

AS PER REVISED SYLLABUS OF B. Sc. (IT) COURSE
UNDER MUMBAI UNIVERSITY W.E.F. JUNE, 2017

*Vipul's*TM
**SOFTWARE
ENGINEERING**
(B.Sc. (IT) Second Year: Fourth Semester)

SHEETAL KHANORE

M.Sc. (CS), M.Phil.(CS)

Assistant Professor,

*S. M. Shetty College of Science, Commerce & Management Studies,
Hiranandani, Powai, Mumbai – 400 076.*

CHUMKI DEY

M.C.A.

Former Assistant Professor,

*S. M. Shetty College of Science, Commerce & Management Studies,
Hiranandani, Powai, Mumbai – 400 076.*

RUPALI KULKARNI MISHRA

M.C.A., H.D.S.E.

Coordinator, B.Sc. IT Department,

*Prahladrai Dalmia Lions College of Commerce & Economics,
Malad (W), Mumbai - 400 063.*

FIRST EDITION



VIPUL PRAKASHAN

161, Jagannath Shankar Seth Road,

Girgaum, Mumbai - 400 004.

Tele/Fax: 2387 9395 / 2387 1127

Published by:

N. V. Maroo
For Vipul Prakashan
161, J. S. Seth Road,
Mumbai - 400 004.

Software Engineering (IT)

© Authors

Exclusive Rights by Vipul Prakashan, Mumbai for manufacture and market, this and subsequent editions.

ISBN: 978-93-87542-45-7

The text of this publication, or any part thereof, may not be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, storage in an information retrieval, or otherwise, without the prior written permission of the Publisher.

Price: `175.00

Printed by:

Jolly Offset
14, Wadala Udyog Bhavan,
Wadala, Mumbai - 400 031.
MMXVII

Preface

We feel highly delighted to present this text book on “Software Engineering”. The book is organized in a way that has covered the entire syllabus of second year bachelor of science in Information Technology program offered by University of Mumbai. We do not claim the complete originality to the subject matter of the book. We have relied on the available releases on the subject. The entire syllabus is divided into small chapters for better understanding.

The book also contains most of the solved practical prescribed in the syllabus for better understanding of computer graphics concepts for the students. Questions at the end of chapters will be a support for the preparation of the exams. Model question paper as per the university prescribed pattern is specified at the end.

Authors

Syllabus

Unit	Details	Lectures
I	<p>Introduction: What is software engineering? Software Development Life Cycle, Requirements Analysis, Software Design, Coding, Testing, Maintenance etc.</p> <p>Software Requirements: Functional and Non-functional requirements, User Requirements, System Requirements, Interface Specification, Documentation of the software requirements.</p> <p>Software Processes: Process and Project, Component Software Processes.</p> <p>Software Development Process Models:</p> <ul style="list-style-type: none"> ● Waterfall Model. ● Prototyping. ● Iterative Development. ● Rational Unified Process. ● The RAD Model ● Time boxing Model. <p>Agile software development: Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, Scaling agile methods.</p>	12
II	<p>Socio-technical system: Essential characteristics of socio technical systems, Emergent System Properties, Systems Engineering, Components of system such as organization, people and computers, Dealing Legacy Systems.</p> <p>Critical system: Types of critical system, A simple safety critical system, Dependability of a system, Availability and Reliability, Safety and Security of Software systems.</p> <p>Requirements Engineering Processes: Feasibility study, Requirements elicitation and analysis, Requirements Validations, Requirements Management.</p> <p>System Models: Models and its types, Context Models, Behavioural Models, Data Models, Object Models, Structured Methods.</p>	12
III	<p>Architectural Design: Architectural Design Decisions, System Organisation, Modular Decomposition Styles, Control Styles, Reference Architectures.</p> <p>User Interface Design: Need of UI design, Design issues, The UI design Process, User analysis, User Interface Prototyping, Interface Evaluation.</p> <p>Project Management: Software Project Management, Management activities, Project Planning, Project Scheduling, Risk Management.</p> <p>Quality Management: Process and Product Quality, Quality assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrics.</p>	12

IV	<p>Verification and Validation: Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal Methods.</p> <p>Software Testing: System Testing, Component Testing, Test Case Design, Test Automation.</p> <p>Software Measurement: Size-Oriented Metrics, Function-Oriented Metrics, Extended Function Point Metrics.</p> <p>Software Cost Estimation: Software Productivity, Estimation Techniques, Algorithmic Cost Modelling, Project Duration and Staffing.</p>	12
V	<p>Process Improvement: Process and product quality, Process Classification, Process Measurement, Process Analysis and Modeling, Process Change, The CMMI Process Improvement Framework.</p> <p>Service Oriented Software Engineering: Services as reusable components, Service Engineering, Software Development with Services.</p> <p>Software reuse: The reuse landscape, Application frameworks, Software product lines, COTS product reuse.</p> <p>Distributed software engineering: Distributed systems issues, Client–server computing, Architectural patterns for distributed systems, Software as a service.</p>	12
Total		60

Books and References:

No.	Title	Author/s	Publisher	Edition	Year
1.	Software Engineering, edition,	Ian Somerville	Pearson Education	Ninth	
2.	Software Engineering	Pankaj Jalote	Narosa Publication		
3.	Software Engineering, A Practitioner's Approach	Roger Pressman	TMH	Seventh	
4.	Software Engineering Principles and Practice	WS Jawadekar	TMH		
5.	Software Engineering - A Concise Study	S.A Kelkar	PHI		
6.	Software Engineering Concept and Applications	SubhajitDatta	Oxford Higher Education		
7.	Software Design	D.Budgen	Pearson education	2nd	
8.	Software Engineering	KL James	PHI	EEE	2009

List of Practicals: (To be executed using Star UML or any similar software)



- (1)** Study and implementation of class diagrams.
- (2)** Study and implementation of Use Case Diagrams.
- (3)** Study and implementation of Entity Relationship Diagrams.
- (4)** Study and implementation of Sequence Diagrams.
- (5)** Study and implementation of State Transition Diagrams.
- (6)** Study and implementation of Data Flow Diagrams.
- (7)** Study and implementation of Collaboration Diagrams.
- (8)** Study and implementation of Activity Diagrams.
- (9)** Study and implementation of Component Diagrams.
- (10)** Study and implementation of Deployment Diagrams.

Books and References:

No.	Title	Author/s	Publisher	Edition	Year
1.	Object - Oriented Modeling and Design	Michael Blaha, James Rumbaugh	Pearson		2011
2.	Learning UML 2.0	Kim Hamilton, Russ Miles	O'Reilly Media		2006
3.	The unified modeling language user guide	Grady Booch, James Rumbaugh, Ivar Jacobson	Addison-Wesley		2005
4.	UML A Beginners Guide	Jason T. Roff	McGraw Hill Professional		2003

Contents

No.	Chapter	Pages
UNIT – I		
1.	Introduction	1-7
2.	Software Requirements	8-16
3.	Software Processes	17-20
4.	Software Development Process Models	21-35
5.	Agile Software Development	36-48
UNIT – II		
6.	Socio-Technical System	49-54
7.	Critical System	55-61
8.	Requirement Engineering Process	62-71
9.	System Models	72-79
UNIT – III		
10.	Architectural Design	80-90
11.	User Interface Design	91-96
12.	Project Management	97-104
13.	Quality Management	105-112
UNIT – IV		

14.	Verification and Validation	113-119
15.	Software Testing	120-128
16.	Software Measurement	129-135
17.	Software Cost Estimation	136-145
UNIT – V		
18.	Process Improvement	146-153
19.	Service Oriented Engineering	154-160
20.	Software Reuse	161-167
21.	Distributed Software Engineering	168-178
	Practicals	179-204
	Model Question Paper	205-207