



**K. K. Wagh Institute of Engineering Education and Research,
Nashik**

(An Autonomous Institute from A. Y. 2022-23)

**Marking Scheme
End -Sem Examination-I, Winter 2025**

Academic Year: 2025-2026	Semester: I
Class: FYMCA	Program: MCA
Branch Code:	Pattern: 2022
Name of Course: Software Engineering	Course Code: MCA221005

Q. No.	Details	Max. Marks								
Q.1.	<p>a) List the generic framework activities of a software process and state their purpose in brief.</p> <p>Solution –</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Component</td> <td style="width: 30%;">Marks</td> </tr> <tr> <td>Correct listing of each generic framework activity (any 5)</td> <td>$5 \times 1 = 5$ marks</td> </tr> <tr> <td>Correct purpose of each activity (brief, relevant)</td> <td>$5 \times 0.2 = 1$ mark</td> </tr> <tr> <td>Total</td> <td>6 Marks</td> </tr> </table> <p>Award marks only if the activity name is correct. Partial marks for partially correct purposes.</p>	Component	Marks	Correct listing of each generic framework activity (any 5)	$5 \times 1 = 5$ marks	Correct purpose of each activity (brief, relevant)	$5 \times 0.2 = 1$ mark	Total	6 Marks	[6]
Component	Marks									
Correct listing of each generic framework activity (any 5)	$5 \times 1 = 5$ marks									
Correct purpose of each activity (brief, relevant)	$5 \times 0.2 = 1$ mark									
Total	6 Marks									
Q.2.	<p>a) List and briefly explain the types of requirements represented in the Kano model.</p> <p>Solution –</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Component</td> <td style="width: 30%;">Marks</td> </tr> <tr> <td>Correct identification of Kano requirement types (any 5)</td> <td>$5 \times 1 = 5$ marks</td> </tr> <tr> <td>Brief explanation of each type (1–2 lines)</td> <td>$5 \times 0.2 = 1$ mark</td> </tr> <tr> <td>Total</td> <td>6 Marks</td> </tr> </table> <ul style="list-style-type: none"> • Award marks only if the category name is correct. • Explanation should reflect customer satisfaction behavior. • Accept relevant examples, but examples are not mandatory. 	Component	Marks	Correct identification of Kano requirement types (any 5)	$5 \times 1 = 5$ marks	Brief explanation of each type (1–2 lines)	$5 \times 0.2 = 1$ mark	Total	6 Marks	[6]
Component	Marks									
Correct identification of Kano requirement types (any 5)	$5 \times 1 = 5$ marks									
Brief explanation of each type (1–2 lines)	$5 \times 0.2 = 1$ mark									
Total	6 Marks									
Q.3.	<p>a) Apply the design model to a Student Information System and explain: Data design, Architectural design, Interface design, Component-level design. Show how these models interact during development.</p> <p>Solution –</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Criteria</td> <td style="width: 30%;">Marks</td> </tr> <tr> <td>Correct application of Data Design to Student Information System</td> <td>2 marks</td> </tr> <tr> <td>Correct application of Architectural Design</td> <td>2 marks</td> </tr> <tr> <td>Correct application of Interface Design</td> <td>2 marks</td> </tr> </table>	Criteria	Marks	Correct application of Data Design to Student Information System	2 marks	Correct application of Architectural Design	2 marks	Correct application of Interface Design	2 marks	[8]
Criteria	Marks									
Correct application of Data Design to Student Information System	2 marks									
Correct application of Architectural Design	2 marks									
Correct application of Interface Design	2 marks									



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<p>Correct application of Component-Level Design 1 mark</p> <p>Explanation of interaction among design models 1 mark</p> <p>Total 8 Marks</p> <ul style="list-style-type: none"> Application to the given system is mandatory. Diagrams may be accepted but are not compulsory. Partial marks allowed if concept is correct but example is weak. <p>OR</p> <p>b) Given a Library Management System, apply software design concepts to: Identify abstraction, modularity, information hiding, and refinement Explain how each concept improves the system design.</p> <p>Solution –</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: right;">Marks</th> </tr> </thead> <tbody> <tr> <td>Correct application of Abstraction to Library Management System</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Correct application of Modularity</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Correct application of Information Hiding</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Correct application of Refinement</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8 Marks</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Application to the Library Management System is mandatory. Each concept must include identification + improvement. Award partial marks if concept is correct but explanation is weak. 	Criteria	Marks	Correct application of Abstraction to Library Management System	2 marks	Correct application of Modularity	2 marks	Correct application of Information Hiding	2 marks	Correct application of Refinement	2 marks	Total	8 Marks	[8]
Criteria	Marks												
Correct application of Abstraction to Library Management System	2 marks												
Correct application of Modularity	2 marks												
Correct application of Information Hiding	2 marks												
Correct application of Refinement	2 marks												
Total	8 Marks												
<p>c.) Apply user interface design principles to design a UI for a Mobile Banking Application, focusing on: User familiarity, Consistency, Error prevention, Feedback mechanisms.</p> <p>Solution –</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: right;">Marks</th> </tr> </thead> <tbody> <tr> <td>Correct application of User Familiarity</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Correct application of Consistency</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Correct application of Error Prevention</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Correct application of Feedback Mechanisms</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8 Marks</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Answers must be applied to a Mobile Banking Application. Each principle must include design feature + benefit. Diagrams are optional but not mandatory. Partial marks if principle is correct but application is weak. <p>OR</p>	Criteria	Marks	Correct application of User Familiarity	2 marks	Correct application of Consistency	2 marks	Correct application of Error Prevention	2 marks	Correct application of Feedback Mechanisms	2 marks	Total	8 Marks	
Criteria	Marks												
Correct application of User Familiarity	2 marks												
Correct application of Consistency	2 marks												
Correct application of Error Prevention	2 marks												
Correct application of Feedback Mechanisms	2 marks												
Total	8 Marks												



	<p>d) Apply different architectural styles to the following scenarios:</p> <ul style="list-style-type: none"> Real-time monitoring system Banking system Content management system <p>Select and justify appropriate styles for each case.</p> <p>Solution –</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: right;">Marks</th> </tr> </thead> <tbody> <tr> <td>Correct architectural style for Real-time monitoring system</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Justification for Real-time system</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Correct architectural style for Banking system</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Justification for Banking system</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Correct architectural style for Content Management System</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Justification for CMS</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8 Marks</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Style selection must match system characteristics. Accept equivalent styles (e.g., MVC for CMS). Short, application-based justification is sufficient. 	Criteria	Marks	Correct architectural style for Real-time monitoring system	2 marks	Justification for Real-time system	1 mark	Correct architectural style for Banking system	2 marks	Justification for Banking system	1 mark	Correct architectural style for Content Management System	2 marks	Justification for CMS	1 mark	Total	8 Marks	
Criteria	Marks																	
Correct architectural style for Real-time monitoring system	2 marks																	
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Correct architectural style for Content Management System	2 marks																	
Justification for CMS	1 mark																	
Total	8 Marks																	
Q.4.	<p>a.) For a Student Management System, apply the following size metrics: Lines of Code (LOC) , Token Count, Function Count. Explain how each metric can be used for effort estimation.</p> <p>Solution</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: right;">Marks</th> </tr> </thead> <tbody> <tr> <td>Correct application of LOC metric to Student Management System</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Explanation of effort estimation using LOC</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Correct application of Token Count metric</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Explanation of effort estimation using Token Count</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Correct application of Function Count metric</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Explanation of effort estimation using Function Count</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8 Marks</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Application to Student Management System is mandatory. Effort estimation explanation should link size → effort/cost. Numerical values are not compulsory; conceptual application is sufficient. 	Criteria	Marks	Correct application of LOC metric to Student Management System	2 marks	Explanation of effort estimation using LOC	1 mark	Correct application of Token Count metric	2 marks	Explanation of effort estimation using Token Count	1 mark	Correct application of Function Count metric	2 marks	Explanation of effort estimation using Function Count	1 mark	Total	8 Marks	<p>[8]</p> <p>[8]</p>
Criteria	Marks																	
Correct application of LOC metric to Student Management System	2 marks																	
Explanation of effort estimation using LOC	1 mark																	
Correct application of Token Count metric	2 marks																	
Explanation of effort estimation using Token Count	1 mark																	
Correct application of Function Count metric	2 marks																	
Explanation of effort estimation using Function Count	1 mark																	
Total	8 Marks																	



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OR	<p>b) Apply data structure metrics and information flow metrics to a Library Management System to Measure complexity and Identify modules with high information flow.</p> <p>Solution –</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 70%;">Criteria</td> <td style="text-align: right;">Marks</td> </tr> <tr> <td>Correct application of Data Structure Metrics to Library Management System</td> <td style="text-align: right;">3 marks</td> </tr> <tr> <td>Explanation of how data structure metrics measure complexity</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Correct application of Information Flow Metrics</td> <td style="text-align: right;">3 marks</td> </tr> <tr> <td>Identification of modules with high information flow</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8 Marks</td> </tr> </table> <ul style="list-style-type: none"> Application to Library Management System is mandatory. Names of relevant modules must be mentioned. Mathematical formulas are not compulsory. 	Criteria	Marks	Correct application of Data Structure Metrics to Library Management System	3 marks	Explanation of how data structure metrics measure complexity	1 mark	Correct application of Information Flow Metrics	3 marks	Identification of modules with high information flow	1 mark	Total	8 Marks
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Correct application of Data Structure Metrics to Library Management System	3 marks												
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Total	8 Marks												
OR	<p>c) Apply use-case oriented metrics to an Online Exam Portal by identifying actors and use cases , estimating project size and effort based on use cases.</p> <p>Solution –</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 70%;">Criteria</td> <td style="text-align: right;">Marks</td> </tr> <tr> <td>Identification of actors for Online Exam Portal</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Identification of use cases</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Application of use-case oriented metrics for size estimation</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Application of effort estimation based on use cases</td> <td style="text-align: right;">2 marks</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8 Marks</td> </tr> </table> <ul style="list-style-type: none"> Application to Online Exam Portal is mandatory. Numerical calculation is not compulsory; logical estimation is sufficient. Use-case list must be relevant and realistic. 	Criteria	Marks	Identification of actors for Online Exam Portal	2 marks	Identification of use cases	2 marks	Application of use-case oriented metrics for size estimation	2 marks	Application of effort estimation based on use cases	2 marks	Total	8 Marks
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OR	<p>d) For a content-driven website, apply web engineering project metrics to estimate development effort, measure productivity and quality.</p> <p>Solution -</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 70%;">Criteria</td> <td style="text-align: right;">Marks</td> </tr> </table>	Criteria	Marks										
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	<p>Identification and application of effort estimation metrics 3 marks</p> <p>Application of productivity metrics 2 marks</p> <p>Application of quality metrics 2 marks</p> <p>Relevance of metrics to content-driven website 1 mark</p> <p>Total 8 Marks</p> <ul style="list-style-type: none"> • Metrics must be applied specifically to a content-driven website (blogs, news portals, CMS). • Numerical values are not mandatory. • Conceptual linkage between metrics and outcomes is required. 																							
Q.5.	<p>a.) Apply appropriate leadership styles and emotional intelligence in a software project team to motivate team members and manage stress and interpersonal issues</p> <p>Solution –</p> <table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: right;">Marks</th> </tr> </thead> <tbody> <tr> <td>Application of appropriate leadership styles to motivate team members</td> <td style="text-align: right;">4 marks</td> </tr> <tr> <td>Application of emotional intelligence to manage stress and interpersonal issues</td> <td style="text-align: right;">3 marks</td> </tr> <tr> <td>Relevance to software project team scenario</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8 Marks</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Leadership styles must be applied, not merely defined. • Emotional intelligence components (self-awareness, empathy, etc.) must be reflected. • Realistic software project context is mandatory. <p style="text-align: right;">[8]</p> <p>OR</p> <p>b) Apply software engineering codes of ethics to a real-world project scenario involving data privacy, user safety and professional responsibility.</p> <p>Solution –</p> <table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: right;">Marks</th> </tr> </thead> <tbody> <tr> <td>Application of codes of ethics to data privacy</td> <td style="text-align: right;">3 marks</td> </tr> <tr> <td>Application of codes of ethics to user safety</td> <td style="text-align: right;">3 marks</td> </tr> <tr> <td>Application of professional responsibility principles</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Relevance to a real-world software project scenario</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8 Marks</td> </tr> </tbody> </table> <p style="text-align: right;">[8]</p>	Criteria	Marks	Application of appropriate leadership styles to motivate team members	4 marks	Application of emotional intelligence to manage stress and interpersonal issues	3 marks	Relevance to software project team scenario	1 mark	Total	8 Marks	Criteria	Marks	Application of codes of ethics to data privacy	3 marks	Application of codes of ethics to user safety	3 marks	Application of professional responsibility principles	1 mark	Relevance to a real-world software project scenario	1 mark	Total	8 Marks	
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	<ul style="list-style-type: none"> • Ethics must be applied, not just listed. • Reference to recognized codes (e.g., ACM/IEEE Software Engineering Code of Ethics) is expected. • Scenario should be realistic and software-related. 											
	<p>c) A software engineer discovers a security flaw just before product release. Apply ethical decision-making steps and professional codes of ethics to decide the correct course of action</p> <p>Solution –</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: right;">Marks</th> </tr> </thead> <tbody> <tr> <td>Identification and application of ethical decision-making steps</td> <td style="text-align: right;">4 marks</td> </tr> <tr> <td>Application of professional codes of ethics (ACM/IEEE)</td> <td style="text-align: right;">3 marks</td> </tr> <tr> <td>Logical conclusion / correct course of action</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8</td> </tr> </tbody> </table> <p style="text-align: right;">Marks</p> <ul style="list-style-type: none"> • Steps must be applied to the given scenario, not merely listed. • Reference to public interest, honesty, and professional responsibility is expected. • The final decision must be ethically justified. 	Criteria	Marks	Identification and application of ethical decision-making steps	4 marks	Application of professional codes of ethics (ACM/IEEE)	3 marks	Logical conclusion / correct course of action	1 mark	Total	8	
Criteria	Marks											
Identification and application of ethical decision-making steps	4 marks											
Application of professional codes of ethics (ACM/IEEE)	3 marks											
Logical conclusion / correct course of action	1 mark											
Total	8											
	<p>OR</p> <p>d) Apply the SCM process and SCM repository to manage source code , documentation and test cases in a team-based development environment.</p> <p>Solution –</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: right;">Marks</th> </tr> </thead> <tbody> <tr> <td>Application of SCM process (identification, control, status accounting, audit)</td> <td style="text-align: right;">4 marks</td> </tr> <tr> <td>Application of SCM repository for managing artifacts</td> <td style="text-align: right;">3 marks</td> </tr> <tr> <td>Relevance to team-based development environment</td> <td style="text-align: right;">1 mark</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">8</td> </tr> </tbody> </table> <p style="text-align: right;">Marks</p> <ul style="list-style-type: none"> • Students must show how SCM is applied, not just define terms. • Management of source code, documentation, and test cases must be explicitly mentioned. • Tool examples (e.g., Git) are acceptable but optional. 	Criteria	Marks	Application of SCM process (identification, control, status accounting, audit)	4 marks	Application of SCM repository for managing artifacts	3 marks	Relevance to team-based development environment	1 mark	Total	8	
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Application of SCM process (identification, control, status accounting, audit)	4 marks											
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