**FMTH0301/Rev.5.3**

**Course Plan**

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| Semester: **V** | Year:2023-2024 |
| Course Title: **Software Engineering** | Course Code: 22ECSC301 |
| Total Contact Credits: **40** | Duration of ESA: 3 Hours |
| ISA Marks: **50** | ESA Marks: **50** |
| Lesson Plan Author: Dr. Padmashree Desai,Dr. P.G. Sunitha Hiremath, Prof. Prashant Narayankar, Miss. Uma Hiremath | Date: 16-09-2023 |
| Checked By: Dr. Suvarna K | Date: 22-09-2023 |

**Prerequisites:** Knowledge of problem solving with C programming, Data structures and algorithms and Object-oriented programming is essential.

**Course Outcomes (COs):**

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

1. **Identify** the need to engineer a software system, software engineering principles and techniques to develop a solution.
2. **Analyze** customer requirements and prepare Software Requirement Specifications (SRS).
3. **Design** software system for the given SRS using appropriate design methodology.
4. **Perform** test planning and test execution for a given system using relevant techniques.
5. **Use** tools to perform Software Development Life Cycle activities.

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

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| --- | --- |
| Course Title: Software Engineering | Semester: 5 |
| Course Code: 22ECSC301 | Year: 2023-24 |

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| **Course Outcomes (COs)/ Program Outcomes (POs)** | **Program Outcome – PO\*(General)** | | | | | | | | | | | **Specific(Optional)** | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| 1. **Identify** the need to engineer a software system, software engineering principles and techniques to develop a solution. | **M** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. **Analyze** customer requirements and prepare Software Requirement Specifications (SRS). |  |  | **H** |  |  |  |  |  |  |  |  |  |  |  |
| 1. **Design** software system for the given SRS using appropriate design methodology. |  |  | **M** |  |  |  |  |  |  |  |  |  |  |  |
| 1. **Perform** test planning and test execution for a given system using relevant techniques. |  |  |  |  |  |  |  |  |  |  |  |  |  | **H** |
| 1. **Use** tools to perform Software Development Life Cycle activities. |  |  |  |  | **M** |  |  |  |  |  |  | **M** |  |  |

Degree of compliance **L**: Low **M**: Medium **H**: High

**Competency addressed in the Course and corresponding Performance Indicators**

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| --- | --- |
| **Competency** | **Performance Indicators** |
| 1.4: Demonstrate competence in computer science engineering knowledge. | 1.4.6. Apply fundamentals of software development life cycle. |
| 3.1: Demonstrate an ability to define a complex open-ended problem in engineering terms | 3.1.2. Elicit and document system requirements from stakeholders. |
| 3.2: Demonstrate an ability to generate a diverse set of alternative design solutions. | 3.2.2. Generate diverse set of potential design solutions to meet system requirements by using design concepts, tools and techniques. |
| 3.4: Demonstrate an ability to advance an engineering design to defined end state. | 3.4.1. Refine a conceptual design into a detailed design within the existing constraints (of the resources) |
| 5.1. Demonstrate an ability to identify/ create modern IT tools for engineering activities. | 5.1.1. Identify modern IT tools for software development life cycle and system analysis activities. |
| 12.1. Demonstrate an ability to identify gaps in knowledge and a strategy to  close these gaps | 12.1.2. Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap |
| 14.2: Demonstrate an ability to test a software system | 14.2.2 Plan and perform testing as per the specified test strategy. |

Eg: 1.2.3: Represents Program Outcome ‘1’, Competency ‘2’ and Performance Indicators ‘3’.

**Course Content**

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| --- | --- | --- |
| Course Code: 22ECSC301 | Course Title: Software Engineering | |
| L-T-P: 3-0-0 | Credits: 3 | Contact Hrs: 40 |
| ISA Marks: 50 | ESA Marks: 50 | Total Marks: 100 |
| Teaching Hrs: 40 |  | Exam Duration: 3 hrs |

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| **Content** | **Hrs** |
| **Unit - 1** |  |
| **Chapter No. 1. Software Engineering Process**  Professional software development, Software engineering ethics, Case studies, Software processes: Software process models, Process activities and Coping with change. | 05 hrs |
| **Chapter No. 2. Agile Software Development**  Agile methods, Plan-driven and agile development, Extreme programming, Agile project management. | 04 hrs |
| **Chapter No. 3. Requirement Engineering**  Functional and Non-functional requirements; The software requirements Document, Requirement specification, Requirements Engineering Processes, Requirements elicitation and analysis; Requirements validation; Requirements management, Source Control Management, and Collaboration tools. | 07 hrs |
| **Unit - 2** |  |
| **Chapter No. 4. System Modeling**  Context models, Interaction Models, Structural models, Behavioral models.Design Tools. | 05 hrs |
| **Chapter No. 5. Architectural Design**  Architectural Design Decision, Architectural views, Architectural patterns, Application Architectures. | 05 hrs |
| **Chapter No. 6. Software Testing**  Development Testing, Test Driven Development, Release Testing, User Testing and Testing Tools. | 06 hrs |
| **Unit - 3** |  |
| **Chapter No. 7. Introduction to DevOps**  DevOps Principles, Benefits of working in a DevOps environment, Lifecycle, stages, Delivery pipeline , Technical challenges and DevOps Tools | 04 hrs |
| **Chapter No. 8. Continuous integration and continuous delivery (CI/CD)**  Essentials of continuous integration, Jenkins architecture, Jenkins security management, Jekins master-slave architecture, Jenkins delivery pipeline and authentication. | 04 hrs |

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

1. **Software Engineering by Ian Sommerville , 10th edition, Pearson publication-24 May 2017**
2. Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation by Jennifer Davis & Ryn Daniels, 1st Edition, Addison-Wesley Signature Series (Fowler), 27 July 2010

**References**

1. **Software Engineering: A Practitioner’s Approach, 8/e**

**by Bruce R. Maxim, Roger S. Pressman , McGraw Hill Education; 19 March 2019**

1. **Software Engineering at Google: Lessons Learned from Programming Over Time by Titus Winters , Tom Manshreck & Hyrum Wright, 1st edition , O'Reilly Media - 28 February 2020**

**Evaluation Scheme**

**ISA Scheme**

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| **Assessment** | **Weightage in Marks** |
| ISA 1 | 15 |
| ISA 2 | 15 |
| Course project Integrated with Web technology course   * Demonstration of web application using software testing tool. * Continuation integration and delivery for web application using Jenkins tool | 15  05 |
| **Total** | **50** |

**Course Unitization for ISA and ESA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Topics / Chapters** | **Teaching Credits** | **No. of Questions in ISA 1** | **No. of Questions in ISA 2** | **No. of Questions in Activity** | **No. of**  **Questions**  **in ESA** |
| **Unit I** | | | | |  |
| 1 Software Engineering process | 5 | 1.00 | -- |  | 1.00 |
| 2 Agile Software Development | 4 | 1.00 | -- |  | 0.75 |
| 3 Requirement Engineering | 7 | 1.00 | -- |  | 1.25 |
| **Unit II** | | | | | |
| 4. System Modeling | 5 | -- | 1.00 |  | 1.00 |
| 5. Architectural Design | 5 | -- | 1.00 |  | 1.00 |
| 6. Software Testing | 6 | -- | 1.00 | 1.00 | 1.00 |
| Unit III | | | | | |
| 7 Introduction to DevOps | 4 | -- | -- |  | 1.00 |
| 8 Continuous integration and continuous delivery (CI/CD) | 4 | -- | -- | 1.00 | 1.00 |

**Note**

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

Date:22-09-23 Head, SoCSE

**Course Assessment Plan**

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| Course Title: Software Engineering Code: 22ECSC301 | | | | | |
| Course outcomes (COs) | Weightage in assessment | Assessment Methods | | | |
| ISA-1 | ISA-II | Activity | ESA |
| 1. **Identify** the need to engineer a software system, software engineering principles and techniques to develop a solution.. | 10% | **✓** |  |  | **✓** |
| 1. **Analyze** customer requirements and prepare Software Requirement Specifications (SRS). | 30% | **✓** |  |  | **✓** |
| 1. **Design** software system for the given SRS using appropriate design methodology. | 30% |  | **✓** |  | **✓** |
| 1. **Perform** test planning and test execution for a given system using relevant techniques. | 20% |  |  | **✓** | **✓** |
| 1. **Use tools** to perform Software Development Life Cycle activities | 10% |  |  | **✓** | **✓** |
| Weightage | | 30% | 30% | 40% | 100% |

Course project Integrated with Web technology course and demonstration of web application using software testing tool.**(15 marks)**

**Rubrics:**

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| --- | --- | --- | --- |
| **Parameter-Marks and PI** | **Good- 100%** | **Average-80%** | **Poor-40%** |
| Test planand test cases for identified requirements &implementation  5 Marks  CO4  PI 14.2.2  BL- L4 | * All test cases are identified for each Functional/non-functional requirement. * Test cases are written as per template. | * Test cases areidentified for 80% of functional and Nonfunctional requirement * Test cases are written as per template. | Test cases are identified for 50% of functional and Non functional requirements.   * Test cases are written as per template. |
| Tool usage  Marks 10  CO 5  PI 5.1.1  BL L4 | * Appropriate testing tool used and tested all test cases | * 80% of the test cases are automated | 50% of the test cases are automated |

**Continuation integration and delivery for web application using Jenkins tool (05 marks)**

**Rubrics:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter-Marks and PI** | **Good- 100%** | **Average-80%** | **Poor-40%** |
| Usage of tool  Marks 05  CO 5  PI 12.1.2  BL L3 | * Jenkins tool used for integrating all modules. | * 60% of the test cases are automated | 40% of the test cases are automated |

**Chapter wise Plan**

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| Course Code and Title: **22ECSC301 / Software Engineering** | |
| Chapter Number and Title:  **1. Software Engineering process** | Planned Hours: **05 hrs** |

**Learning Outcomes:-**

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

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| Topic Learning Outcomes | COs | BL | CA Code |
| 1. Explain the role of software Engineering in the software development | CO1 | L2 | 1.4 |
| 1. Identify ethical and professional issues important for software engineers | CO1 | L3 | 1.4 |
| 1. Select an appropriate process model for a software system being built | CO1 | L3 | 1.4 |

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| Lesson Schedule  Class No. - Portion covered per hour / per Class |
| 1. Professional software development, Software engineering ethics. |
| 2. Case studies |
| 3. Software processes: Software process models |
| 4. Process activities, Coping with change |
| 5. Coping with change |

**Review Questions**

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| --- | --- | --- | --- |
| Sl.No. - Questions | TLOs | BL | PI Code |
| 1. Explain ethical importance in software engineering | TLO2 | L2 | 1.4.6 |
| 2.Explain the attributes of good software | TLO1 | L2 | 1.4.6 |
| 3. Giving reasons for your answer based on the type of system being developed, suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems.   1. A system to control anti-lock braking in a car. 2. A virtual reality system to support software maintenance. 3. A university accounting system that replaces an existing system. 4. An interactive travel planning system that helps users plan journeys with the lowest environmental impact | TLO3 | L3 | 1.4.6 |
| 4. Define Software Engineering. Write two reasons why it is important. | TLO1 | L2 | 1.4.6 |
| 5. Compare strengths and weakness of Waterfall model with iterative model | TLO3 | L2 | 1.4.6 |
| 6. Which of the development process models discussed would you follow for the following projects and justify your answers.   1. An on-line store. 2. A Toll Collection System for Highway Authorities to collect Toll at multiple entry points between PUNE and HUBLI. 3. A new operating system for Mobile Devices to reach market in defined amount of time which is short | TLO3 | L3 | 1.4.6 |

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| Course Code and Title: **22ECSC301 / Software Engineering** | |
| Chapter Number and Title:  **2 Agile Software Development** | Planned Hours: **4 hrs** |

**Learning Outcomes:-**

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

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| Topic Learning Outcomes | COs | BL | CA Code |
| 1. Explain the rationale for agile software development methods | CO1 | L2 | 1.4 |
| 1. Differentiate between test and plan-driven development | CO1 | L2 | 1.4 |
| 1. Explain extreme programming and scrum model used in agile software development | CO1 | L2 | 1.4 |
| 1. Apply extreme programming practices for a given project or scenario | CO1 | L3 | 1.4 |

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| Lesson Schedule  Class No. - Portion covered per hour / per Class |
| 1. Agile methods |
| 2. Plan-driven and agile development |
| 3. Extreme programming |
| 4. Agile project management(scrum) |

**Review Questions**

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| --- | --- | --- | --- |
| Sl.No. - Questions | TLOs | BL | PI Code |
| 1. Apply scrum for building a chat application. | TLO2 | L3 | 1.4.6 |
| 1. Draw the Scrum process and list the Key characteristics of this process. | TLO3 | L2 | 1.4.6 |
| 1. Explain why test-first development helps the programmer to develop a better understanding of the system requirements. What are the potential difficulties with test-first development? | TLO2 | L3 | 1.4.6 |
| 1. What are the principles of agile methods | TLO1 | L2 | 1.4.6 |
| 1. Differentiate between Plan driven and agile method of software development. | TLO2 | L2 | 1.4.6 |

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| Course Code and Title: **22ECSC301 / Software Engineering** | |
| Chapter Number and Title:  **3 Requirement Engineering** | Planned Hours: **7 hrs** |

**Learning Outcomes:-**

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

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| Topic Learning Outcomes | COs | BL | CA Code |
| 1. Differentiate between functional and non-functional of a system under consideration. | CO2 | L2 | 3.1 |
| 1. Apply requirements engineering activities: elicitation, analysis and validation for collecting requirements from a customer | CO2 | L3 | 3.1 |
| 1. Analyze the problem statement and Write functional and Nonfunctional requirements. | CO2 | L4 | 3.1 |
| 1. Organize requirements of a system in SRS | CO2 | L3 | 3.1 |
| 1. Explain requirement management. | CO2 | L2 | 3.1 |

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| Lesson Schedule  Class No. - Portion covered per hour / per Class |
| 1. Functional and Non-functional requirements |
| 2. The software requirements Document |
| 3. Requirement specification, Requirements Engineering Processes |
| 4. Requirements elicitation and analysis |
| 5. Requirements validation |
| 6. Requirements management |

**Review Questions**

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| Sl.No. - Questions | TLOs | BL | PI Code |
| 1. List and explain the structure of SRS | TLO4 | L2 | 3.1.2 |
| 1. List at least five use cases of a satellite road detection system. | TLO3 | L4 | 3.1.2 |
| 1. Deepak has to make a payment through an UPI payment App. With respect to the transaction processing time and list, describe any two metrics for specifying the non functional requirement- “speed of transaction” | TLO3 | L4 | 3.1.2 |
| 1. List and explain the important components of SRS | TLO4 | L2 | 3.1.2 |
| 1. Write five Functional Requirements and two Non – functional requirements for a Toll Collection System established by State Highway Authority to collect toll at multiple entry points on all Highways in the state. The system should be able to generate intelligent reports doing data analysis. | TLO1 | L4 | 3.1.2 |

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| Course Code and Title: **22ECSC301 / Software Engineering** | |
| Chapter Number and Title:  **4. System Modeling** | Planned Hours: **5hrs** |

**Learning Outcomes:-**

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

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| Topic Learning Outcomes | COs | BL | CA Code |
| 1. Explain the use of different models to represent software system | CO3 | L2 | 3.2 |
| 1. Discuss the need for different types of models viz. context, interaction, structure and behavior. | CO3 | L3 | 3.2 |
| 1. Analyze the system with different UML diagrams in modeling systems: activity diagrams, Usecase diagrams, Sequence diagram, class diagrams and state diagrams. Usage of tools in design. | CO3 | L4 | 3.2 |

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| Lesson Schedule  Class No. - Portion covered per hour / per Class |
| 1. Context models |
| 2. Interaction Models |
| 3. Contd. Interaction models |
| 4. Structural models |
| 5. Behavioral models |

**Review Questions**

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| Sl.No. - Questions | TLOs | BL | PI Code |
| 1. In the tiger monitoring project at Anshi National Park drones are used.These drones are operated by Forest Reserve Officers from the command center. They have unique IDs to validate their access to the drones. Drones have a communication module(to transmit and receive information) and a rotary module( to control drone movement). Draw escribe sequence diagram for moving the drone in the forward direction | TLO3 | L3 | 3.4.1 |
| 1. Consider a web-based online bookstore system which sells books, music CDs, and software. Typically, a customer first logs on to the system, entering a customer ID and password. The customer can then browse for titles or search by keyword. The customer puts some of the titles into a "shopping cart" which keeps track of the desired titles. When the customer is done shopping, he/she confirms the order, shipping address, and billing address. The bookstore system then issues a shipping order, bills the customer, and issues an electronic receipt. At the end of the transaction, the customer logs off."For this scenario design the class diagram. | TLO3 | L4 | 3.4.1 |
| 1. Explain why it is important to model the context of a system that is being developed. Give two examples of possible errors that could arise if software engineers do not understand the system context. | TLO2 | L3 | 3.2.2 |
| 1. Design the class diagram for your own mini project problem statement. | TLO3 | L4 | 3.4.1 |
| 1. What State diagram and when it is used? | TLO3 | L2 | 3.4.1 |
| 1. Using the UML graphical notation for object classes, design the following object classes and identify attributes and operations using your experience. A telephone, A printer,A personal stereo system for a personal computer. | TLO3 | L4 | 3.4.1 |
| 1. Draw state diagrams of the control software for the DVD player. | TLO3 | L3 | 3.4.1 |
| 1. As part of the embedded design team at Microchips, you are asked to present a design model for a new privacy sensor that needs to be added as a new feature in the next release of a phone. The following rules are given to you. 2. The sensor is active only when the user needs it. 3. It has two modes: fully secure and partiall secure 4. When activated in full secure mode it will halt all background OS operations, deactivates the GPS sensor 5. When activated in partially secure mode it will only halt background OS operations   Which system design model will you consider? Justif and design the model | TLO2 | L4 | 3.2.2 |

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| Course Code and Title: **22ECSC301 / Software Engineering** | |
| Chapter Number and Title:  **5. Architectural Design** | Planned Hours: **5 hrs** |

**Learning Outcomes:-**

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

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| Topic Learning Outcomes | COs | BL | CA Code |
| 1. Explain the importance of architectural design and patterns of a software system. | CO3 | L2 | 3.2 |
| 1. Analyze the performance of the architectureof a given system using Non functional requirements. | CO3 | L4 | 3.2 |
| 1. Draw the architecture of a given system using the appropriate architecture pattern/approach. | CO3 | L4 | 3.2 |
| 1. Use different types of application architectures to provide a solution. | CO3 | L3 | 3.2 |

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| Lesson Schedule  Class No. - Portion covered per hour / per Class |
| 1. Architectural design decisions |
| 2. Architectural views |
| 3. Contd. Architectural views |
| 4. Architectural patterns |
| 5. Application architectures |

**Review Questions**

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| Sl.No. - Questions | TLOs | BL | PI Code |
| 1. Listdifferent types of architecture diagrams? Explain any one | TLO1 | L2 | 3.2.2 |
| 1. Explain the role of Software Architecture and different views. | TLO2 | L2 | 3.2.2 |
| 1. Apply Repository architecture for student information system. | TLO2 | L3 | 3.2.2 |
| 1. With a suitable diagram, explain different views of architecture diagrams | TLO1 | L2 | 3.2.2 |
| 1. Select and justify suitable architectures for the following software systems and explain the rationale behind your suggestion: i) Lip-reading system ii) smart notice board iii) analytical module for customers buying in online website | TLO2 | L4 | 3.2.2 |
| 1. Consider an interactive Web site which provides many different features to perform various tasks. Show that the architecture for this can be represented as a shared-data style as well as client-server style. Which one will you prefer and why? | TLO3 | L3 | 3.2.2 |
| 1. Consider a compiler used to compile a source code to generate an object code. Which Architecture style is best suitable? Justify answer. | TLO2 | L4 | 3.2.2 |

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| Course Code and Title: **22ECSC301 / Software Engineering** | |
| Chapter Number and Title: **6 Software Testing** | Planned Hours: 6 **hrs** |

**Learning Outcomes:-**

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

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| Topic Learning Outcomes | COs | BL | CA Code |
| 1. Explain different types of testing performed during development to acceptance by system customers | CO4 | L2 | 14.2 |
| 1. Analyze a given scenario and write test cases using test-driven development | CO4 | L4 | 14.2 |
| 1. Differentiate between component, system, release testing, and user testing processes. | CO4 | L3 | 14.2 |

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| Lesson Schedule  Class No. - Portion covered per hour / per Class |
| 1. Development Testing-(Black box testing and White box testing) |
| 1. Test Driven Development |
| 1. Test Driven Development |
| 1. Release Testing |
| 1. User Testing |
| 1. Testing tools |

**Review Questions**

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| Sl.No. - Questions | TLOs | BL | PI Code |
| 1. What are the different levels of testing and the goals of different levels? For each level, specify which of the testing approaches is most suitable. | TLO1 | L2 | 14.2.2 |
| 1. An Online Journal Portal system need to be developed to manages subscriptions for readership, online submission of papers from authors, online review of papers from experts. Write possible test cases using test driven approach. | TLO2 | L4 | 14.2.2 |
| 1. You need to find largest of N numbers. Design test cases using path testing technique. | TLO2 | L4 | 14.2.2 |
| 1. Given the following fragment of code, how many tests are required for 100% decision coverage?   if width > length thenbiggest\_dimension = width if height > width thenbiggest\_dimension = height end\_if elsebiggest\_dimension = length if height > length thenbiggest\_dimension = height end\_if end\_if | TLO2 | L4 | 14.2.2 |
| 1. You have designed test cases to provide 100% statement and 100% decision coverage for the following fragment of code. if width > length then biggest\_dimension = width else biggest\_dimension = length end\_if The following has been added to the bottom of the code fragment above. print "Biggest dimension is " &biggest\_dimensionprint "Width: " & width print "Length: " & length How many more test cases are required? | TLO2 | L4 | 14.2.2 |
| 1. What is the difference between negative and positive testing? Give example for both | TLO1 | L3 | 14.2.2 |
| 1. You have written module to replace old string with new string if there is a match. Write test cases to perform the same. | TLO2 | L4 | 14.2.2 |

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| Course Code and Title: **22ECSC301 / Software Engineering** | |
| Chapter Number and Title: **7. Introduction to DevOps** | Planned Hours: **4 hrs** |

**Learning Outcomes:-**

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

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| Topic Learning Outcomes | COs | BL | CA Code |
| 1. Explain DevOps principles and environment | CO5 | L2 | 5.1.1 |
| 1. Explain DevOps Lifecycle and stages | CO5 | L2 | 5.1.1 |
| 1. Identify delivery pipeline and technical challenges for an application | CO5 | L3 | 5.1.1 |
| 1. Explain DevOps tool | CO5 | L2 | 5.1.1 |

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| Lesson Schedule  Class No. - Portion covered per hour / per Class |
| 1. DevOps Principles, Benefits of working in a DevOps environment |
| 2. Lifecycle, stages |
| 3. Delivery pipeline |
| 4. Technical challenges and DevOps Tools |

**Review Questions**

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| --- | --- | --- | --- |
| Sl.No. - Questions | TLOs | BL | PI Code |
| 1. Explain the DevOps Principles | TLO4 | L2 | 5.1.1 |
| 1. Why DevOps lifecycle is suitable for business applications. Justify the answer. | TLO3 | L2 | 5.1.1 |
| 1. Identify a possible DevOps pipeline for a simple calculator application | TLO4 | L3 | 5.1.1 |

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| Course Code and Title: **22ECSC301 / Software Engineering** | |
| Chapter Number and Title: **8. Continuous integration and continuous delivery (CI/CD)** | Planned Hours: **4 hrs** |

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

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| --- | --- | --- | --- |
| Topic Learning Outcomes | COs | BL | CA Code |
| 1. Essentials of continuous integration | CO5 | L2 | 5.1.1 |
| 1. Jenkins architecture, Jenkins security management | CO5 | L2 | 5.1.1 |
| 1. Differentiate between traditional architecture and Jekins master-slave architecture, | CO5 | L3 | 5.1.1 |
| 1. Validating the Jenkins delivery pipeline and authentication | CO5 | L3 | 5.1.1 |

**Review Questions**

|  |  |  |  |
| --- | --- | --- | --- |
| Sl.No. - Questions | TLOs | BL | PI Code |
| 1. Discuss the benefits of CI/CD | TLO1 | L2 | 5.1.1 |
| 1. Why Jenkins master-slave architecture is suitable for business applications. Give reason by taking an appropriate example. | TLO3 | L3 | 5.1.1 |
| 1. How do you validate the Jenkins delivery pipeline with different authentication process. | TLO4 | L3 | 5.1.1 |

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| Model Question Paper for Minor Examination (ISA-I) | | | | | | | | |
| Course Code: 22ECSC301 | |  | Course Title: Software Engineering | | | | | |
| Duration (H:M):1:15 | |  |  | | | | | |
| Max. Marks: 40 | |  |  | | | | | |
| Note : Answer any two full questions | | | | | | | | |
| Q.No | Questions | | | Marks | CO | BL | PO | PI Code |
| Q1.a | Propose and justify the process model for each of the following software projects:   1. Tool to conduct online meetings, presentations and conference and classes. Software need to be developed in a limited duration. 2. Online transaction facility to be provided for senior citizens in the existing software used in a postal department. Improve the software to deal with the senior citizens while using a software.   You are expected to identify at least two characteristics for each of the software which ideally suits the choice of a particular process model. | | | 08 | CO1 | L3 | 1 | 1.4.6 |
| Q1.b | Web application for KLE Technological University need to be developed for managing the different programs, courses and students. Website is designed to provide required information to users gobally.  Analyze the given problem and write six functional and four Nonfunctional requirements for the above scenario. | | | 08 | CO2 | L4 | 3 | 3.1.2 |
| Q1.c | Explain SCRUM agile software development model with neat diagram. | | | 04 | CO1 | L2 | 1 | 1.4.6 |
| Q2.a | Apply SCRUM process knowledge and propose the project flow for any of the software mentioned in Q1(a). | | | 08 | CO1 | L3 | 1 | 1.4.6 |
| Q2.b | Discover ambiguities or omissions in the following statement of requirements for part of a ticket-issuing system:  An automated ticket-issuing system sells rail tickets. Users select their destination and input a credit card and a personal identification number. The rail ticket is issued and their credit card account charged. When the user presses the start button, a menu display of potential destinations is activated, along with a message to the user to select a destination.  Once a destination has been selected, users are requested to input their credit card. Its validity is checked and the user is then requested to input a personal identifier. When the credit transaction has been validated, the ticket is issued. | | | 08 | CO2 | L4 | 1 | 3.1.2 |
| Q2.c | What are the two related approaches that are used to reduce the costs of rework in the software development? Discuss any one method of coping with change and changing system requirements for the software development. | | | 04 | CO1 | L2 | 3 | 1.4.6 |
| Q3.a | You are asked to build KLE Tech Automation Software which includes the following modules: Students, Admission, Examination, and Attendance. Discuss the pros and cons of building this software using:   1. Incremental model and 2. Integrations and configuration models   How requirements will be considered in each of the model. Show with the appropriate diagram | | | 10 | CO1 | L3 | 1 | 1.4.6 |
| Q3.b | Draw use case diagram for “Skype - the video chat application”, consisting of at least two actors and 5 scenarios.  Write Use case description for one of the use cases from your list. | | | 10 | CO2 | L4 | 3 | 3.1.2 |

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| Model Question Paper for Minor Examination (ISA-II) | | | | | | | | |
| Course Code: 22ECSC301 | |  | Course Title: Software Engineering | | | | | |
| Duration (H:M):1:15 | |  |  | | | | | |
| Max. Marks: 40 | |  |  | | | | | |
| Note : Answer any two full questions | | | | | | | | |
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| Q.No | Questions | | | Marks | CO | BL | PO | PI Code |
| 1a | A software system will be built to allow drones to autonomously herd cattle in farms. These drones can be remotely controlled by human operators. Draw appropriate two archiectures and justy how **multiple architectural patterns** can fit together to help build this kind of system. | | | 8 | CO3 | L3 | 3 | 3.2.2 |
| 1b | Differentiate between Component testing and system testing. | | | 8 | CO4 | L3 | 14 | 14.2.2 |
| 1c | Explain interaction modelling with appropriate example. | | | 4 | CO3 | L2 | 3 | 3.4.1 |
| 2a | Draw **state diagrams** of the control software for the DVD player. | | | 8 | CO3 | L3 | 3 | 3.4.1 |
| 2b | Write test cases(at least 7) for the scenario given in **Q 1(a)** | | | 8 | CO4 | L4 | 14 | 14.2.2 |
| 2c | Discuss the advantages of application architecture for design of aninformation system with example. | | | 4 | CO3 | L2 | 3 | 3.2.2 |
| 3a | Select a suitable application from Q1a. Write the most important functional requirements by assigning priority for each. Draw its sequence diagram for higher-priority functional requirements. | | | 10 | CO3 | L3 | 3 | 3.4.1 |
| 3b | An online Journal portal system need to be developed to manage subscriptions for readership, online submission of papers from authors, online review of papers from experts. Write possible test cases using test driven approach. | | | 10 | CO4 | L4 | 14 | 14.2.2 |

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| Model Question Paper for End Semester Assessment (ESA) | | |
| Course Code: 22ECSC301 |  | Course Title: Software Engineering |
| Duration:3 Hours |  |  |
| Max. Marks: 100 |  |  |
| Note: *Answer any TWO full questions from UNIT-I, any TWO full questions from UNIT-II and any ONE full question from UNIT-III.* | | |

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| **UNIT - 1** | | | | | | | | |
| **Q.No.** | **Questions** | | **Marks** | | **CO** | **BL** | **PO** | **PI Code** |
| Q1.a | Propose and justify the process model for each of the following software projects:   1. Tool to conduct online meetings, presentations and conference and classes. Software need to be developed in a limited duration. 2. Online transaction facility to be provided for senior citizens in the existing software used in a postal department. Improve the software to deal with the senior citizens while using a software.   You are expected to identify at least two characteristics for each of the software which ideally suits the choice of a particular process model. | | 08 | | CO1 | L3 | 1 | 1.4.6 |
| Q1.b | Web application for KLE Technological University need to be developed for managing the different programs, courses and students. The website is designed to provide required information to users globally.  Analyze the given problem and write six functional and four Nonfunctional requirements for the above scenario. | | 08 | | CO2 | L4 | 3 | 3.1.2 |
| Q1.c | Explain SCRUM agile software development model with neat diagram. | | 04 | | CO1 | L2 | 1 | 1.4.6 |
| Q2.a | Apply SCRUM process knowledge and propose the project flow for any of the software mentioned in Q1(a). | | 08 | | CO1 | L3 | 1 | 1.4.6 |
| Q2.b | Discover ambiguities or omissions in the following statement of requirements for part of a ticket-issuing system:  An automated ticket-issuing system sells rail tickets. Users select their destination and input a credit card and a personal identification number. The rail ticket is issued and their credit card account charged. When the user presses the start button, a menu display of potential destinations is activated, along with a message to the user to select a destination.  Once a destination has been selected, users are requested to input their credit card. Its validity is checked and the user is then requested to input a personal identifier. When the credit transaction has been validated, the ticket is issued. | | 08 | | CO2 | L4 | 1 | 3.1.2 |
| Q2.c | What are the two related approaches that are used to reduce the costs of rework in the software development? Discuss any one method of coping with change and changing system requirements for the software development. | | 04 | | CO1 | L2 | 3 | 1.4.6 |
| Q3.a | You are asked to build KLE Tech Automation Software which includes the following modules: Students, Admission, Examination, and Attendance. Discuss the pros and cons of building this software using:   1. Incremental model and 2. Integrations and configuration models   How requirements will be considered in each of the model. Show with the appropriate diagram | | 10 | | CO1 | L3 | 1 | 1.4.6 |
| Q3.b | Draw use case diagram for “Skype - the video chat application”, consisting of at least two actors and 5 scenarios.  Write Use case description for one of the use cases from your list. | | 10 | | CO2 | L4 | 3 | 3.1.2 |
| UNIT - 2 | | | | | | | | |
| Q.No. | Questions | | Marks | | CO | BL | PO | PI Code |
| 1a | A software system will be built to allow drones to autonomously herd cattle in farms. These drones can be remotely controlled by human operators. Draw appropriate two archiectures and justy how **multiple architectural patterns** can fit together to help build this kind of system. | | 8 | | CO3 | L3 | 3 | 3.2.2 |
| 1b | Differentiate between Component testing and system testing. | | 8 | | CO4 | L3 | 14 | 14.2.2 |
| 1c | Explain interaction modelling with appropriate example. | | 4 | | CO3 | L2 | 3 | 3.4.1 |
| 2a | Draw **state diagrams** of the control software for the DVD player. | | 8 | | CO3 | L3 | 3 | 3.4.1 |
| 2b | Write test cases(at least 7) for the scenario given in **Q 1(a)** | | 8 | | CO4 | L4 | 14 | 14.2.2 |
| 2c | Discuss the advantages of application architecture for design of an information system with example. | | 4 | | CO3 | L2 | 3 | 3.2.2 |
| 3a | Select a suitable application from Q1a. Write the most important functional requirements by assigning priority for each. Draw its sequence diagram for higher-priority functional requirements. | | 10 | | CO3 | L3 | 3 | 3.4.1 |
| 3b | An online Journal portal system need to be developed to manage subscriptions for readership, online submission of papers from authors, online review of papers from experts. Write possible test cases using test driven approach. | | 10 | | CO4 | L4 | 14 | 14.2.2 |
| UNIT-3 | | | | | | | | |
| Q.No. | Questions | Marks | | CO | | BL | PO | PI Code |
| 7a | How DevOps environment will be applied for the development of Banking System. Discuss the flow of system implementation. | 10 | | CO5 | | L3 | 5 | 5.1.1 |
| 7b | Design DevOps pipeline for calculator application by considering all possible operations | 10 | | CO5 | | L3 | 5 | 5.1.1 |
| 8a | Apply Jekins master-slave architecture for banking system and diagram for the same. | 10 | | CO5 | | L3 | 5 | 5.1.1 |
| 8b | How Jenkins delivery pipeline is different from other traditional development models. Justify with example and explain authentication process. | 10 | | CO5 | | L3 | 5 | 5.1.1 |