

Course Syllabus

SEM-II

| MCAL201: Software Engineering | | |
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| Teaching Scheme: Lectures: 3 Hrs/Week Tutorials: Nil Practical: Nil | Examination Scheme (Theory) Teacher Assessment Examination: 20 Marks Class Assessment Examination: 20 Marks End Sem Examination: 60 Marks | Examination Scheme (Laboratory) Internal(TW): Nil External(OR): Nil External(PR) : Nil |
| Credit | 3 | |
| Prerequisite(If any): Basic elementary knowledge of Data structure & Programming language | | |
| Course Objective: | | |
| 1. This course introduces basic idea of software engineering while making them aware of basic mechanism of software engineering. | | |
| 2. It is aimed at developing skills to provide development solutions to variety of real life situations which involve software engineering. | | |
| 3. Students learn appropriate cost estimations for developed software. | | |
| 4. This course provides career opportunities in subject area of software requirement, software design, and software testing quality management, Configuration management. | | |
| Course Outcome: | | |
| 1. Understand Basics of software engineering. | | |
| 2. Choose and apply appropriate lifecycle model of software development. | | |
| 3. Identify life cycle models involved in designing software. | | |
| 4. Develop an appropriate design technique for software development problems and analyze them with proper requirements | | |
| 5. Understand advanced development technique and tools in software analysis, modeling design and testing software | | |
| 6. Translate the requirements model into the design model | | |
| 7. Describe and demonstrate use of software and user-interface design principles. | | |
| 8. To be aware of different life cycle models, requirement dictation process analysis modeling and specification, Learn about advance tools use software engineering | | |
| Course Contents | | Hrs |
| Unit – I : Introduction of Software Engineering | | 4 |
| Software & software engineering. The importance of software, software-software myths, software engineering paradigms, generic view of software egg, software metrics, measures and metrics, estimation, risk analysis, scheduling, size oriented metrics; function oriented metrics, metrics of software quality. | | |
| Unit – II : Requirements Engineering | | 6 |
| Requirements Engineering Tasks, Initiating the process, Eliciting Requirements, Developing Use-Cases, Building The Analysis Model: Requirements Analysis, Data | | |

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| Modeling Concepts, Object-Oriented Analysis, Scenario-Based Analysis, Flow-Oriented Modeling, Class-Based Modeling, Creating a Behavioral Model | |
| Unit – III : Software Project Planning | |
| Software project estimation and planning, decomposition techniques, LOC and FP estimation, effect estimation, risk analysis, identification, projection, assessment, management and monitoring, software reengineering, requirement analysis, tasks, analyst, software prototyping, specification principles, representation and the software requirements specification | 8 |
| Unit – IV : Software Design Engineering | |
| Design Process and design quality, Design Concepts, The Design Model, Introduction to Pattern-Based Software Design Architectural Design: Software Architecture, Data Design and Architectural Design User Interface Design: Rules, User Interface Analysis and Steps in Interface Design, Design Evaluation | 7 |
| Unit – V : Software Quality Concepts | |
| Software quality assurance, software quality factors quality assurance, quality metrics, Halstead's S/W science, software testing techniques, S/W testing fundamentals; White box testing, black box-testing, validation testing, system testing, debugging software maintenance maintainability, maintenance tasks, reverse engineering and re-engineering. | 8 |

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| Text Books: |
| 1. Software Engineering by Roger S. Pressman, McGraw Hill, Second Ed. |
| Reference Books: |
| 1. Software Engineering by D.Bell, I. Morrey- PHI Pub. |
| WEB Resources: |
| 1. http://www.umsl.edu/~sauterv/analysis/F08papers/View.html#Introduction_8121203202754259 2. http://nptel.ac.in/courses/Webcourse-contents/IISc-ANG/System%20Analysis%20and%20Design/pdf/Lecture_Notes/LNm14.pdf 3. http://www.rspa.com/spi/index.html#webe 4. http://www-itec.uni-klu.ac.at/~harald/proseminar/web11.pdf 5. http://58.59.135.118:8081/BOOKS%5C026%5C21%5CHXYWPJH144310.pdf 6. www.scrum.org 7. http://www.slideshare.net/abhirajoria/web-analytics-and-metrics 8. http://www.slideshare.net/awahid/web-engineering-2337102 9. http://cs.queensu.ca/home/cordy/Papers/ACD_STVR_Survey.pdf http://www.digitalanalyticsassociation.org/Files/PDF_standards/WebAnalyticsDefinitionsVol1.pdf 10. https://www.mooc-list.com/ |

MCAL202: Web Technology

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| Teaching Scheme: Lectures: 3 Hrs/Week Tutorials: Nil Practical: 4 Hr/Week | Examination Scheme (Theory) Teacher Assessment Examination: 20 Marks Class Assessment Examination: 20 Marks End Sem Examination: 60 Marks | Examination Scheme (Laboratory) Internal(TW): 50 Marks External(OR): Nil External(PR) : 50 Marks |
| Credit | 3 | 2 |
| Prerequisite (If any): Elementary knowledge of Operating system & Database management system | | |
| Prerequisite (If any): | | |
| 1. Elementary knowledge OS & DBMS. | | |
| 2. Knowledge of HTML & DHTML. | | |
| Course Objective: | | |
| 1. To increase the students knowledge of available web technologies. | | |
| 2. To become familiar with scripting languages. | | |
| 3. To learn and apply techniques that enhances a user's web experience. | | |
| Course Outcome: | | |
| 1. At the end of the course the student should be able to: Understand the various steps in designing a creative and dynamic website. Discuss the impact that growing sources of information such as the Internet are having on society. | | |
| 2. Identify and discuss examples of legal, ethical, security and privacy issues relating to the use of Internet based computer systems. | | |
| 3. Demonstrate an understanding of modern Internet tools and be able to create simple web sites including JavaScript scripting, forms and the use of Web-enabled Databases. | | |
| 4. Students will develop a basic understanding of technologies and protocols used on the Internet, and how to effectively use Internet tools technologies including current web-based applications, e-mail, and social networking tools; developing searching strategies; and basic web authoring | | |
| 5. Finally they can create good, effective and customized websites. | | |
| Course Contents | | Hrs |
| Unit – I : HTML 5 & CSS 3 | | 8 |
| Introduction of HTML5,Features,Sample of new Attributes for HTML5,Document Structure Changes, Open Media Effort <video>,<audio>,Client Side Graphics with <canvas>, Form hanges,CSS3 Proprietary and Emerging Features Reference, Selectors, Introduced values and Units, Color values, Namespaces, Media Queries, Web Fonts. | | |
| Unit – II : Java Scripting | | 8 |
| Introduction of Scripting, Server Side and Client Side Scripting, Basic JavaScript Instructions, Functions, Method & Objects, Decisions & Loops, DOM, Events. | | |

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| Unit – III : Advanced Scripting JQuery & JSON | 8 |
| JQUERY: Introduction and Installation, Anatomy of a JQuery Script JSON: Introduction to JSON, Syntax, Example of JSON Data and XML Data, JSON Methods. | |
| Unit – IV : XML | 8 |
| Concept of XML, features of XML, Writing XML elements, attributes , Examples on XML, XML with CSS, XML with DSO, XML Namespace, XML DTD, XML schemas, writing Simple sheet using XSLT,SAX Parser, DOM Parser | |
| Unit – V : Angular JS & Web Services | 8 |
| Angular JS: Introduction to Angular JS, Client Side Templates, Model View Controller, Data Binding, Directives. Web Services: What is a Web Service? Software as a service, Web Service Architectures, SOA, Creating and consuming Web, XML Web Services, Designing XML Web Services, Creating an XML Web Service with Visual Studio, Creating Web Service Consumers | |

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| Text Books: |
| 1. “Web Publishing with HTML 4”,Laura Lemay,Techmedia,2 nd Edition |
| 2. “HTML A Beginner’s Guide”, Wendy Willard ,Tata McGraw-Hill Publications,3 rd Edition |
| Reference Books: |
| 1. "Web Enabled Commercial Applications Development using. HTML, DHTML, Javascript, Perl CGI", Ivan Bayross, PBP Publications, ISBN: 81-7656-274-2 |
| 2. "Complete reference HTML", Thomas A. Powell , Tata McGraw-Hill Publications, 4th edition, ISBN: 948-0-07-058281-1 |
| 3. “HTML & CSS: The Complete Reference” Thomas Powell, Tata McGraw-Hill Publications,5 th Edition |
| 4. Begining XML Databases by Gavin Powell, Wiley Publishing Inc. |
| E-Books/Web Links |
| 1. www.tutorialspoint.com |
| 2. www.W3schools.com |
| 3. http://freevidelectures.com/ |
| 4. http://nptel.iitm.ac.in |
| 5. www.youtube.com |

MCAP202 Web Technology Laboratory

| List of Practical | Hrs. |
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| 1.Design a static website using HTML5 elements to show the use of table, links, client side image maps and form elements. | 6 |
| 2. Design a web pages using HTML5 & CSS3. | 6 |
| 3. Design the web pages using different properties and <ul style="list-style-type: none">• External CSS• Internal CSS• Inline CSS | 6 |
| 4. Write Java Script functions to validate form controls using regular Expressions. | 4 |
| 5. Adding/Removing classes using jQuery's .addClass () and .removeClass (). | 6 |
| 6. Adding New elements using jQuery UI | 4 |
| 7. Write a template for JSON and Design the function. | 4 |
| 8. Create XML file for a student or customer or employee. Next create the document type definition for the xml structure and finally create the schema document for the xml document. | 4 |
| 9. Store the form data in any file or database. | 6 |
| 10. Design and develop different applications by using Angular JS. | 4 |
| 11. Design and develop applications to generate and deploy the web service. | 4 |

| MCAL203: Data Structure | | |
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| Teaching Scheme: Lectures: 3 Hrs/Week Tutorials: Nil Practical: 4 Hrs/Week | Examination Scheme (Theory) Teacher Assessment Examination : 20Marks Class assessment Examination: 20Marks End Sem Examination: 60Marks | Examination Scheme (Laboratory) Internal(TW): 50 Marks External(OR): Nil External(PR): 50 Marks |
| Credit | 3 | 2 |
| Prerequisite(If any): | | |
| 1. C & C++ Programming | | |
| Course Objective: | | |
| 1. To introduce algorithmic analysis, fundamental data structures, problem solving paradigms | | |
| 2. To study the representation, implementation and application of basic data structures. | | |
| 3. To introduce algorithmic strategies and time complexity analysis of problems. | | |
| 4. To study applications of Data Structure in solving real life problems | | |
| Course Outcome: | | |
| 1. Able to understand the concepts of data structure, data type and array data structure. | | |
| 2. Able to understand and apply various data structure such as linked list, stacks, queues, trees and graphs to solve various computing problems using C++ programming language | | |
| 3. Able to analyze algorithms and determine their time complexity. | | |
| 4. Able to effectively choose the data structure that efficiently model the information in a problem. | | |
| Course Contents | | Hrs |
| Unit – I | | 8 |
| Introduction to data structures: Concept of data, Data types, Data Object, Data structure, Abstract, Data types (ADT), linear data structures using sequential organization: Concept of sequential organization, Concept of Linear data structures, arrays as ADT, Multidimensional arrays, Storage representations (row major and column major and their address calculation). Polynomial representation using arrays, Application of array in sparse matrix representation, addition and transpose | | |
| Unit – II | | 8 |
| Concept of linked organization, singly linked list, doubly linked list, circular linked list and operations on above data structure. Application of linked list for Representation and manipulations of polynomials | | |
| Unit – III | | 8 |
| Concept of stack and queues as ADT, Implementation of stacks using sequential and linked organization, linear queue, circular queue using sequential and linked organization, Priority Queue, Application of stack for expression conversion, evaluation, processing of function calls, and | | |

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| recursion, Application of queue in job scheduling. | |
| Unit – IV | |
| Non-linear Data Structures: Trees and binary trees-concept and terminology, Sequential & Linked representation of binary trees, Algorithm for tree traversals, Conversion of general tree to binary tree, Binary search trees, Applications of binary tree : expression tree, decision tree. Graph: Representation of graph -Adjacency matrix and Adjacency list, Graph traversals, application of graph: connected components, Spanning tree, Minimum cost spanning tree, and shortest path computation. | 8 |
| Unit – V | |
| Searching and Sorting: Sequential, binary and Fibonacci search. General concepts: sort order, sort stability, efficiency and passes, Internal and external sorting, Bubble sort, Quick and Merge sort. Files: Organization of files: sequential and direct access file and simple index file, hashing function and its characteristics, collision resolution, linear probing, chaining with and without replacement, rehashing. | 8 |

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| Text Books: |
| 1. “Data Structures and Algorithms”, Aho A., Hopcroft J., Ullman J., Pearson Education, 1998, ISBN-0-201-43578-0. |
| 2. “Data Structures using C & C++”, Y. Langsam, M. Augenstein and A. Tannenbaum, Prentice Hall India, Second edition, ISBN-978-81-203-1177-0 |
| Reference Books: |
| 1. “Data Structures Using C++”, Varsha H. Patil, Oxford University Press, 1st Edition, ISBN- 13: 978-0-19-806623-1 |
| 2. An Introduction to Data Structures with Applications, Trembley, J.P. and Sorenson P.G., McGraw Hill International Student Edition, New York (1984). |
| E-Books/Web Links |
| 1. Data Structures using C++ 2 nd Edition, By D. S. Malik |

| MCAP203: Data Structure Laboratory | |
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| List of Practical | Hrs. |
| 1. Write a program to implement addition of polynomials. | 2 |
| 2. Write a program to implement application of array in sparse matrix to perform transpose. | 2 |
| 3. Write a menu driven program to perform operations on singly linked list | 4 |
| 4. Write a menu driven program to perform operations on doubly linked list. | 4 |
| 5. Write a program to implement circular linked list and perform operations on it. | 4 |
| 6. Write a program to implement stack as an ADT. Use this ADT to perform expression conversion and evaluation. (Infix – Postfix). | 4 |
| 7. Write a program to implement queue using arrays. | 4 |
| 8. Write a program to implement Merge Sort Method. | 2 |
| 9. Write a program to implement Heap Sort Method. | 2 |
| 10. Write a program to implement the Binary Search. | 2 |
| 11. Write a program to implement Fibonacci Search. | 2 |
| 12. Write a program to create binary tree and perform recursive traversals. | 4 |
| 13. Write a program to implement DFS traversal on a graph represented using an adjacency matrix. | 4 |
| 14. Write a program to implement shortest path algorithm. | 4 |
| 15. Write a program to implement various operations for file handling. | 4 |

| MCAL204: Object Oriented Analysis and Design | | |
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| Teaching Scheme: Lectures: 3 Hrs/Week Tutorials: Nil Practical: 2 Hrs./Week | Examination Scheme (Theory) Teacher Assessment Examination : 20Marks Class Assessment Examination: 20Marks End Sem Examination: 60Marks | Examination Scheme (Laboratory) Internal(TW): 50 Marks External(OR): Nil External(PR): Nil |
| Credit | 3 | 1 |
| Prerequisite(If any): C++ and object oriented programming concepts | | |
| Course Objective: | | |
| 1. To become familiar with the unified modeling language (UML 1.x or UML 2.0) | | |
| 2. To experience the insights necessary to obtain maximum benefit from object technology | | |
| 3. To understand the issues involved in implementing an object-oriented design. | | |
| 4. To understand the practical connections between the theory of object-oriented design and the object-oriented programming languages. | | |
| Course Outcome: | | |
| 1. Able to understand the concepts of object oriented analysis and design | | |
| 2. Able to understand and apply various UML diagram and also help to develop the building blocks of systems. | | |
| 3. Able to analyze requirements of system to develop the model. | | |
| Course Contents | | Hrs |
| Unit – I : Introduction to OOAD | | |
| An overview - Object basics. Benefits of OO Methodology. Two views of Software Development: SSAD, OOAD, Overview of Prominent OO Methodologies: The Rumbaugh OMT, The Booch methodology. Jacobson's OOSE methodologies, Rational Unified Process, 4+1 View architecture, Architectural approaches | | 8 |
| Unit – II : Object Oriented Methodologies | | |
| Introduction to UML & History, UML 2.0 New Features, UML Meta-Model, Extensibility mechanisms like stereotypes, Tagged Values, constraints and profiles, OCL, Overview of all diagrams in UML 2.0. Use case diagram, Requirement Capture with Use case. Building blocks of Use Case diagram - actors, use case, guidelines for use case models. Relationships between use cases - extend, include, and generalize. | | 8 |
| Unit – III : Class Diagram Structural Diagram | | |
| Class diagrams: Classes, values and attributes, operations and methods, responsibilities for classes, abstract classes, access specification (visibility of attributes and operations). Relationships among classes: Associations, Dependencies, Generalizations, Aggregation. Adornments on Association: association names, association classes, qualified association, n-ary associations, ternary and reflexive association. Dependency relationships among classes, notations. Object diagrams notations and | | 8 |

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| modeling, relations among objects (links). | |
| Unit – IV : Interaction diagrams | |
| Interaction diagrams: Sequence diagrams, Interaction occurrences, and combines fragments, Communication diagrams, Interaction Overview diagrams including interactions, signals, exceptions, regions, partitions. | 8 |
| Unit – V : Activity diagrams | |
| Activity diagrams: Activities, sub activities, signals, pins, exceptions, partitions, fork,join, regions, State Machine diagrams: States, encapsulation of states, transitions,submachine, state generalization, Timing diagrams. Modeling Architecture in UML: Package diagrams, Component diagrams, Deployment diagrams. Applications of UML in embedded systems, Web applications, commercial applications, | 8 |

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| Text Books: |
| 1. “Unified Modeling Language User Guide”, Grady Booch, James Rumbaugh, Ivar Jacobson The (2nd Edition) (Addison-Wesley Object Technology Series) (Hardcover) |
| 2. “SAMS Teach yourself UML in 24 Hours”, Joseph Schmuller, Third edition. |
| Reference Books: |
| 1. “UML Distilled: A Brief Guide to the Standard Object Modeling Language”, Martin Flower, 3rd Edition, Addison- Wesley, ISBN – 0321193687. |
| 2. Robert Lafore, Object Oriented Programming in C++, Fourth Edition, Tech Media, 2002. ISBN 0-672-32308-7. |
| E-Books/Web Links |
| 1. “Unified Modeling Language User Guide”, The (2nd Edition) Grady Booch, James Rumbaugh, Ivar Jacobson |

| MCAP204: UML Laboratory using open source software | |
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| List of Practical | Hrs. |
| 1. UML Diagram case studies (Use-case Diagram) | 4 |
| 2. UML Diagram case studies (Object Diagram) | 4 |
| 3. UML Diagram case studies(Class Diagram) | 4 |
| 4. UML Diagram case studies(Activity Diagram) | 4 |
| 5. UML Diagram case studies(Sequence Diagram) | 4 |
| 6. UML Diagram case studies(State Chart Diagram) | 4 |
| 7. UML Diagram case studies(Communication Diagram) | 4 |
| 8. UML Diagram case studies(Component Diagram) | 4 |
| 9. UML Diagram case studies(Package Diagram) | 4 |
| 10. UML Diagram case studies(Deployment Diagram) | 4 |

| MCAL205: Operations Research | | |
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| Teaching Scheme: | Examination Scheme(Theory) | Examination Scheme(Laboratory) |
| Lectures: 4Hrs/Week Tutorials: Nil Practical: Nil | Teacher Assessment Examination : 20 Marks Class Assessment Examination: 20 Marks End Sem Examination: 60 Marks | Internal(TW): Nil External(OR): Nil External(PR) : Nil |
| Credit | 4 | |
| Course Objective: | | |
| 1. Operations research is a scientific approach to analyzing problems and making decisions. | | |
| 2. It uses mathematics and mathematical modeling on computers to forecast the implications of various choices and identify the best alternatives. | | |
| Course Outcome: | | |
| 1. Operations research methodology is applied to a broad range of problems in both the Public and private sectors. | | |
| 2. Many problems deal with the allocation of scarce human resources, money, materials, equipment or facilities. | | |
| 3. Applications include staff scheduling, vehicle routing, warehouse location, product distribution, quality control, traffic light phasing, police patrolling, preventive maintenance scheduling, economic forecasting, design of experiments, power plant fuel allocation, stock portfolio optimization, cost effective environmental protection, inventory control and university course scheduling. | | |
| Course Contents | | Hrs. |
| Unit – I : Linear Programming | | 10 |
| Linear Programming-Mathematical formulation of Problems, graphical solution, Simplex method, Big M Method, concept of duality, dual simplex method, Degeneracy and its resolution, sensitivity analysis. | | |
| Unit – II : Transportation problem | | 10 |
| Assignment problems- Mathematical formulation, Hungarian method for solution, unbalanced assignment problems, infeasible assignment, Transportation problems- North-west corner Rule – lowest cost methods –Vogel’s approximation method, and modified distribution method, degeneracy in transportation problems, Transshipment problems, Minimization and Maximization problem. | | |
| Unit – III : Network Analysis | | 10 |
| Terminology of network, shortest route problem, minimal spanning tree problem, Basic differences between PERT and CPM. ,Arrow Networks, time estimates, Earliest expected time ,Latest – allowable occurrences time, Forward Pass Computation, Backward Pass Computation, Representation in Tabular Form, Critical Path, Probability of meeting scheduled date of completion, Calculation on CPM network, various floats for activities, Critical path updating projects. ,Operation time cost trade off Curve project | | |

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| Unit – IV : Sequencing Problem & Decision Theory | |
| Sequencing Model: Classification of self-problems, processing of n jobs through two machines, three machines, processing of two jobs through m machines. Decision Theory: Classification of Decisions, Steps in decision theory approach, Decision making under certainty, Decision making under uncertainty, Decision making under risk, Decision making under conflict | 6 |
| Unit – V : Game Theory | |
| Introduction to Game Theory, Terminologies of Game Theory, Game of pure strategy (Saddle point), Mix strategy (Game without saddle point), reducing game by dominance. | 4 |

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| Text Books: (Book Title, Name of the author, name of the Publisher, edition, year of publication) |
| 1. Operation Research By Taha H.A., PHI, 7 th Ed. |
| 2. B.E. Gillet, Introduction to Operations Research, McGraw-Hill. |
| 3. Introduction to Operation Research : A Computer Oriented Algorithm Approach By Filet B. E. |
| 4. Introduction to Operation Research By Hiller F. and Lieberman G. J., TMH, 8 th Ed. |
| Reference Books: |
| 1. A Ckoff, R.L. and Sasieni, M.W. Fundamentals of Operations Research, Wiley, 1968. |
| 2. Hadley G. Linear Programming, Oxford and IBH Publishing Co. Ltd. Ltd., New-Delhi. |
| 3. S.S. Rao, Optimization Theory and Applications, Wiley Eastern |
| 4. G. Hadley, Linear programming, Addison-Wesley. |
| Web Links |
| 1. https://www.doc.ic.ac.uk/~br/berc/linearprog.pdf |
| 2. https://books.google.co.in/books/.../Kirshna_s_Operations_Research.html |
| 3. freecomputerbooks.com/specialOperationResearchBooks.html |

Dr. Kishor Wagh
BOS Chairman