Savitribai Phule Pune University
Final Year of Information Technology (2019 Course)
(With effect from Academic Year 2022-23)

Semester VII

Course Code	Course Name	Teaching Scheme(Hours/week)			Examination Scheme and Marks						Credit Scheme			
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Termwork	Practical	Oral	Total	Lecture	Practical	Tutorial	Total
414441	Information and Storage Retrieval	03	-	-	30	70	-	-	-	100	3	-	-	3
414442	Software Project Management	03	-	-	30	70	-	-	-	100	3	-	-	3
414443	Deep Learning	03	-	-	30	70	-	-	-	100	3	-	-	3
414444	Elective III	03	-	-	30	70	-	-	-	100	3	-	-	3
414445	Elective IV	03	-	-	30	70	-	-	-	100	3	-	-	3
414446	Lab Practice III	-	04	-	-	-	25	-	25	50	-	2	-	2
414447	Lab Practice IV	-	02	-	-	-	25	25	-	50	-	1	-	1
414448	Project Stage-I	-	-	02	-	-	50	-	-	50	-	-	2	2
414449	Audit Course7													
										Total Credit	15	03	02	20
	Total	15	06	02	150	350	100	25	25	650	15	03	02	20

Elective III:

- Mobile Computing
- High Performance Computing
- Multimedia Technology
- Smart Computing

Elective IV:

- Bioinformatics
- Introduction to DevOps
- Computer Vision
- Wireless Communications

Lab Practice-III:

It is based on subjects:

- Information and Storage Retrieval

Lab Practice-IV:

It is based on subjects:

- Deep Learning

B.E. (INFORMATION TECHNOLOGY)

SEMESTER-VII

Time– 2.00 p.m. to 3.00 p.m.

Day& Date	SUBJECT (2019 Course)	SUBJECT CODE
Tuesday 19/08/2025	Information and Storage Retrieval	414441
Wednesday 20/08/2025	Software Project Management	414442
Thursday 21/08/2025	Deep Learning	414443
Friday 22/08/2025	(ELECTIVE-III) Mobile Computing	414444A
	(ELECTIVE-III) High Performance Computing	414444B
	(ELECTIVE-III) Multimedia Technology	414444C
	(ELECTIVE-III) Smart Computing	414444D
Saturday 23/08/2025	(ELECTIVE-IV)Bioinformatics	414445A
	(ELECTIVE-IV) Introduction to DevOps	414445B
	(ELECTIVE-IV) Computer Vision	414445C
	(ELECTIVE-IV) Wireless Communications	414445D

COURSE CONTENTS

Unit I	Introduction to Software Project Management	(6hrs.)

Introduction to Software Project Management: Why is Software Project Management important? What is a Project? Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some Ways of Categorizing Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success, and Failure, what is Management? Management Control, Traditional versus Modern Project Management Practices.

Case study: Online Shopping System.

Mapping of Course Outcomes for Unit I	CO1

Unit II	Project Design and Evaluation	(6 hrs.)

Project Design: Overview of UML diagrams: Use case, Class, Activity, State, Sequence, Deployment

Project Evaluation: What is Project Evaluation? Importance of Project Evaluation, Cost Benefit Evaluation Techniques

Process Evaluation and Improvement: The Process Improvement Process: The Process Improvement Cycle, Process Measurement: The GQM Paradigm, Process Analysis: Techniques of Process Analysis, Process change: The Process Change Process

Case study: Online Shopping System, Perform Cost-Benefit Analysis using Microsoft Excel

Unit I: Introduction to Software Project Management (6 hrs.)

Introduction to Software Project Management

- Why is Software Project Management important?
- What is a Project?
- Contract Management
- Activities Covered by Software Project Management
- Plans, Methods, and Methodologies
- Some Ways of Categorizing Software Projects
- Stakeholders
- Setting Objectives
- Business Case
- Project Success and Failure
- What is Management?
- Management Control
- Traditional versus Modern Project Management Practices

Case study: Online Shopping System

Q1) a) What is project? Why is software project management important. **[5]**

b) How plans, methods and methodologies differ from each other? **[5]**

c) Describe contract management in detail. **[5]**

OR

Q2) a) Identify the management responsibilities of the manager in view of software project management. **[5]**

b) Explain traditional project management and modern project management. **[5]**

c) Define business case and explain the concept of business case. **[5]**

Q1) a) Write the activities covered by software project management. **[5]**

b) What is a project? Enlist the characteristics of project. **[5]**

c) Explain the ways of categorizing software projects. **[5]**

OR

Q2) a) Describe in brief stakeholders of project. **[5]**

b) How one can find out the success and failure of a project. **[5]**

c) Identify the management responsibilities of the manager in view of software project management. **[5]**

Q1)	a)	What is project? Why is software project management important.	**[5]**
	b)	How plans, methods and methodologies differ from each other?	**[5]**
	c)	Describe contract management in detail.	**[5]**

OR

Q2)	a)	Identify the management responsibilities of the manager in view of software project management.	**[5]**
	b)	Explain traditional project management and modern project management.	**[5]**
	c)	Define business case and explain the concept of business case.	**[5]**

- Why is Software Project Management important?
- What is a Project?

a) What is project? Why is software project management important. [5]

Software Project Management (SPM)

Software Project Management (SPM)
Software Project Management matlab ek plan banakar software project ko manage karna – taaki project time pe complete ho, budget ke andar rahe aur quality achhi ho.

•Why is Software Project Management important?

SPM kyu zaroori hai?

1.Complexity handle karne ke liye – Software projects me bohot saare log, tools aur tasks hote hai. SPM sabko manage karta hai.

2.Time par delivery – Proper planning ke bina project delay ho jata hai. SPM deadlines fix karke project time pe complete karata hai.

3.Budget control – Agar planning na ho toh cost badh jaati hai. SPM project ko budget ke andar rakhta hai.

4.Quality ensure karne ke liye – SPM check karta hai ki software customer ke requirements ke hisaab se quality maintain kare.

5.Risk management – Development ke time problems aati hai (bugs, team issues, technology change). SPM risk ko pehle identify karke solution deta hai.

6.Customer satisfaction – Jab project sahi time, budget aur quality ke saath deliver hota hai toh customer khush hota hai.

Main Goals of SPM

1.Project **time pe deliver karna**.
2.Budget control karna.
3.Software ki **quality maintain karna**.
4.Customer ke **requirements fulfill karna**.
5.Risk aur changes ko handle karna.

Easy Example (Online Shopping App jaise Amazon)

•Pehle decide karna ki **features kya honge** (cart, payment, search).
•**Developers, testers aur designers** ko kaam assign karna.
•**Deadline set** karna (login page 2 weeks me, payment 4 weeks me).
•**Cost control** karna (free tools vs paid APIs).
•Agar beech me customer bole **"UPI payment bhi chahiye"**, toh us change ko manage karna.
👉 Ye pura process hi **Software Project Management** hai.

What is a Project ?
Project ek aisa **temporary kaam (task/effort)** hota hai jo ek **unique product, service ya result** banane ke liye kiya jata hai.

Project ki Characteristics
1. **Temporary hota hai** – shuru hone ka time aur khatam hone ka time fix hota hai.
2. **Unique Output deta hai** – har project ka result alag hota hai.
3. **Defined Objectives hote hai** – goal clear hota hai ki kya achieve karna hai.
4. **Resources limited hote hai** – time, money, aur manpower fix hoti hai.

Simple Example

•Ek **Online Shopping Website** banana = Project.
•Ek **College Fest Organize karna** = Project.
•Ek **Mobile App Develop karna** = Project.

👉 Matlab daily routine kaam project nahi hai, balki wo kaam jiska **specific goal + start aur end time** ho, usko **Project** kehte hai.

•Contract Management

c) Describe contract management in detail. [5]

Contract Management
Definition:
Contract Management ek process hai jisme agreements (contracts) ko create, execute aur monitor kiya jata hai between client aur vendor taaki dono parties apne obligations ko sahi tarike se follow kare.

Importance of Contract Management

1.Clear Expectations – dono parties ke roles, responsibilities aur deliverables clear hote hai.

2.Legal Protection – agar dispute ya conflict ho, toh contract ek legal proof hota hai.

3.Risk Reduction – contract ensure karta hai ki kaam time pe, budget ke andar aur required quality me complete ho.

4.Relationship Management – client aur vendor ke beech trust build hota hai.

Phases of Contract Management

1.Contract Creation – agreement draft karna, terms & conditions likhna.

2.Contract Execution – dono parties contract sign karke project start karte hai.

3.Monitoring & Compliance – ensure karna ki sab terms follow ho rahe hai (time, cost, quality).

4.Amendments/Changes – agar requirements change ho toh contract update karna.

5.Contract Closure – project complete hone par formally close karna.

Example (Online Shopping System)

•Ek software company ko **Online Shopping Website** banane ka contract mila.

•Contract me likha gaya:

- Project 6 months me complete hoga.
- Total cost ₹10 lakh hogi.
- Payment milestones fix honge.
- Testing aur maintenance included hoga.

👉 Ye pura process **Contract Management** ke through handle hota hai.

•Activities Covered by Software Project Management

Activities Covered by Software Project Management

1.Project Planning

1. Project ka scope, objectives, schedule aur resources decide karna.

2.Project Scheduling

1. Timeline set karna (Gantt chart, milestones, deadlines).

3.Cost Estimation & Budgeting

1. Project ke liye required cost ka estimation aur budget allocate karna.

4.Resource Allocation

1. Developers, testers, designers aur tools ko kaam assign karna.

5.Risk Management

1. Possible risks identify karna (delay, cost overrun, technical issues) aur unka solution plan karna.

6.Quality Management

1. Ensure karna ki software customer requirements aur standards ko meet kare.

7.Monitoring & Controlling

1. Project progress ko track karna, deviations ko control karna.

8.Communication Management

1. Team members, clients aur stakeholders ke beech effective communication maintain karna.

9.Contract Management

1. Vendors aur clients ke saath agreements handle karna.

10.Project Closure

1.Final delivery karna, documentation complete karna, aur project formally close karna.

Activities Covered by Software Project Management

1. Project Planning

- Decide karna ki project ka goal kya hai, kya features honge, kitna time aur resources lagenge.

  👉 *Example:* Tu decide karta hai ek **Online Shopping Website** banani hai jisme cart, payment aur search features honge.

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2. Project Scheduling

- Kaam ko small tasks me todna aur timeline/milestones set karna.

  👉 *Example:* Login system 2 weeks me, payment gateway 4 weeks me, testing 6 weeks me.

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3. Cost Estimation & Budgeting

- Project ke liye lagne wali total cost ka estimate lagana (team salary, software tools, hosting).

  👉 *Example:* Developers ₹5 lakh, Hosting ₹50,000, Tools ₹1 lakh. Total budget = ₹6.5 lakh.

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4. Resource Allocation

- Kaun developer coding karega, kaun tester testing karega, aur kaun designer UI banayega.
  👉 *Example:* Ram = Backend Developer, Shyam = Tester, Priya = UI/UX Designer.

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5. Risk Management

- Identify karna ki project me kaunse problems aa sakti hai aur unka backup plan banana.
  👉 *Example:* Agar payment gateway integrate nahi hua toh backup me COD (Cash on Delivery) option dena.

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6. Quality Management

- Ensure karna ki software customer ki requirements aur standards ko follow kare.
  👉 *Example:* Testing team bug check karti hai aur website fast + secure banati hai.

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7. Monitoring & Controlling

- Regularly check karna ki project track pe hai ya nahi, aur agar delay ho raha hai toh control karna.
  👉 *Example:* Weekly meeting me pata chala ki UI design late ho raha hai, toh extra designer assign kar diya.

8. Communication Management

- Team, client aur stakeholders ke beech proper communication maintain karna.

  👉 *Example:* Client ko har 2 weeks ke sprint ke baad demo dikhaya jata hai.

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9. Contract Management

- Clients aur vendors ke saath agreements aur legal documents handle karna.

  👉 *Example:* Hosting company ke saath 1 year ka hosting contract sign karna.

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10. Project Closure

- Jab project complete ho jaye toh final delivery dena, documentation handover karna, aur formally close karna.

  👉 *Example:* Online Shopping Website client ko deliver karke sign-off liya aur maintenance contract start kiya.

•Plans, Methods, and Methodologies

b) How plans, methods and methodologies differ from each other? **[5]**

- **Plan** = “What to do and when to do.”
- **Method** = “How to do a specific task.”
- **Methodology** = “Overall framework or philosophy to manage the whole project.”

Term	Meaning	Example (Online Shopping Project)
Plan	Ek roadmap hota hai jo batata hai ki project kaise complete hoga (what + when).	Decide karna ki login module 2 weeks me complete hoga aur testing 1 week me.
Method	Ek specific technique/approach jo use ki jati hai task perform karne ke liye (how).	Testing ke liye Black-box Testing method use karna.
Methodology	Ek structured framework (set of principles + methods + best practices) jo pura project manage karne ke liye follow kiya jata hai.	Project ke liye Agile Methodology adopt karna jisme Scrum meetings, sprints use hote hai.

•Some Ways of Categorizing Software Projects

c) Explain the ways of categorizing software projects. [5]

Ways of Categorizing Software Projects

1.Based on Size

1. **Small Projects** – chhote modules ya individual developer handle kar sakta hai.
2. **Medium Projects** – ek chhoti team ke saath develop hote hain.
3. **Large Projects** – bade-bade organizations me multiple teams aur complex management chahiye.

- Example:
  1. Small → Calculator app
  2. Medium → College management system
  3. Large → Banking or Railway reservation system

Based on Complexity
•**Simple Projects** – kam features aur kam risk.
•**Complex Projects** – multiple modules, integration, high risk.
- Example:

•Simple → To-do list app
•Complex → Online Shopping System (Amazon, Flipkart)

Based on Application Domain
•**Business Software** – Payroll, Inventory, ERP.
•**Engineering/Scientific Software** – CAD, MATLAB tools.
•**Embedded Software** – ATM, Washing machine systems.
•**Web/Mobile Applications** – Social media apps, E-commerce apps.

Based on Development Approach
•**Traditional (Waterfall Model)** – step by step process.
•**Agile / Iterative** – flexible, sprint-based, continuous feedback.

•Stakeholders

a) Describe in brief stakeholders of project. [5]

Stakeholders of a Project:
Definition:
Stakeholders wo log ya group hote hain jo **project se directly ya indirectly affected hote hain** aur jinki interest project ke success/failure se judi hoti hai.

Types of Stakeholders

1.Project Manager

1. Responsible for overall planning, execution aur delivery of project.

2.Project Team Members

1. Developers, testers, designers, jo directly project ka kaam karte hain.

3.Customers/Clients

1. Jinke liye project banaya ja raha hai, unki requirements fulfill karna hota hai.

4.End Users

1. Wo log jo final software/product use karenge.

5.Sponsors/Investors

1. Jo project ke liye fund provide karte hain.

6.Top Management

1. Organization ke higher-level managers jo policies aur resources decide karte hain.

7.Vendors/Suppliers

1. Third-party companies ya individuals jo tools, services ya resources supply karte hain.

•Setting Objectives

Setting Objectives :
👉 Software Project Management mein **Setting Objectives** ek important activity hai. Matlab project ke clear goals decide karna – ki hum kya achieve karna chahte hain aur kaise. Ye project ka **direction** set karta hai.

Steps in Setting Objectives:
1.Clear Goals Define Karna – project ka exact outcome decide karna.
2.SMART Objectives – Specific, Measurable, Achievable, Relevant, Time-bound hone chahiye.
3.Stakeholders ke Expectations Samajhna – client, users aur team ki needs ko dhyaan me rakhna.
4.Documentation – objectives ko likhna taaki sabko clarity ho.

Real Life Example:

💻 Suppose tum ek **Food Delivery App** bana rahe ho.

Objective Setting:

•App customer ko nearby restaurants dikhayega.

•User easily food order aur online payment kar sake.

•Order delivery 30 minutes ke andar hoga.

•App launch 6 months ke andar karna hai.

Yahaan pe objectives ne **clear roadmap** diya – kya banana hai, kis time tak banana hai aur kis standard ke saath banana hai.

•Business Case

c) Define business case and explain the concept of business case. [5]

Definition:
Business Case ek document ya justification hota hai jisme bataya jata hai ki ek project ya investment kyun karni chahiye. Ye mainly cost (kharcha), benefits (faayde), risk (jokhim) aur alternatives (options) ko explain karta hai.

Concept:

•Business case ka main purpose hota hai decision makers ko convince karna ki ek project ko start karna sahi hoga ya nahi.

•Isme problem statement (kya issue solve karna hai), solution options, expected benefits, cost estimate aur risk analysis include hote hain.

•Ye ek **roadmap jaisa** hota hai jo dikhata hai ki project se organization ko kya value milegi.

•Example: Agar ek company ko naye software me invest karna hai, toh business case batayega ki isme kitna kharcha hoga, kitna time bachega, efficiency kaise improve hogi, aur agar invest na kare toh kya loss ho sakta hai.

•Project Success and Failure

Project Success
Ek project successful tab mana jata hai jab:
1. **Time par complete ho** – Project deadline ke andar finish ho.
2. **Budget ke andar ho** – Jitna paisa decide hua tha, usi ke andar complete ho.
3. **Quality meet kare** – Jo requirements aur specifications diye gaye the, unko pura kare.
4. **Stakeholders khush ho** – Client aur users satisfied ho project ke result se.
5. **Business value create kare** – Project se company ya organization ko fayda mile.

Project Failure
Project fail tab hota hai jab:
1. **Time delay ho** – Project bahut late ho jaye.
2. **Budget exceed kare** – Jyada kharcha ho jaye jo plan se bahar ho.
3. **Requirements fulfill na ho** – Users ki needs ya expectations meet na kare.
4. **Poor quality deliver ho** – Product ya service reliable na ho.
5. **Business ko loss ho** – Project se expected value ya return na mile.

•What is Management?

Identify the management responsibilities of the manager in view of software project management. [5]

Q1: What is Management?

Definition (Simple):
Management ek process hai jisme resources (log, paisa, technology, time) ko effectively plan, organize, lead aur control karke organization ke goals achieve kiye jate hain.

Key Points:
1.Planning – Decide karna kya karna hai.
2.Organizing – Kaam aur resources ko sahi tarike se arrange karna.
3.Leading – Team ko guide aur motivate karna.
4.Controlling – Ensure karna ki work plan ke according ho raha hai.

👉 Simple line: **Management ka matlab hai right people, right resources aur right time ka use karke objectives achieve karna.**

Q2: Management Responsibilities of a Manager in Software Project Management

Software project manager ki responsibilities:

1. **Planning** – Project goals, schedule aur resources plan karna.
2. **Organizing** – Team banani aur roles assign karna.
3. **Monitoring & Controlling** – Project progress track karna, risks handle karna.
4. **Communication** – Client aur team ke beech clear communication maintain karna.
5. **Quality & Delivery** – Ensure karna ki software required quality ke sath time par deliver ho.

👉 Simple line: **Software project manager ki responsibility hai project ko time, cost aur quality ke balance ke sath successfully deliver karna.**

Management Control

Definition:
Management control ek process hai jisme managers ensure karte hain ki organization ki activities planned goals aur objectives ke according chal rahi hain.

Key Points:
1. **Setting Standards** – Pehle decide karna ki kaam kaisa hona chahiye (time, cost, quality ke standards).
2. **Measuring Performance** – Actual performance ko check karna.
3. **Comparing with Standards** – Actual aur planned results ka comparison karna.
4. **Corrective Action** – Agar deviation (galti) ho toh usse correct karna.

•Traditional versus Modern Project Management Practices

Explain traditional project management and modern project management. [5]

Traditional Project Management (TPM):

•Ye **linear / sequential model** hota hai (jaise *Waterfall model*).
•Steps fixed hote hain: **Planning** → **Designing** → **Development** → **Testing** → **Delivery**.
•Ek phase complete hone ke baad hi next phase start hota hai.
•Change handle karna mushkil hota hai.
•Focus more on **process & documentation**.
👉 Example: Construction projects, manufacturing projects.

Modern Project Management (MPM):

- Ye **flexible & adaptive approach** hoti hai (jaise *Agile, Scrum*).
- Kaam **iterative cycles** me hota hai (short sprints).
- Changes ko easily accept karta hai.
- Focus more on **customer satisfaction & teamwork**.
- Continuous feedback & improvement hota hai.

👉 Example: Software development projects.

✨ Thank You for Watching! ✨

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