

1.6 Teaching Plan

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures Planned
1	I	Fundamentals: The Role of Algorithms in Computing - What are algorithms, Algorithms as technology	[T1,R1]	09
2	II	Models and Design: Functional Model – Features, Recursive processes, Scope rules, Tail recursion, Checking correctness of Iterative process.	[T1,R2]	09
3	III	Abstract Algorithms: Dynamic Programming, Divide and Conquer, Greedy strategy, Branch-n-Bound	[T1,R2,R3]	09



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4	IV	Complexity Theory: Counting Dominant operators, Growth rate, upper bounds, asymptotic growth	[T2,R3,R4,R5]	09
5	V	Amortized Analysis: Amortized Analysis – Binary, Binomial and Fibonacci heaps, Dijkstra’s Shortest path algorithm, Splay Trees, Time-Space tradeoff, Introduction to Tractable and Non-tractable Problems	[T2,R2,R3]	09
6	VI	Multithreaded and Distributed Algorithms: Multithreaded Algorithms - Introduction	[T2,R2,R3]	09

1.7 Assessment Tools Details

Sr. No.	Assessment Tool	Marks	Marks scale down to
1	Internal Tests (T1 to T3)	Each of 25 marks	75
2	Quiz (Q1)	25 marks	25
Total			100

Assessment Tools:

Class Tests (T1 to T3), each of 25 marks

Quiz (Q1) of 25 marks



1.8 SCHEDULE OF ASSESSMENT TOOL

Class – TE

Course Name – Design and Analysis of Algorithms

Course Code – 310250

Course No. – 310

Teaching Scheme

Marking Scheme

Theory – 4 Hrs/wk

Theory Marks

ISE – 30 ESE – 70

Detail Schedule / Plan of conduction of assessment tool:

Sr. No.	CO No.	Assessment Tool	Marks	Schedule
1	C310.1: Apply knowledge of computing and mathematics for algorithmic design.	Test -1(T1)	25	2 nd week of February 2021
2	C310.2: Apply appropriate algorithmic strategy to solve problems.	Test -2(T2)	25	3 rd week of February 2021
3	C310.3: Analyze the time and space complexity of various algorithms and problems.	Test -3(T3)	25	4 th week of April 2021
4	C310.4: Examine problems on Multithreaded and Distributed Algorithms.	Quiz (Q1)	25	2 nd week of May 2021

1.9 Question Bank

Unit No.-I

Question Bank: Theory

1. Show whether the following functions are CORRECT or INCORRECT and justify your answer.

i. $3n+2= O(n)$

ii. $10n^2 +4n+2= O(n^2)$

2. Consider the recurrence:

$$T(n)= O(n)$$

$$T(1)=\Theta(1)$$



Show that above recurrence is asymptotically bounded by $\Theta(n)$.

3. Interpret the following equations:
 - i. $2n^2 + 3n + 1 = 2n^2 + \Theta(n)$
 - ii. $2n^2 + \Theta(n) = \Theta(n^2)$
4. Distinguish between Algorithm and Psuedocode.
5. Define i) Principles of optimality ii) Feasible solution iii) Optimal solution
6. Differentiate between Bigoh and omega notation with example.
7. What is meant by Divide – and – Conquer approach?
8. Write Divide – And – Conquer recursive Merge sort algorithm and derive the time complexity of this algorithm.
9. Write the General method of Divide – And – Conquer approach.
10. Define i) Time Complexity ii) Space Complexity.
11. What are the different mathematical notations used for algorithm analysis.
12. Discuss the Amortized analysis with an example.
13. What are the advantages and disadvantages of Divide – And – Conquer?
14. Write Divide – And – Conquer recursive Quick sort algorithm and analyze the algorithm for average time complexity.
15. Derive the time complexity of Quick sort algorithm for worst case.
16. Describe & Define any three Asymptotic Notations.
17. Write Control Abstraction of Divide – and – Conquer.
18. Distinguish between Merge sort and quick sort.
19. Discuss the time complexity of Binary search algorithm for best and worst case.
20. What is stable sorting method? Is Merge sort a stable sorting method?
21. Why worst-case analysis of algorithms is most important than average case analysis?
22. Write an algorithm to search an item in a linear list. If there are n nodes in the list, what is the running time of your algorithm.



Unit No. II

Question Bank: Theory

1. State the Job Sequencing Deadline Problem.
2. Find an optimal solution to the knapsack instance $n=4$ objects and the capacity of knapsack $m=15$, profits (10, 5, 7, 11) and weight are (3, 4, 3, 5).
3. State the Greedy Knapsack? Find an optimal solution to the Knapsack instance $n=3$, $m=20$, $(P_1, P_2, P_3) = (25, 24, 15)$ and $(W_1, W_2, W_3) = (18, 15, 10)$.
4. Draw an Optimal Binary Search Tree for $n=4$ identifiers $(a_1, a_2, a_3, a_4) = (\text{do, if, read, while})$ $P(1:4) = (3, 3, 1, 1)$ and $Q(0:4) = (2, 3, 1, 1, 1)$.
5. State the Greedy Knapsack Problem.
6. Find an optimal solution to the knapsack instance $n=7$ objects and the capacity of knapsack $m=15$. The profits and weights of the objects are $(P_1, P_2, P_3, P_4, P_5, P_6, P_7) = (10, 5, 15, 7, 6, 18, 3)$ $(W_1, W_2, W_3, W_4, W_5, W_6, W_7) = (2, 3, 5, 7, 1, 4, 1)$
7. State the Job – Sequencing with deadlines problem. Find an optimal sequence to the $n=5$ Jobs where profits $(P_1, P_2, P_3, P_4, P_5) = (20, 15, 10, 5, 1)$ and deadlines $(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$.
8. Describe the Dynamic 0/1 Knapsack Problem. Find an optimal solution for the dynamic programming 0/1 knapsack instance for $n=3$, $m=6$, profits are $(p_1, p_2, p_3) = (1, 2, 5)$, weights are $(w_1, w_2, w_3) = (2, 3, 4)$.
9. Distinguish between Dynamic Programming and Greedy method.

Unit No. III

Question Bank: Theory

1. Write the Control Abstraction of iterative Backtracking method.
2. Distinguish between fixed – tuple sized and variable tuple sized state space tree organization.
3. Discuss the 4 – queen’s problem. Draw the portion of the state space tree for $n = 4$ queens using backtracking algorithm.
4. Distinguish between backtracking and branch – and bound techniques.



5. What is a Backtracking and give the 4 – Queens’s solution.
6. Define Chromatic number & Give the state space tree for 4 – coloring problem.
7. Define Bounding Function? Give the statement of 0/1 Knapsack FIFO BB.
8. Write an algorithm for N – queen’s problem. Give time and space complexity for 8 – queen’s problem.
9. Write Control Abstraction of Least – Cost(LC) Search.
10. Define: i) LC – Search ii) Branch and Bound (BB) iii) FIFO – BB.
11. What is LC – Search? Discuss LC – Search algorithm.
12. Define: i) State Space tree ii) E – Node and iii) Dead Node.
13. Give the Big – O notation definition and briefly discuss with suitable example.
14. Construct an optimal travelling sales person tour using Dynamic Programming.

0	10	9	3
5	0	6	2
9	6	0	7
7	3	5	0
15. Discuss the time and space complexity of Dynamic Programming traveling sales person algorithm.
16. What is a backtracking? Give the explicit and implicit constraints in 8 queen’s problem.
17. Draw the portion of state space tree for 4 queen’s problem using variable – tuple sized approach.
18. Suggest an approximation algorithm for traveling sales person problems using Minimum spanning tree algorithm. Assume that the cost function satisfies the triangle inequality.
19. Explain the concept of backtracking using fixed and variable tuple formation.



Unit No.-IV:

Question Bank: Theory

1. Explain NP hard and NP complete problem.
2. Differentiate NP hard and NP complete problem.
3. What is P and NP classes? What is their relationship? Give example of each class.
4. what is SAT and 3- SAT problem? prove that 3 SAT problem is NP complete.
5. Write one example each of deterministic and non-deterministic for searching.
6. Explain following: Polynomial algorithms, non- Polynomial hard algorithms, non-Polynomial complete algorithms,
7. What is NP complete algorithm? How do we prove that algorithm is NP complete?
8. Prove vertex cover problem is NP complete.
9. Write nondeterministic algorithm for sorting elements in non-decreasing order.



Curriculum

Name of the Subject – Systems Programming and Operating System

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	04	-	-

In-Sem	Theory	Total Marks	Credit
30	70	100	4

1.1 Course Objectives

1. To understand basics of System Programming
2. To learn and understand data structures used in design of system software
3. To learn and understand basics of compilers and tools.
4. To understand functions of operating system
5. To learn and understand process, resource and memory management.

1.2 Course Outcomes

- Relate and Explain the functioning of system software's.
- Analyze Language Translators.
- Explain and Analyze process structure, its management and process sub system.
- Explain memory management and I/O management.

1.3 Syllabus

Unit	<u>Course Contents</u>	<u>Hours</u>
I	Introduction	09
	Introduction: Components of System Software: Text editors, Loaders, Assemblers, Macro processors, Compilers, Debuggers. Machine Structure, Machine language and Assembly Language. Assemblers: General design procedure, design of two pass assembler	
II	Macro Processor, Linker and Loader	09
	Macro Processor: Macro instructions, Features of macro facility, Design of two-pass, single pass and nested macro processor. Loaders: Loader schemes: Compile and go, General Loader Scheme, Absolute loaders, subroutine linkages, relocating loaders, direct linking loaders, overlay structure. Design of an absolute loader, Design of direct linking loader. Linkers: Relocation and linking concepts, Design of linker, self relocating programs, Static and dynamic link libraries, use of call back functions. Case Study: Loading phases using Java.	
III	Language Translator	09
	Role of lexical analysis -parsing & Token, patterns and Lexemes & Lexical Errors, regular definitions for the language constructs & strings, sequences, Comments & Transition diagram for recognition of tokens, reserved words and identifiers, examples Introduction to Compilers and Interpreters: General Model of Compiler, Program interpretation, Comparison of compiler and Interpreter, Use of Interpreter and components of Interpreter. Case Study: Overview of LEX and YACC specification and features.	
IV	Operating Systems	09
	Operating Systems: Introduction to different types of operating Real Time Operating Systems, System Components, OS services, System structure- Layered Approach. Process Management: Process Concept-Process states, Process control block, Threads, Process Scheduling: Types of process schedulers, Types of scheduling: Preemptive, Non preemptive. Scheduling algorithms: FCFS, SJF, RR, Priority, Deadlocks: Methods of handling deadlocks, Deadlock prevention, avoidance and detection, Recovery from deadlocks. Case Study: Process Management in multi-cores OS.	
V	Memory Management	09
	Memory management: Review of Programming Model of Intel 80386, Contiguous and noncontiguous, Swapping, Paging, Segmentation, Segmentation with Paging. Virtual Memory: Background, Demand	



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	paging, Page replacement scheme- FIFO, LRU, Optimal, Thrashing. Case Study: Memory Management in multi-cores OS.	
VI	I/O Management	09
	I/O Management: I/O Devices, Organization of I/O function, I/O Buffering, Disk Scheduling Disk Scheduling policies like FIFO, LIFO, STTF, SCAN, C-SCAN. File Management: Concept, Access methods, Directory Structure, Protection, File System implementation, Directory Implementation, Allocation methods, Free Space management. Case Study: I/O and File Management in multi-cores OS Case Study: Light weight and heavy weight OS: Linux, Tizen	

1.4 TEXT Books

1. John Donovan, "System Programming", McGraw Hill, ISBN 978-0--07-460482-3.
2. Silberschatz, Galvin, Gagne, "Operating System Principles", 9th Edition, Wiley, ISBN 9781-118-06333-0

1.5 Reference Books

1. Dhamdhare D., "Systems Programming and Operating Systems", McGraw Hill, ISBN 0 - 07 - 463579 – 4
2. Randal Bryant and David O'Hallaron, "Computer Systems: A Programmer's Perspective", Pearson, ISBN 10: 0-13-610804-0
3. Stallings W., "Operating Systems", 6th Edition, Prentice Hall, ISBN-978-81-317-2528-3.
4. John. R. Levine, Tony Mason and Doug Brown, "Lex and Yacc", O'Reilly, 1998, ISBN: 156592-000-7

1.6 Teaching Plan

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures Planned
1	I	Introduction	T1 & R1	9
2	II	Macro Processor, Linker and Loader	T1 & R1	9
3	III	Language Translator	T1 & R1	9
4	IV	Operating Systems	T2, R1 & R3	9
5	V	Memory Management	T2, R1 & R3	9
6	VI	I/O Management	T2, R1 & R3	9

1.7 Assessment Tools Details

Assessment Tool	Marks
Test 1	20
Test 2	20
Test 3	30
MCQ Test	30

1.8 Question Bank

Unit-1

Q.No	<u>Question</u>
1	Explain components of system softwares.
2	Explain machine structure, assembly language and machine language.
3	Illustrate the functioning of two pass assembler.
4	Explain in brief imperative statements, declaration statements and assembler directives with examples for assembly language programming.
5	Explain different assembly language statements with examples.
6	Explain Compilers and Interpreters.
7	What is interpreter? Explain the role of interpreter with suitable example.
8	Explain in details design of Text editor.
9	Explain in brief assembler directives with example
10	Write an sample assembly code and process that code using Pass-I of assembler.
11	What is forward reference problem in assembler. How Pass-II overcome forward reference problem.
12	Draw & explain flow chart of PASS-I and PASS-II of TWO Pass Assembler.
13	Construct MOT,POT,ST,LT,POOL Table,BT for ANY ALP(Assembly language Program) EXAMPLE FORM PREVIOUS Q.P,SOLVED EXAMPLE IN CLASS.

Unit-2

Q.No	<u>Question</u>
1	Explain the role of Macro processor.
2	Illustrate functioning of Linker.
3	Explain working of Loader.
4	What are the data structures used for the design of macro processing?
5	Explain the nested macros with example.
6	Explain the process of alteration of flow of control during macro expansion.
7	Explain expansion time variables with example
8	What are the data structures used for the design of macro processing?
9	Explain in brief different loader scheme.
10	Explain use of call back function.
11	Construct PNTAB,EVTAB,SSTAB,MDT,MNT,KPDTAB,APTAB considering any MACRO DEFINATION EXAMPLE.

Unit 3

Q.No	<u>Question</u>
1	Explain the role and functioning of the Compiler and Interpreter.
2	Utilize LEX and YACC utilities.
3	Compare Compiler and Interpreter.
4	Explain the term linker
5	Explain the need of program relocatability.
6	Explain dynamic loading and linking
7	Explain MS-DOS linker in detail.
8	Explain functions of a loader.
9	List and explain different loader schemes in brief.



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10	Explain the working of lex and Yacc.
11	Write Short note on Phases of Compiler and Show the Output of each phase of compiler considering input as $Price := Amount + Rate * 50$
12	Diffrence between Static Linking and Dynamic Linking

Unit 4

Q.No	<u>Question</u>
1	Explain process management and process sub system.
2	Apply process scheduling algorithms to schedule processes.
3	Explain and Analyze Deadlock mechanism.
4	What is an operating system? Explain its functions.
5	List the different categories of system calls and explain in brief.
6	Draw and explain process control block
7	Explain different modes of thread.
8	Explain scheduling criteria? Explain different types of scheduling algorithms in brief
9	Write short note on: Round Robbin Scheduling
10	Explain inter process communication.

Unit 5

Q.No	<u>Question</u>
1	Explain paging and segmentation mechanisms.
2	Explain concepts of virtual memory
3	Explain how memory management is achieved in operating system.
4	Explain the concept of segmentation.
5	What is internal fragmentation?



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6	What is external fragmentation?
7	Explain demand paging with advantages.
8	Explain page fault for first in first out.
9	Explain page fault for least recently used.
10	Explain how LRU page replacement algorithm is simulated in software

Unit 6

Q.No	<u>Question</u>
1	Explain I/O management.
2	Explain file management.
3	Explain in detail file systems and its implementations.
4	Write short note on file, management under UNIX
5	Explain the directories
6	Write short notes on: File management.
7	Draw and briefly explain the file structure
9	Explain the directory system with diagram.
10	Explain interrupt processing is managed for input and output



Curriculum

Name of the Subject – Embedded Systems & Internet of Things

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	4	-	-

In-Sem	Theory	Total Marks	Credit
30	70	100	4

1.1 Course Objectives

- 1.To understand fundamentals of IoT and embedded system including essence, basic design strategy and process modeling.
- 2.To introduce students a set of advanced topics in embedded IoT and lead them to understand research in network.
- 3.To develop comprehensive approach towards building small low cost embedded IoT system.
- 4.To understand fundamentals of security in IoT.
- 5.To learn to implement secure infrastructure for IoT.
- 6.To learn real world application scenarios of IoT along with its societal and economic impact using case studies.

1.2 Course Outcomes

- Explain basics of embedded system and internet of things.
- Describe various IoT platform specifications & Explain basic building blocks of IoT devices.
- List and Explain IoT Protocols and Security for real time applications.
- Explain IoT physical servers and web services.



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1.3 Syllabus

Unit	<u>Course Contents</u>	<u>Hours</u>
I	Introduction to Embedded System and Internet of Things	09
	Embedded Systems: Application Domain and Characteristic of Embedded System, Real time systems and Real time scheduling, Processor basics and System-On-Chip, Introduction to ARM processor and its architecture. IoT: Definition and characteristics of IoT, Internet of Things: Vision, Emerging Trends, Economic Significance, Technical Building Blocks, Physical design of IoT, Things of IoT, IoT Protocols, Logical design of IoT, IoT functional blocks, IoT communication models, IoT Communication APIs, IoT enabling technologies, IoT levels and deployment templates, IoT Issues and Challenges, Applications	
II	Embedded IoT Platform Design Methodology	09
	Purpose and requirement specification, Process specification, Domain model specification, information model specification, Service specifications, IoT level specification, Functional view specification, Operational view specification, Device and component integration, Application development.	
III	Pillars of Embedded IoT and Physical Devices	09
	Horizontal, verticals and four pillars of IoT, M2M: The internet of devices, RFID: The internet of objects, WSN: The internet of transducer, SCADA: The internet of controllers, DCM: Device, Connect and Manage, Device: Things that talk, Connect: Pervasive Network, Mangae: To create business values. IoT Physical Devices and Endpoints: Basic building blocks of and IoT device, Exemplary device: Raspberry Pi, Raspberry Pi interfaces, Programming Raspberry Pi with Python, Beagle board and Other IoT Devices.	
IV	IoT Protocols and Security	09
	Protocol Standardization for IoT, Efforts, M2M and WSN Protocols, SCADA and RFID Protocols, Issues with IoT Standardization, Unified Data Standards, Protocols – IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Network layer, APS layer. IoT Security: Vulnerabilities of IoT, Security Requirements, Challenges for Secure IoT, Threat Modeling, Key elements of IoT Security: Identity	



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	establishment, Access control, Data and message security, Non-repudiation and availability, Security model for IoT.	
V	Web of Things and Cloud of Things	09
	Web of Things versus Internet of Things, Two Pillars of the Web, Architecture Standardization for WoT, Platform Middleware for WoT, Unified Multitier WoT Architecture, WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing, Cloud Middleware, Cloud Standards – Cloud Providers and Systems, Mobile Cloud Computing, The Cloud of Things Architecture.	
VI	IoT Physical Servers, Cloud Offerings and IoT Case Studies	09
	Introduction to Cloud Storage Models, Communication API, WAMP: AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework: Django, Amazon Web Services for IoT, SkyNet IoT Messaging Platform. Case Studies: Home Intrusion Detection, Weather Monitoring System, Air Pollution Monitoring, Smart Irrigation.	

1.4 Text Books

1. Arshdeep Bahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, ISBN: 0: 0996025510, 13: 978-0996025515
2. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012. ISBN : 9781439892992
3. Dieter Uckelmann, Mark Harrison, Florian Michahelles, “Architecting the Internet of Things”, Springer, 2011. ISBN: 978-3-642-19156-5
4. Lyla B. Das, “Embedded Systems: An Integrated Approach” Pearson , ISBN: 9332511675, 9789332511675.

1.5 Reference Books

1. David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a Highly Connected World”, Cambridge University Press, 2010, ISBN:10: 0521195330
2. Olivier Hersent, Omar Elloumi and David Boswarthick, “The Internet of Things: Applications to the Smart Grid and Building Automation”, Wiley, 2012, 9781119958345



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3. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012, ISBN:978-1-119-99435-0
4. Barrie Sosinsky, “Cloud Computing Bible”, Wiley-India, 2010.ISBN : 978-0-470-90356-8
5. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2014, ISBN: 978-1-118-43063-7
6. Christopher Hallinan, “Embedded Linux Primer”, Prentice Hall, ISBN:13: 978-0-13-167984-9

1.6 Teaching Plan

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures Planned
1	I : Introduction to Embedded System and Internet of Things	Embedded Systems: Introduction to ARM processor and its architecture. IoT	1.a.1 1.a.4 1.b.6	9
2	II : Embedded IoT Platform Design Methodology	IoT Platform Design specification	1.a.1	9
3	III : Pillars of Embedded IoT and Physical Devices	Pillars of IoT	1.a.1 1.a.2	9
4	IV : IoT Protocols and Security	IoT Protocols, IoT Security	1.a.1 1.a.2	9
5	V : Web of Things and Cloud of Things	Architecture Standardization for WoT and CoT	1.a.1 1.a.4 1.b.2	9
6	VI : IoT Physical Servers, Cloud Offerings and IoT Case Studies	WAMP ,Python Web Application Framework	1.a.1 1.a.2 1.b.5	9



1.7 Assessment Tools Details

Direct Assessment (100%)

Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Marks	Marks scale down to
1	Unit Test 1, Unit Test 2	20 Each	40
2	Unit Test 3	30	30
3	Assignment	10	10
4	Case Study	10	10
Total			90

Rubrics for Case Study (10 Marks)			
Report	Knowledge	Presentation	On time Submission
3	3	2	2

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Marks scale down to
1	Insem	30
2	ESE	70
Total		100

ESE: End Semester Examination

1.8 Question Bank

Sr.No	Unit No.-I:
1	What is embedded Systems?
2	Explain applications of embedded systems.
3	What are real time systems? Explain with examples.
4	What are the types of real time tasks? Explain in details.
5	Explain following terms regarding real time scheduling: Arrival time,
6	Explain the concept of Real Time Scheduling Algorithms with example.
7	What is a processor? Explain system on chip.
8	Explain ARM SoC.
9	Describe advanced features of ARM.
10	Differentiate between RISC and CISC.

Sr.No	Unit No.-II:
1	Explain purpose and requirement specification in IoT design
2	Explain process model specification for home automation system.
3	Write Domain model specification for smart home automation
4	Define “on-device Resources” and “Network Resources”
5	Explain service specification step in IoT system design
6	Write note on :
7	State different IoT deployment levels. Explain IoT level
8	Explain functional view specification step in IoT design
9	Explain operational view specification step from IoT design
10	Describe device and component integration for IoT based home

Sr.No	Unit No. III
1	What are horizontal and verticals of IoT applications?
2	Explain M2M communication in details.
3	Explain RFID communication in details.
4	Explain WSN communication in details.
5	Explain SCADA communication in details.
6	What is with reference to IoT?
7	What do you mean by “Things that talk” in IoT?
8	What type of connections are available in IoT based systems.
9	What is an IoT device?
10	Explain Raspberry Pi in brief/in details.

Sr.No	Unit No.-IV
1	What are some protocol standardization efforts taken for IoT?
2	Explain M2M protocol standardization.
3	Explain SCADA protocol standardization.
4	Explain the issues with IoT standardization.
5	Explain various data standards used in IoT data exchange.
6	Explain IEEE 802.15.4 protocols in details,
7	Explain BACNet protocols in details.
8	Explain lifecycle of an IoT device.
9	What are some misuse cases in IoT security?
10	Explain security model for IoT.

Sr.No	Unit No.-V
1	What is Web of Things (WOT)?
2	What are two pillars of the web? Explain in brief.
3	Explain M2M Middleware Standards in brief.
4	Explain WSN Middleware Standards in brief.
5	Explain SCADA Middleware Standards in brief.
6	Explain RFID Middleware Standards in brief.
7	Explain unified multitier WoT Architecture in details.
8	Give examples of some WoT Portals.
9	Explain Cloud Middleware Architecture.
10	Explain cloud standards.

	Unit No.-VI
1	Give a brief overview of cloud computing and IoT cloud storage models.
2	Give a brief overview of communication API.
3	Describe the AutoBehn framework in brief.
4	Explain the Python Web Application Framework – Django.
5	Explain the different cloud based services offered by Amazon for IoT.
6	Explain the SkyNet IoT messaging platform.
7	Provide an IoT solution for home intrusion detection system.
8	Provide an IoT solution for weather monitoring system.
9	Provide an IoT solution for air pollution monitoring.
10	Provide an IoT solution for smart irrigation system.



Curriculum

Name of the Subject – Software Modeling and Design

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	04	-	-

In-Sem	Theory	Total Marks	Credit
30	70	100	4

1.1 Course Objectives

1. To understand and apply different design methods and techniques
2. To understand architectural design and modeling
3. To understand and apply testing techniques
4. To implement design and testing using current tools and techniques in distributed, concurrent and parallel environments

1.2 Course Outcomes

- Compare Software Methodologies and Model a software system using unified Modeling Language.
- Illustrate the architecture of the software to be developed.
- Identify design patterns in software systems and discover the best suited pattern for a particular System.
- Identify test cases for various applications and Evaluate the quality of software system.

1.3 Syllabus

Unit	<u>Course Contents</u>	<u>Hours</u>
I	Introduction	09
	Topics – Introduction to software design, design methods- procedural / structural and object oriented, Requirement Vs Analysis Vs Architecture Vs Design Vs Development 4+1 Architecture, case study of transferring requirement to design, UP, COMET use case based software life cycle, Introduction to UML -Basic building blocks, Reusability, Use case modeling, Use case template Case study – Transferring requirements into design using advanced tool	
II	Static Modelling	09
	Topics –Analysis Vs Design, Class diagram- Analysis - Object & classes finding analysis & Design- design classes, refining analysis relationships, Inheritance & polymorphism, Object diagram, Component diagram- Interfaces & components, deployment diagram, Package diagram	
III	Dynamic Modelling	09
	Topics – Interaction & Interaction overview diagram, sequence diagram, Timing diagram, Communication diagram, Advanced state machine diagram, Activity diagram	
IV	Architecture Design	09
	Topics – Introduction to Architectural design, overview of software architecture, Object oriented software architecture, Client server Architecture, Service oriented Architecture, Component based Architecture, Real time software Architecture	
V	Design Patterns	09
	Topics – Introduction to Creational design pattern – singleton, Factory ,Structural design pattern- Proxy design pattern, Adapter design pattern, Behavioral – Iterator design pattern, Observer design pattern	
VI	Testing	09
	Topics – Introduction to testing, Error, Faults, Failures, verification and validation, Whit Box Testing, Black Box Testing, Unit testing, Integration testing, GUI testing, User acceptance Validation testing, integration testing, scenario testing, performance testing. Test cases and test plan. Case studies expected for developing usability test plans and test cases.	



1.4 TEXT Books

1. Jim Arlow, Ila Neustadt, “UML 2 and the unified process –practical object-oriented analysis and design”, Addison Wesley, Second edition, ISBN 978-0201770605.
2. Len Bass, Paul Clements, Rick Kazman, "Software Architecture in Practice", Second Edition, Pearson ,ISBN 978-81-775-8996-2

1.5 Reference Books

1. Hassan Gomaa, “Software Modeling and Design- UML, Use cases, Patterns and Software Architectures”, Cambridge University Press, 2011, ISBN 978-0-521-76414-8
2. Gardy Booch, James Rumbaugh, Ivar Jacobson, “The unified modeling language user guide” , Pearson Education, Second edition, 2008, ISBN 0-321-2456
3. Ian Sommerville, “Software Engineering”, Addison and Wesley, ISBN 0-13-703515-2.

1.6 Teaching Plan

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures Planned
1	I	Introduction	T1, R1	7
2	II	Static Modelling	T1, R3	8
3	III	Dynamic Modelling	T1, R3	7
4	IV	Architecture Design	T1, R1	8
5	V	Design Patterns	T1, T2	7
6	VI	Testing	T1, T2	8
Total Lectures				45



1.7 Assessment Tools Details

Activities planned / assessment tools to be used to achieve Course Outcomes.

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks
1	Class Test (T1 & T2)	Each of 20 marks	40
2	Class Test T3	30 marks	30
3	Assignment	10 marks	10
4	Knowledge Survey	20 marks	20
Total			100

Assessment tools

Class Tests (T1 & T2), each of 20 marks and T3

for 30 marks. Knowledge Survey (KS)–

20 questions of 1 mark each to check if the student has understood the concept/topic.

Assignment (A1), of 10 marks

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Marks scale down to
1	ISE	30
2	ESE	70
Total		100

1.8 Question Bank

Unit 1

- Q.1) Define software design and give its importance.
- Q.2) Explain 4+1 View Architecture of UML. Why it is called as 4+1 view architecture.
- Q.3) Draw Use Case diagram for Online Shopping system.
- Q.4) Explain the difference between procedural / structural and Object-Oriented paradigm of design.
- Q.5) Write a use case specification for the use case: User authentication?
- Q.6) State and explain how UML supports requirements modelling?
- Q.7) Describe classification of design based on abstraction level?
- Q.8) Draw Use case diagram for automated cold-drink machine with scenario?
- Q.9) What is COMET? Explain phases of COMET.
- Q.10) Draw a use case diagram for the system: Credit card authentication system. The scenario is: The merchant submits a credit card transaction request to the credit card payment gateway on behalf of a customer. Bank which issued customer's credit card is actor which could approve or reject the transaction. If transaction is approved, funds will be transferred to merchant's bank account.
- Q.11) Comment on how COMET is useful in software design and analysis.
- Q.12) Mention the significance of Extends and the includes relation in the Use Case diagram with a suitable example.



Unit 2

- Q.1) Define components. Compare component and deployment diagram.
- Q.2) Explain with an example the difference between aggregation and composition.
- Q.3) Why class diagram is important in static modelling? Explain different relationships used in class diagram?
- Q.4) Explain the elements of a class diagram with an example.
- Q.5) Explain the application of composite structure diagram.
- Q.6) Explain the difference between component diagram and deployment diagram in UML.
- Q.7) What are different degrees of Multiplicity in association relationship?
- Q.8) State and explain the concept of Class Inheritance.
- Q.9) State and explain the concept of Overriding.
- Q.10) State and explain the concept of Polymorphism.
- Q.11) Explain Package Diagram with UML notations?
- Q.12) Describe & draw Deployment Diagram for ATM System.
- Q.13) Write Short note on Association.
- Q.14) Draw a class diagram for online shopping system. Assume the scope.
- Q.15) Difference element used in package diagram.

Unit 3

- Q.1) Draw sequence diagram for Event registration system?
- Q.2) Explain asynchronous message communication with call back pattern with suitable example.
- Q.3) Explain any two operators used in sequence diagram with an example.
- Q.4) Draw an activity diagram for the functionality: credit card validation.
- Q.5) Explain basic symbols of sequence diagram and draw sequence diagram for Cellular Phone Working?
- Q.6) What is advanced state machine diagram? Draw for washing machine?
- Q.7) Write Short note on Swim lanes.
- Q.8) Write Short note on Fork & Join.
- Q.9) Draw a sequence diagram for online shopping system.
- Q.10) Explain Fork and Join concept in Activity diagram with a suitable example.
- Q.11) Draw a State machine diagram for ATM machine. ATM is initially turned off. After the power is turned on, ATM performs start up action and enters Self-Test State. If the test fails, ATM goes into Out of Service state, otherwise there is trigger less transition to the idle state. In this state ATM waits for customer interaction.
- Q.12) Explain the significance of timing diagram with a suitable example.



Unit 4

- Q.1) Explain Client Server architecture for Software Design.
- Q.2) Explain the importance of Object oriented software architecture and its applicability in software development.
- Q.3) Explain the broker pattern for design of service oriented architecture.
- Q.4) Explain the real time software architecture with a suitable example.
- Q.5) Explain the difference between procedural / structural and Object-Oriented paradigm of design.
- Q.6) Explain synchronous communication pattern in Client server architecture with example?
- Q.7) Explain Location & Platform transparency in service oriented architecture?
- Q.8) Explain asynchronous message communication with call back pattern with suitable example.
- Q.9) Explain important characteristic of real time software architecture?
- Q.10) Explain dynamic view of software architecture with the help of example?
- Q.11) Write short note Real time software architecture.
- Q.12) Explain Client Server architecture in detail.
- Q.13) Explain object oriented architecture with a suitable example.



Unit 5

- Q.1) Explain factory pattern. Describe its intent, motivation and implementation with suitable example.
- Q.2) What are design pattern and explain its significance in modern software development.
- Q.3) Draw the structure of observer pattern with suitable class diagram including subject and observer.
- Q.4) What is singleton pattern? Explain one example scenario where you will singleton pattern to get applied.
- Q.5) Write short note web registration services.
- Q.6) Write short note Brokering & discovery services.
- Q.7) Explain asynchronous message communication with call back pattern with suitable example.
- Q.8) Explain proxy pattern? Describe its intent, motivation, Applicability & implementation with example?
- Q.9) Write short note Port provided & required interface.
- Q.10) Explain Behavioural Design Pattern in short?
- Q.11) Explain factory pattern? Describe its intent, motivation & implementation with example.
- Q.12) What is singleton pattern? Explain with suitable example.
- Q.13) Explain broker pattern for service oriented architecture.
- Q.14) What is the use of design pattern in modern software development?
- Q.15) Explain categories of design pattern.
- Q.16) Explain iterator design pattern with suitable example.



Unit 6

- Q.1) Define test case? Why is it necessary to develop test cases for both valid and invalid input condition?
- Q.2) Define error, fault and failure with a suitable example.
- Q.3) Explain the types of Integration testing.
- Q.4) Write short note Scenario testing.
- Q.5) Write short note Integration testing.
- Q.6) Write short note Performance testing.
- Q.7) Write short note Acceptance testing.
- Q.8) What is integration testing; Explain its type in detail?
- Q.9) Define stub & Driver?
- Q.10) What is Black box testing? Why it is called BBT? Also explain boundary value analysis?
- Q.11) Explain graph based testing with suitable example?
- Q.12) Compare white box testing and black box testing.
- Q.13) What is performance testing? List few tools of performance testing?
- Q.14) What is integration testing? Explain its type in detail.
- Q.15) Explain difference between verification & validation.
- Q.16) What is cyclomatic Complexity? Explain with example.
- Q.17) Define test case? What is the importance test case? Give example.



Subject – Web Technology

Weekly Work Load(in Hrs.)	Lecture	Tutorial	Practical
	3	-	2

Online/ In-sem	Theory	Practical	Oral	Term-work	Total Marks	Credit
30	70	50	-	25	175	5

1.1 Course Objectives

1. Understand the principles and methodologies of web based applications development process.
2. Understand and gain the skill of current client side and server side web technologies.
3. Understand current client side and server side frameworks & their use in web applications.
4. Be able to develop applications using web services and content management system.

1.2 Course Outcomes

- Explain web development process and Develop web applications using front end tools
- Explain client side, server side technologies and Develop web applications using it.
- Compare client side frameworks with server side frameworks and Develop web applications using it.
- Develop web applications using web services and Content Management System.



1.3 Syllabus

Unit No.	Contents	Hours
I	Introduction to web technology, internet and www, Web site planning and design issues, HTML: structure of html document , HTML elements: headings, paragraphs, line break, colors & fonts, links, frames, lists, tables, images and forms, Difference between HTML and HTML5. CSS: Introduction to Style Sheet, Inserting CSS in an HTML page, CSS selectors, XML: Introduction to XML, XML key component, Transforming XML into XSLT, DTD: Schema, elements, attributes, Introduction to JSON.	7
II	JavaScript: Overview of JavaScript, using JS in an HTML (Embedded, External), Data types, Control Structures, Arrays, Functions and Scopes, Objects in JS, DOM: DOM levels, DOM Objects and their properties and methods, Manipulating DOM, JQuery: Introduction to JQuery, Loading JQuery, Selecting elements, changing styles, creating elements, appending elements, removing elements, handling events	8
III	Introduction to Server Side technology and TOMCAT, Servlet: Introduction to Servlet, need and advantages, Servlet Lifecycle, Creating and testing of sample Servlet, session management. JSP: Introduction to JSP, advantages of JSP over Servlet, elements of JSP page: directives, comments, scripting elements, actions and templates, JDBC Connectivity with JSP.	8
IV	PHP: Introduction to PHP, Features, sample code, PHP script working, PHP syntax, conditions & Loops, Functions, String manipulation, Arrays & Functions, Form handling, Cookies & Sessions, using MySQL with PHP, WAP & WML, AJAX: Introduction, Working of AJAX, AJAX processing steps, coding AJAX script.	7
V	Angular JS: Overview, MVC architecture, directives, expression, controllers, filters, tables, modules, forms, includes, views, scopes, services, dependency injection, custom directives, Internationalization, Introduction to NodeJS. Struts: Overview, architecture, configuration, actions, interceptors, result types, validations, localization, exception handling, annotations.	7
VI	Web Services: Overview, types of WS, difference between SOAP and REST, EJB: types of EJB, benefits, Architecture, EJB technology, JNDI lookup, Introduction to Content Management System (CMS), Wordpress / Joomla, Advanced Technology: Bootstrap, JSF, and Spring.	8



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UNITWISE SYLLABUS AND OUTCOMES

UNIT – I

Topics –

Introduction to web technology, internet and www, Web site planning and design issues, HTML: structure of html document , HTML elements: headings, paragraphs, line break, colors & fonts, links, frames, lists, tables, images and forms, Difference between HTML and HTML5. CSS: Introduction to Style Sheet, Inserting CSS in an HTML page, CSS selectors, XML: Introduction to XML, XML key component, Transforming XML into XSLT, DTD: Schema, elements, attributes, Introduction to JSON.

Outcomes – At the end of this unit students will be able to -

No. of Lectures – 07

Sr. No.	Learning Outcomes	Bloom's Level
1	Explain Web development process.	L2
2	Design & Develop web applications using front end tools.	L6

UNIT – II

Topics –

JavaScript: Overview of JavaScript, using JS in an HTML (Embedded, External), Data types, Control Structures, Arrays, Functions and Scopes, Objects in JS, DOM: DOM levels, DOM Objects and their properties and methods, Manipulating DOM, JQuery: Introduction to JQuery, Loading JQuery, Selecting elements, changing styles, creating elements, appending elements, removing elements, handling events.

Outcomes – At the end of this unit students will be able to -

No. of Lectures – 08

Sr. No.	Learning Outcomes	Bloom's Level
1	Explain Client Side Technologies.	L2
2	Develop web applications using client side technologies.	L6

UNIT – III

Topics –

Introduction to Server Side technology and TOMCAT, Servlet: Introduction to Servlet, need and advantages, Servlet Lifecycle, Creating and testing of sample Servlet, session management. JSP: Introduction to JSP, advantages of JSP over Servlet, elements of JSP page: directives, comments, scripting elements, actions and templates, JDBC Connectivity with JSP.

Outcomes – At the end of this unit students will be able to -

No. of Lectures – 08

Sr. No.	Learning Outcomes	Bloom's Level
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1	Explain server side technologies such as servlet, JSP.	L2
2	Develop web applications using server side technologies.	L6

UNIT – IV

Topics –

PHP: Introduction to PHP, Features, sample code, PHP script working, PHP syntax, conditions & Loops, Functions, String manipulation, Arrays & Functions, Form handling, Cookies & Sessions, using MySQL with PHP, WAP & WML, AJAX: Introduction, Working of AJAX, AJAX processing steps, coding AJAX script.

Outcomes – At the end of this unit students will be able to -

No. of Lectures – 07

Sr. No.	Learning Outcomes	Bloom's Level
1	Explain server side technologies such as PHP, AJAX	L2
2	Develop web applications using server side technologies.	L6

UNIT – V

Topics –

Angular JS : Overview, MVC architecture, directives, expression, controllers, filters, tables, modules, forms, includes, views, scopes, services, dependency injection, custom directives, Internationalization,
Introduction to NodeJS. Struts: Overview, architecture, configuration, actions, interceptors, result types, validations, localization, exception handling, annotations.

Outcomes – At the end of this unit students will be able to -

No. of Lectures – 07

Sr. No.	Learning Outcomes	Bloom's Level
1	Compare AngularJS and NodesJS.	L2
2	Develop web applications with the help of AngularJS.	L6
3	Develop web applications with the help of NodeJS.	L6

UNIT – VI

Topics –

Web Services: Overview, types of WS, difference between SOAP and REST, EJB: types of EJB, benefits, Architecture, EJB technology, JNDI lookup, Introduction to Content Management System (CMS), Wordpress / Joomla, Advanced Technology: Bootstrap, JSF, and Spring.

Outcomes – At the end of this unit students will be able to -

No. of Lectures – 08

Sr. No.	Learning Outcomes	Bloom's Level
1	Develop web applications using web services.	L6



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2	Develop web applications using Content Management System (CMS).	L6
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1.4 Text Books

T1	Achyut Godbole & Atul Kahate, "Web Technologies: TCP/IP to Internet Application Architectures", McGraw Hill Education publications, ISBN, 007047298X, 9780070472983
T2	Ralph Moseley & M. T. Savaliya, "Developing Web Applications", Wiley publications, ISBN 13 : 9788126538676

1.5 Reference Books

R1	Adam Bretz & Colin J Ihrig, "Full Stack Javascript Development with MEAN", SPD, ISBN-13: 978-0992461256
R2	Giulio Zambon, " Beginning JSP, JSF and Tomcat", Apress Publication, ISBN-10: 1430246235; ISBN-13: 978-1430246237
R3	Black Book, "Struts 2", Dreamtech Press, ISBN 13, : 9788177228700
R4	Jeremy McPeak & Paul Wilton, " Beginning JavaScript", Wrox Publication, ISBN-13: 978-0470525937
R5	Black Book, " JDBC 4.2, Servlet 3.1 & JSP 2.3", Dreamtech Press, ISBN-13: 978-8177228700
R6	Sandeep Panda, "Angular JS: Novice To Ninja", SPD, First Edition 2014, ISBN-13: 978-0992279455



1.6 Teaching Plan

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures Planned
1	I	Web Development Process, Front End Tools	T1, T2	7
2	II	Client Side Technologies	T2, R1	8
3	III	Server Side Technologies	T2, R2	8
4	IV	Server Side Technologies	T2, R3	8
5	V	Client and Server Side Frameworks	T2, R3	7
6	VI	Web Services	T2, R3, R4	8

1.7 Unit Wise Lecture Plan

<u>Unit 1</u>			
Lecture No	Detail Topics To be Covered	References	Mode of Delivery
1.	Web Technology	T1	PPT
2.	HTML documents and functions	T1	PPT
3.	HTML, HTML5	T1	PPT
4.	CSS and Style sheet	T1	PPT
5.	Introduction to XML	T1	PPT
6.	XSLT , DTD	T1	PPT
7.	JSON	T1	PPT
<u>Unit 2</u>			
8.	JavaScript: Overview of JavaScript, using JS in an HTML (Embedded, External)	T2	PPT
9.	Data types, Control Structures, Arrays, Functions and Scopes, Objects in JS	T2	PPT
10.	DOM levels, DOM Objects and their properties and methods	T2	PPT
11.	Manipulating DOM	T2	PPT



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12.	Introduction to JQuery, Loading JQuery	T2	PPT
13.	Selecting elements, changing styles in JQuery	T2	PPT
14.	Creating elements, appending elements in JQuery	T2	PPT
15.	Removing elements, handling events	T2	PPT
<u>Unit 3</u>			
16.	Introduction to Server Side technology and TOMCAT	T1	PPT
17.	Introduction to Servlet, need and advantages	T2	PPT
18.	Servlet Lifecycle	T1	PPT
19.	Creating and testing of sample Servlet, session management	T1	PPT
20.	Introduction to JSP, advantages of JSP over Servlet	T1	PPT
21.	Directives, comments, scripting elements	T2	PPT
22.	Actions and Templates	T2	PPT
23.	JDBC Connectivity with JSP	T2	PPT
<u>Unit 4</u>			
24.	Introduction to PHP, Features, sample code, PHP script working	R3	PPT
25.	PHP syntax, conditions & Loops	R3	PPT
26.	Functions, String manipulation, Arrays	R3	PPT
27.	Form handling, Cookies & Sessions	R3	PPT
28.	MySQL with PHP, WAP & WML	R3	PPT
29.	Introduction, Working of AJAX	R3	PPT
30.	AJAX processing steps, coding AJAX script	R3	PPT
<u>Unit 5</u>			
31.	Overview, MVC architecture, directives, expression	R3	PPT
32.	Controllers, filters, tables, modules, forms, includes, views, scopes	R3	PPT
33.	Services, dependency injection, custom directives	R3	PPT
34.	Internationalization, Introduction to NodeJS	R3	PPT
35.	Overview, architecture, configuration, actions, interceptors	R3	PPT



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36.	Result types, validations, localization	R3	PPT
37.	Exception handling, annotations	R3	PPT
<u>Unit 6</u>			
38.	Overview, types of WS, difference between SOAP and REST	R3	PPT
39.	Types of EJB, benefits, Architecture	R3	PPT
40.	EJB technology	R3	PPT
41.	JNDI lookup	T2	PPT
42.	Introduction to Content Management System(CMS)	T2	PPT
43.	Wordpress / Joomla	T2	PPT
44.	Advanced Technology: Bootstrap	T2	PPT
45.	JSF, Spring	T2	PPT



1.8 Question Bank

Unit-1

Q. No	<u>Question</u>
1	Explain the term Internet
2	Explain the term WWW
3	Explain the term Website
4	Describe phases of web site development in brief
5	List and explain different design issues in web design
6	Give the list with definition of HTML components
7	List various tags in HTML with example
8	Explain handling element in HTML
9	Explain paragraph element in HTML
10	Explain line break element in HTML

Unit-2

Q. No	Question
1	What is JavaScript?
2	Explain characteristics of JavaScript
3	Enlist JavaScript editing tools
4	Write the difference between java and javascript?
5	Explain syntax of JavaScript
6	Write a simple embedded JavaScript Code
7	Write a simple code to demonstrate the use of External JavaScript



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8	Explain various data types in JavaScript
9	Explain the Functions prompt() and alert() with suitable example
10	Explain control structures in JavaScript

Unit-3

Q. No	Question
1	What is JSP?
2	Write advantages of JSP over Servlet
3	Enlist advantages of JSP over CGI
4	Write advantages of JSP over different technologies
5	What do you mean by JSP processing?
6	How JSP pages are handled?
7	Explain various JSP directives
8	Explain different attributes of page directive in JSP
9	Write a program to illustrate client-server application in JSP
10	Enlist and explain types of actions in JSP



Subject – Seminar and Technical Communication
COURSE DETAILS DOCUMENT

Class – TE

Course Name – Seminar and Technical Communication

Course Code – 310255

Course No. – 315

Teaching Scheme

Marking Scheme

Tut. – 1 Hrs./wk.

Term Work – 50

Course Objectives

1. To develop ability of thinking and motivation for seminar.
2. To develop ability to perform literature survey.
3. To develop ability to generate proof-of-concepts.
4. To develop ability to prepare presentations.
5. To develop seminar presentation and technical communication skills.

Course Outcomes

CO No.	Year of study 2017-18	Bloom's taxonomy	Bloom's Level
At the end of the course students will be able to -			
C315.1	Identify & Choose the appropriate domain(area).	Remembering	L1
C315.2	Summarize the literature survey on problems and deduce the problem statement.	Understanding and Analyzing	L2,L4
C315.3	Compile the documents for an identified problem.	Creating	L6
C315.4	Express the idea, concepts and solution of the selected problem ethically as an individual.	Understanding	L2



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Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Presentation(P1-P4)	04 (each of 10 marks)	40
2	Reports(R1)	01 (10 marks)	10
Total			50

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	TW	01	50
Total			50

Assessment tools

P1 to P4 – PresentationsEach containing 10 Marks

R1– ReportEach containing 10 Marks

Internal Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	Total Weightage
C315.1	P1(10)	10
C315.2	P2(10)	10
C315.3	P3(10)	10
C315.4	P4(10), R1	20
TOTAL		50



External Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED
C315.1	TW(50)
C315.2	
C315.3	
C315.4	
Marks	50
Total Marks	50

Program Outcomes (PO)

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. 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.
- 3. 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.
- 4. 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.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. 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.
- 7. 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.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.



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9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. 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.

11. 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.

12. 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.

CO to PO mapping

CO	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C316.1	2	-	-	-	-	1	1	1	1	-	-	1
C316.2	3	2	1	-	2	1	1	2	2	1	-	2
C316.3	2	-	-	-	2	-	1	2	2	2	-	1
C316.4	2	-	-	-	1	-	1	2	1	1	-	1
C316	2.25	2	1	-	1.66	1	1	1.75	1.5	1.33	-	1.25

Level - High (3), Moderate (2), Low (1)



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Program Specific Outcomes (PSOs)

Graduate of computer engineering programme will demonstrate

1. The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.
2. The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.
3. The ability to solve problems using engineering principles, tools and techniques.

CO to PSO mapping

CO	PSO		
	PSO1	PSO2	PSO3
C315.1	1	1	-
C315.2	2	2	2
C315.3	2	2	1
C315.4	2	1	-
C316	1.75	1.5	1.5

Level - High (3), Moderate (2), Low (1)



Subject – Web Technology Lab

COURSE DETAILS DOCUMENT

Class – TE

Course Name – Web Technology Lab

Course Code – 310256

Course No. – 316

Teaching Scheme

Practical- 02 Hour/Week

Marking Scheme

TW: 25 marks

PR: 50 marks

Course Objectives

1. To use current client side and server side web technologies.
2. To implement communication among the computing nodes using current client side and server side technologies.
3. To design and implement web services with content management.

Course Outcomes

CO No.	Year of study 2017-18	Bloom's taxonomy	Bloom's Level
At the end of the course students will be able to -			
C316.1	Apply the concepts of web server installation, configuration and Design&Develop a web application using Front End Tools.	Apply, Create	L3,L6
C316.2	Design & Develop a web application using suitable client side and server side web technologies.	Create	L6
C316.3	Develop a web application using Client and Server Side Frameworks.	Create	L6
C316.4	Design & Develop a web application using Web Services or Content Management System.	Create	L6

List of Assignments

Sr. No.	Title	Bloom's Level
LA1	A. Installation and Configuration of Web Application Servers Tomcat, Apache, WebSphere, JBoss, GlassFish.	L3
	B. Design and develop any suitable web application using HTML, CSS and XML in consultation of course instructor	L6
LA2	Perform validation of all fields in LA1 by using Java script/JQuery.	L6
LA3	Add dynamic web application essence in LA2 using Servlet, JSP and backend	L6
LA4	Add dynamic web application essence in LA2 using PHP, MySQL database connectivity and AJAX controls.	L6
LA5	A. Re-Design, develop and deploy LA3 using Strut.	L6
	B. Re-Design, develop and deploy LA4 using Angular JS.	
LA6	Design, Develop and Deploy separate web application using EJB/CMS/JSF/Spring/Bootstrap.	L6

COURSE ASSESMENT

Sr. No.	Type	Weightage
1	Direct Assessment (Internal + External)	80%
2	Indirect Assessment (Course Exit Survey)	20%
TOTAL		100%

DIRECT ASSESMENT (80% Weightage)

Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Lab Assignments (LA1 to LA6)	Each of 10 marks	60
2	Mock Practical (MP)	01	50
3	Mini Project(MPR)	01	20
Total			130



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Rubrics for evaluation of Practical Assignment of 10 Marks Each .			
Problem Solving Ability and logic	Basic Concept: Knowledge	Execution of assignment &	On time Submission
3	2	3	2

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Marks scale down to
1	TW	25
2	Practical	50
Total		75

Internal Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	Total Weightage
C316.1	LA1,MP	10
C316.2	LA2, LA3, LA4, MP	30
C316.3	LA5, MP	10
C316.4	LA6, MP,MPR	30
TOTAL		80(Except mock)

External Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	
C316.1	TW (25)	PR (50)
C316.2		
C316.3		
C316.4		
Marks	25	50
Total Marks	75	

INDIRECT ASSESMENT (20% Weightage)

- Course Exit Survey (to be submitted at the end of the course)



Program Outcomes (PO)

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. 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.
- 3. 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.
- 4. 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.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. 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.
- 7. 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.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. 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.
- 11. 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.
- 12. 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.



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CO to PO mapping (Course Articulation Matrix – CAM)

CO	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C316.1	2	1	1	1	2	1	-	2	2	2	2	3
C316.2	2	2	2	2	3	1	-	2	2	2	2	3
C316.3	2	2	1	1	3	1	-	2	2	2	2	3
C316.4	3	1	1	1	3	2	-	3	3	2	3	3
C316	2.25	1.5	1.25	1.25	2.75	1.25	-	2.25	2.25	2	2.25	3

Level - High (3), Moderate (2), Low (1)

Program Specific Outcomes (PSOs)

Graduate of computer engineering programme will demonstrate

4. The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.
5. The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.
6. The ability to solve problems using engineering principles, tools and techniques.

CO to PSO mapping

CO	PSO		
	PSO1	PSO2	PSO3
C316.1	2	2	2
C316.2	2	2	3
C316.3	2	2	2
C316.4	3	3	3
C316	2.25	2.25	2.5

Level - High (3), Moderate (2), Low (1)



Subject – System Programming & Operating System Lab
COURSE DETAILS DOCUMENT

Class – TE

Course Name – System Programming & Operating System Lab

Course Code –310257

Course No. – 317

Teaching Scheme

Marking Scheme

Practical – 4 Hrs/wk

Term Work: 25

Practical: 50

Course Objectives

1. To implement basic language translator by using various needed data structures .
2. To implement basic Macroprocessor.
3. To design and implement Dynamic Link Libraries.
4. To implement scheduling schemes.

Course Outcomes

Related Course No	CO No.	Year of study 2017-18	Bloom's taxonomy	Bloom's Level
At the end of the course students will be able to -				
C317	C317.1	Design and Develop pass – I and pass – II of two pass assembler and macroprocessor.	Applying	L3
	C317.2	Construct lexical analyzer and parsers using Lex and YACC tools.	Applying	L3
	C317.3	Write a program to create Dynamic Link Libraries.	Applying	L3
	C317.4	Compare and Develop various scheduling schemes.	Understand, Applying	L2,L3



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List of Assignments

Course No.	Sr. No.	Title	Bloom's Level
C317	LA1	Design suitable data structures and implement pass-I of a two-pass assembler for pseudomachine in Java using object oriented feature. Implementation should consist of a few instructions from each category and few assembler directives.	L3
	LA2	Implement Pass-II of two pass assembler for pseudo-machine in Java using object oriented features. The output of assignment-1 (intermediate file and symbol table) should be input for this assignment.	L3
	LA3	Design suitable data structures and implement pass-I of a two-pass macro-processor using OOP features in Java	L3
	LA4	Write a Java program for pass-II of a two-pass macro-processor. The output of assignment-3 (MNT, MDT and file without any macro definitions) should be input for this assignment.	L3
	LA5	Write a program to create Dynamic Link Library for any mathematical operation and write an application program to test it. (Java Native Interface / Use VB or VC++).	L3
	LA6	Write a program using Lex specifications to implement lexical analysis phase of compiler to generate tokens of subset of 'Java' program.	L3
	LA7	Write a program using Lex specifications to implement lexical analysis phase of compiler to count no. of words, lines and characters of given input file.	L3
C317	LA8	Write a program using YACC specifications to implement syntax analysis phase of compiler to validate type and syntax of variable declaration in Java.	L3
	LA9	Write a program using YACC specifications to implement syntax analysis phase of compiler to recognize simple and compound sentences given in input file.	L3
	LA10	Write a Java program (using OOP features) to implement following scheduling algorithms: FCFS , SJF (Preemptive), Priority (Non-Preemptive) and Round Robin (Preemptive)	L2, L3
	LA11	Write a Java program to implement Banker's Algorithm	L2, L3



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	LA12	Implement UNIX system calls like ps, fork, join, exec family, and wait for process management (use shell script/ Java/ C programming).	L2, L3
	LA13	Study assignment on process scheduling algorithms in Android and Tizen.	L2
	LA14	Write a Java Program (using OOP features) to implement paging simulation using 1. Least Recently Used (LRU) 2. Optimal algorithm	L2, L3

Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Lab Assignments (LA1 to LA14) Implementation	14 (each of 05 marks)	70
2	Mock Viva (MV1 to MV2)	02 (each of 10 marks)	20
Total			90

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Marks scale down to
1	Practical	50
2	Term Work	25
Total		75

Internal Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	Total Weightage
C317.1	LA1, LA2, LA3, LA4	20
C317.2	LA5, LA6, LA7, LA8, MV1	30
C317.3	LA9	05
C317.4	LA10, LA11, LA12, LA13, LA14, MV2	35
TOTAL		90



External Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	
C317.1	PRACTICAL (50)	TERM WORK (25)
C317.2		
C317.3		
C317.4		
Marks	50	25
Total Marks	75	

Program Outcomes (PO)

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. 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.
- 3. 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.
- 4. 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.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. 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.
- 7. 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.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.



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9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. 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.

11. 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.

12. 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.

CO to PO mapping (Course Articulation Matrix – CAM)

CO	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C317.1	2	1	1	-	1	-	-	-	-	-	-	-
C317.2	2	1	1	-	1	-	-	-	-	-	-	1
C317.3	2	1	1	-	-	-	-	-	-	-	-	-
C317.4	2	2	2	-	1	-	-	-	-	-	-	1
C317	2	1.25	1.25	-	1.0	-	-	-	-	-	-	1.0

Level - High (3), Moderate (2), Low (1)

Program Specific Outcomes (PSOs)

Graduate of computer engineering programme will demonstrate

1. The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.
2. The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.
3. The ability to solve problems using engineering principles, tools and techniques.

CO to PSO mapping



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CO	PSO		
	PSO1	PSO2	PSO3
C317.1	1	-	-
C317.2	1	-	-
C317.3	1	-	-
C317.4	1	1	1
C317	1.0	1.0	1.0

Level - High (3), Moderate (2), Low (1)



Subject – Embedded Systems & Internet of Things Lab
COURSE DETAILS DOCUMENT

Class – TE

Course Name – Embedded Systems & Internet of Things Lab

Course Code – 310258

Course No. – 318

Teaching Scheme

Practical – 2Hrs./wk.

Marking Scheme

TW: 50 marks

Course Objectives

1. To understand functionalities of various single board embedded platforms fundamentals
2. To develop comprehensive approach towards building small low cost embedded IoT system.
3. To understand different sensory inputs.

Course Outcomes

CO No.	Year of study 2017-18	Bloom's taxonomy	Bloom's Level
At the end of the course students will be able to -			
C318.1	Compare the different ARM based micro controllers and Demonstrate the connectivity with peripherals.	Understanding	L2
C318.2	Develop real time application using Raspberry-Pi, Peripherals and sensors.	Apply	L3
C318.3	Develop web applications using Zigbee module and cloud on Raspberry-Pi/Beagle board.	Apply	L3
C318.4	Develop an IoTbased Real time application in a team.	Create	L6

List of Assignments

Sr. No.	Title	Bloom's Level
LA1	Study of Raspberry-Pi, Beagle board, Arduino and other micro controller.	L2
LA2	Study of different operating systems for Raspberry-Pi /Beagle board. Understanding the process of OS installation on Raspberry-Pi /Beagle board.	L2
LA3	Study of Connectivity and configuration of Raspberry-Pi /Beagle board circuit with basic peripherals, LEDS. Understanding GPIO and its use in program.	L2
LA4	Understanding the connectivity of Raspberry-Pi /Beagle board circuit with temperature sensor. Write an application to read the environment temperature. If temperature crosses a threshold value, the application indicated user using LEDSs	L3
LA5	Understanding the connectivity of Raspberry-Pi /Beagle board circuit with IR sensor. Write an application to detect obstacle and notify user using LEDs.	L3
LA6	Understanding and connectivity of Raspberry-Pi /Beagle board with camera. Write an application to capture and store the image.	L3
LA7	Understanding and connectivity of Raspberry-Pi /Beagle board with a Zigbee module. Write a network application for communication between two devices using Zigbee.	L3
LA8	Study of different CPU frequency governors. Write an application to change CPU frequency of Raspberry-Pi /Beagle board	L3
LA9	Write an application using Raspberry-Pi /Beagle board to control the operation of stepper motor.	L3
LA10	Write an application using Raspberry-Pi /Beagle board to control the operation of a hardware simulated traffic signal.	L3
LA11	Write an application using Raspberry-Pi /Beagle board to control the operation of a hardware simulated lift elevator	L3
LA12	Write a server application to be deployed on Raspberry-Pi /Beagle board. Write client applications to get services from the server application.	L3
LA13	Create a small dashboard application to be deployed on cloud. Different publisher devices can publish their information and interested application can subscribe.	L3



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LA14	Create a simple web interface for Raspberry-Pi/Beagle board to control the connected LEDs remotely through the interface.	L3
LA15	Develop a Real time application like smart home with following requirements: When user enters into house the required appliances like fan, light should be switched ON. Appliances should also get controlled remotely by a suitable web interface. The objective of this application is student should construct complete Smart application in group.	L3
LA16	Develop a Real time application like a smart home with following requirements: If anyone comes at door the camera module automatically captures his image send it to the email account of user or send notification to the user. Door will open only after user's approval.	L6

COURSE ASSESMENT

Sr. No.	Type	Weightage
1	Direct Assessment (Internal + External)	80%
2	Indirect Assessment (Course Exit Survey)	20%
TOTAL		100%

DIRECT ASSESMENT (80% Weightage)

Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Lab Assignments (LA1 to LA16)	Each of 05 marks	80
2	Mock Oral (MO)	01	50
3	Mini Project(MP)	01	10
Total			140



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Rubrics for evaluation of Practical Assignment of 05Marks Each .			
Problem Solving Ability and logic	Basic Concept: Knowledge Understanding	Execution of assignment & Inference Drawn	On time Submission
1	1	2	1

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Marks scale down to
1	TW	50
Total		50

Internal Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	Total Weightage
C318.1	LA1 to LA3,MO	15
C318.2	LA4,LA5,LA6,LA8,LA9,LA10,LA11,MO	35
C318.3	LA7,LA12,LA13,LA14,MO	20
C318.4	LA15,LA16,MP.MO	20
TOTAL		90(Except mock)

External Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED
C318.1	TW (50)
C318.2	
C318.3	
C318.4	
Total Marks	50

INDIRECT ASSESMENT (20% Weightage)

- Course Exit Survey (to be submitted at the end of the course)



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Program Outcomes (PO)

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. 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.
- 3. 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.
- 4. 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.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. 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.
- 7. 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.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. 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.
- 11. 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.
- 12. 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.



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CO to PO mapping (Course Articulation Matrix – CAM)

CO	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C318.1	2	-	-	-	2	-	-	-	1	-	-	2
C318.2	2	2	2	-	1	-	-	-	1	-	-	1
C318.3	3	1	1	-	2	-	-	-	1	-	-	1
C318.4	2	2	2	-	2	2	1	1	2	1	1	1
C318	2.25	1.66	1.66	-	1.75	2	1	1	1.25	1	1	1.25

Level - High (3), Moderate (2), Low (1)

Program Specific Outcomes (PSOs)

Graduate of computer engineering programme will demonstrate

7. The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.
8. The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.
9. The ability to solve problems using engineering principles, tools and techniques.

CO to PSO mapping

CO	PSO		
	PSO1	PSO2	PSO3
C318.1	-	-	-
C318.2	-	-	1
C318.3	1	1	2
C318.4	1	1	2
C318	1	1	1.66

Level - High (3), Moderate (2), Low (1)



Subject – Audit Course-IV (Digital & Social Media Marketing)
COURSE DETAILS DOCUMENT

Class – TE

Course Name – Audit Course-IV (Digital & Social Media Marketing)

Course Code – 310259

Course No. – C319

Teaching Scheme:

Marking Scheme:

Lab – 2 Hrs/week

Grade – PP

Prerequisites of the Course

- Basic Computer Knowledge

Course Objectives

- Identify best practices for Social Media Marketing, including platform level best practices.
- Connect business objectives to appropriate Social Media tactics.
- Create strong content that engages their target audience with their marketing message.

Course Outcomes

CO No.	Year of study 2019-20	Mapping to POs/PSOs		
		Substantial	Moderate	Low
C319.1	Explain major social media marketing portals.	-	-	5,14
C319.2	Explain effective social media marketing strategies for various types of industries and businesses.	-	14	2, 3,15
C319.3	Create, post content & measure the effectiveness of social marketing.	-	5,14	1,15

Direct Assessment (100%)

Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Presentation(P1)	01	20
2	Certificate(C1)	01	10
3	Blog Creation (BC)	01	10
Total			40



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External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Grade	01	PP
Total			PP

Program Outcomes (PO)

1. Engineering knowledge:

Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.

2. Problem analysis:

Identify, formulate, research literature, and analyze complex engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences.

3. Design/development of solutions:

Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems:

Use research based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. 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.

6. The Engineer and Society:

Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant and cultural issues and the consequent responsibilities relevant to professional engineering practice.

7. Environment and Sustainability:

Understand the impact of professional engineering solutions in societal and professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

8. Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

9. Individual and Team Work:

Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.



10. 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 documentation, make effective presentations and give and receive clear instructions.

11. Project Management and Finance:

Demonstrate knowledge and understanding of 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.

12. Life-long Learning:

Recognize the need for and have the preparation and ability to engage in independent and preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

CO to PO mapping

CO	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C319.1	-	-	-	-	1	-	-	-	-	-	-	-
C319.2	-	1	1	-	-	-	-	-	-	-	-	-
C319.3	1	-	-	-	2	-	-	-	-	-	-	-
C319	1.00	1.00	1.00	-	1.50	-	-	-	-	-	-	-

Level - High (3), Moderate (2), Low (1)

Program Specific Outcomes (PSOs)

Graduate of computer engineering programme will demonstrate

1. The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.
2. The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.
3. The ability to solve problems using engineering principles, tools and techniques.



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CO to PSO mapping

CO	PSO		
	PSO1	PSO2	PSO3
C319.1	-	1	-
C319.2	-	2	1
C319.3	-	2	1
C319	-	1.67	1.00

Level - High (3), Moderate (2), Low (1)