CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
ITT309	MANAGEMENT FOR SOFTWARE ENGINEERS	PCC	3	0	0	3

Preamble: This course aims on providing the concepts of Software Engineering, Software Development Life Cycle and the key aspects of managing a software project like project evaluation, planning, monitoring along with management of people and quality.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO No.	Course Outcome (CO)	Bloom's Category
CO 1	Understand about the basics of software process, software development life cycle and process models.	Level 2 : Understand
CO 2	Interpret the concepts of managing software projects.	Level 2 : Understand
CO 3	Make use of project evaluation techniques and choose software estimation approaches for effort and cost.	Level 3: Apply
CO 4	Explain on planning the project activities and describe the concepts of risk management and resource allocation.	Level 2 : Understand
CO 5	Understand project monitoring and control, organize people and teams and describe the techniques for ensuring software quality.	Level 2 : Understand

Mapping of course outcomes with program outcomes

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	2	2								1	1	2
CO 2	2	2								1	1	2
CO 3	2	1								1	1	2
CO 4	2	1								1	1	2
CO 5	2	2						1	2	1	2	2

3/2/1: high/medium/low

Assessment Pattern

Bloom's Category	Continuous Assessment Tests		End Semester Examination
	1	2	
Remember	10	10	10
Understand	20	20	80
Apply	20	20	10
Analyse			
Evaluate			
Create			

Mark distribution

Total Marks	CIE	ESE	ESE Duration
150	50	100	3 hours

Continuous Internal Evaluation Pattern:

Attendance : 10 marks
Continuous Assessment Test (2 numbers) : 25 marks
Assignment/Quiz/Course project : 15 marks

End Semester Examination Pattern: There will be two parts; Part A and Part B. Part A contain 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 14 marks.

Course Level Assessment Questions

Course Outcome 1 (CO1):

1. What is Software Engineering?
2. Explain about Software Process.
3. Explain about any one process model.

Course Outcome 2 (CO2)

1. Explain any one aspect of software project management spectrum.
2. Explain the importance of software project management over other types of projects.

3. What are the activities involved in project management?

Course Outcome 3(CO3):

1. How evaluation of individual projects is done?
2. What are steps in project planning?
3. Explain any one effort estimation technique.
4. Suppose a project was estimated to be 400 KLOC. Calculate the effort and development time for each of the three model i.e., organic, semi-detached & embedded.
5. Explain on cost estimation.

Course Outcome 4 (CO4):

1. Explain any one scheduling technique.
2. Explain on risk assessment.
3. How are resources identified for a project?

Course Outcome 5 (CO5):

1. How data collection is done for project monitoring?
2. What are the factors for selecting a right person for a project?
3. What is a quality plan?

Model Question paper

Course Code: ITT309

Course Name: MANAGEMENT FOR SOFTWARE ENGINEERS

Max Marks:100 Duration: 3hr

PART A

Answer all questions, each carries 3 marks

1. Explain the Generic process framework for Software engineering.

2. Briefly explain about Scrum.

3. How can a Project manager avoid the problems in a project which may lead to project failure?

4. Compare Traditional and Modern project management practices.

5. What is Cost-benefit analysis?

6. Explain the Bottom-up approach of estimation.

7. What are activity-on-arrow networks?

8. How are Risks identified?

9. What are the activities that are carried out as a part of the project termination review process?

10. Explain CMMI. (10*3=30)

PART B

Answer all questions, each carries 14 marks

11. a) What are the advantages and disadvantages of Waterfall model? How can an Agile model overcome the disadvantages of Waterfall model? (8)

    b) What is Agile Modeling? Explain. (6)

OR

12. a) Explain prototyping model in detail. (9)

    b) What is Pair programming? What are the advantages of Pair Programming? (5)

13. a) Explain about Agile Teams. (5)

    b) How are Software projects categorized? (9)

OR

14. a) Explain the Product aspect of Software management spectrum. (8)

    b) Explain the major activities carried out by a software project manager and the order in which these are carried out. (6)

15. Explain in detail the Steps in Project planning. (14)

OR

16. a) What is Benefits management? Explain. (5)
    b) Explain the COCOMO II approach for effort estimation. (9)
17. a) Explain on the Forward pass and Backward pass analysis in CPM. (8)

    b) How are resources scheduled over the duration of the project? (6)

OR

18. a) What is an Activity? Explain the approaches for identifying the activities that make up a project. (7)

b) Explain any one techniques used for evaluating risks in the project schedule. (7)

19. a) Explain Software Configuration Management. (9)

b) What is leadership? What are the various styles of Leadership? (6)

OR

20. a) Explain in detail about Earned Value Analysis. (10)

b) Explain the difference between Verification and Validation. (4)

Syllabus

Module 1 (8 Hours)
Introduction: Software engineering, Software process, Software engineering practice **Process models**: Prescriptive process models- Specialised process models, The unified process, Personal and Team process models. **Agile development:** Agility, Agile process. Extreme programming- XP Values, The XP Process, Industrial XP, The XP Debate. Other Agile development models- Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), Agile Unified Process (AUP). Selection of an appropriate Project Approach- Choice of process Models.
Module 2 (5 Hours)
Managing software projects: Project Management Concepts –The Management Spectrum- People- Product- Process- Project. **Software Project Management** - Importance – Software projects VS other types of project – Categorizing Software projects- Stakeholders – Setting Objectives –The Business Case- Project success and failure. **Management** –Activities- Management Control- Traditional VS modern project management.
Module 3 (8 Hours)
Project Evaluation: Project portfolio management- Evaluation of individual projects- Cost benefit evaluation techniques- Risk evaluation- Programme Management- Creating a Programme- Aids to Programme Management- Benefits Management. **Project Planning**: Step wise Project Planning **Software Estimation:** Basis for software estimation- Software Effort estimation techniques- Bottom-up and Top-down estimation- Function Point Analysis- COCOMO II. Cost Estimation- Staffing Pattern- Schedule compression.

Module 4 (7 Hours)
Activity Planning: Objectives- Project Schedules- Projects and Activities- Sequencing and Scheduling Activities- Network Planning Models- Forward Pass- Backward pass- Identifying Critical Path and Critical Activities- Activity-on-arrow networks. **Risk Management:** Risk- Categories of Risk- Risk Identification- Risk Assessment- Risk Planning- Risk management- Risk Evaluation- PERT, Monte Carlo Simulation, Critical Chain. **Resource Allocation:** Nature of Resources- Identifying and Scheduling Resources- Creating Critical Paths- Cost Schedule- Scheduling sequence.
Module 5 (7 Hours)
Monitoring and Control: Creating the framework- Collecting data- Review- Project Termination Review- Visualizing Progress- Gantt Chart, Slip Chart, Timeline. Cost Monitoring- Earned Value Analysis- Getting the project back to target- Change control- Software Configuration Management- Contract management. **Managing People:** Organizational Behaviour- Selecting the right Person- Motivation- Stress- Working in Teams- Becoming a Team- Decision Making- Organization and Team Structures- Communication- Leadership. **Software Quality:** Quality Management Systems- Process Capability Models- CMMI, Six Sigma. Techniques for Enhancing Software Quality- Testing- Software Reliability- Quality Plans.

Text Books

1. Roger S Pressman, Software Engineering: A Practitioner's Approach, Seventh edition, Tata McGraw Hill.
2. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill

Reference Books

1. Pankaj Jalote, Software Project Management in Practice, Pearson Education
2. Walker Royce, Software Project Management- Addison-Wesley, 1998.
3. Sunitha E.V, Sarath K.S, Software Project Management, Jyothis Publishers 2019

Course Contents and Lecture Schedule

No	Topic	No. of Lectures
1	**Introduction**	**8 Hours**
1.1	Software engineering, Software process, Software engineering practice	1
1.2	**Process models**: Prescriptive process models- Specialised process models, The unified process, Personal and Team process models.	3
1.3	**Agile development:** Agility, Agile process. Extreme programming- XP Values, The XP Process, Industrial XP, The XP Debate. Other Agile development models- Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), Agile Unified Process (AUP). Selection of an appropriate Project Approach- Choice of process Models.	4
2	**Managing software projects**	**5 Hours**
2.1	Project Management Concepts –The Management Spectrum- People- Product- Process- Project.	1
2.2	**Software Project Management** - Importance – Software projects VS other types of project – Categorizing Software projects- Stakeholders – Setting Objectives –The Business Case- Project success and failure.	3
2.3	**Management** –Activities- Management Control- Traditional VS modern project management.	1
3	**Evaluation, Planning and Estimation**	**8 Hours**
3.1	**Project Evaluation:** Project portfolio management- Evaluation of individual projects- Cost benefit evaluation techniques- Risk evaluation- Programme Management- Creating a Programme- Aids to Programme Management- Benefits Management.	3
3.2	**Project Planning**: Step wise Project Planning	2
3.3	**Software Estimation:** Basis for software estimation- Software Effort estimation techniques- Bottom-up and Top-down estimation- Function Point Analysis- COCOMO II. Cost Estimation- Staffing Pattern- Schedule compression.	3
4	**Activity Planning, Risk management and Resource allocation**	**7 Hours**
4.1	**Activity Planning:** Objectives- Project Schedules- Projects and Activities- Sequencing and Scheduling Activities- Network	3

	Planning Models- Forward Pass- Backward pass- Identifying Critical Path and Critical Activities- Activity-on-arrow networks.	
4.2	**Risk Management:** Risk- Categories of Risk- Risk Identification- Risk Assessment- Risk Planning- Risk management- Risk Evaluation- PERT, Monte Carlo Simulation, Critical Chain.	2
4.3	**Resource Allocation:** Nature of Resources- Identifying and Scheduling Resources- Creating Critical Paths- Cost Schedule- Scheduling sequence	2
5	**Monitoring, People management, Quality**	**7 Hours**
5.1	**Monitoring and Control:** Creating the framework- Collecting data- Review- Project Termination Review- Visualizing Progress- Gantt Chart, Slip Chart, Timeline. Cost Monitoring- Earned Value Analysis- Getting the project back to target- Change control- Software Configuration Management- Contract management.	3
5.2	**Managing People:** Organizational Behaviour- Selecting the right Person- Motivation- Stress- Working in Teams- Becoming a Team- Decision Making- Organization and Team Structures- Communication- Leadership.	2
5.3	**Software Quality:** Quality Management Systems- Process Capability Models- CMMI, Six Sigma. Techniques for Enhancing Software Quality- Testing- Software Reliability- Quality Plans.	2