Government of Karnataka
Department of Collegiate and Technical Education
Board of Technical Examinations, Bangalore

Course Code	20PM01T	**Semester**	II
Course Title	**Project Management Skills**	**Course Group**	PM
No. of Credits	4	**Type of Course**	Activity based study
Course Category	Theory with Activities	**Total Contact Hours**	6 Hrs Per Week (2Theory +4 hrs of classroom activities) 78 Hrs Per Semester
Prerequisites	10th Level Mathematics	**Teaching Scheme**	4 hrs per week classroom sessions dedicated to case studies & activities
CIE Marks	50	**SEE Marks**	50

RATIONALE

Project Management is a confluence of Management principles and Engineering subject area. This course enables the students to develop conceptualisation of Engineering Management principles and apply the same for their engineering projects, in their domains, example, Software Development project or Construction Project and so on. The course integrates three core areas of Planning, Execution and Auditing of Projects.

1. COURSE SKILL SET

Student will be able to:

1. Understand what constitutes a project, Plan for the execution of the project by breaking into manageable work units, and Prepare necessary project artifacts
2. Track and control the Project while preparing verifiable records for Project Inspections and Audits
3. Inspect and Audit projects for Milestones or other project completion criteria and other metrics, Defects and remediation, Project learnings
4. Gain knowledge and develop curiosity on latest technology trends in Project management

2. COURSE OUT COMES

At the end of the course, student will be able to

CO1	Apply the concepts of Project Management to real projects which are expressed in the form of the Project reports or Engineering drawings
CO2	Estimate Project resources needed – Time, Material and Effort, and Plan for execution
CO3	Understand, analyse and assess the risks involved in a project and plan for managing them
CO4	Use Project Management Software and processes to track and control Projects
CO5	Conduct inspection of Projects and audit progress and bills
CO6	Understand the Digital Technology trends in Project management and concepts like Smart cities

3. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS

UNIT NO	UNIT TITLE	TEACHING HOURS (L-T-P)	MARKS DISTRIBUTION(THEORY)			
			R LEVEL	U LEVEL	A LEVEL	TOTAL
1	Introduction	02-00-04	8	8	4	20
2	Project Administration	06-00-12	8	12	20	40
3	Project Lifecycle	04-00-08	8	12	20	40
4	Project Planning, Scheduling and Monitoring	06-00-12	8	12	20	40
5	Project Control, Review and Audit	06-00-12	8	12	20	40
6	Digital Project Management	02-00-04	8	8	4	20
	Total	26-00-52=78	**48**	**64**	**88**	**200**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

4. DETAILS OF COURSE CONTENT

The following topics/subtopics is to be taught and assessed in order to develop Unit Skill sets for achieving CO to attain identified skill sets.

UNIT NO	Unit skill set	Topics / Subtopics	Hours L-T-P

	(In cognitive domain)		
1 Introduction	Use Basic Science, Maths skills to understand Project management and project planning, execution and control.	Introduction and definition, Features of a Project, Types of Projects, Benefits and Obstacles in Project Management, Project Management Profession, Role of Project manager, Consultants, Project and Operation, Project Management Process, Project Scope	02-00-04
2 Project Administration	Able to develop WBS, PEP and PM processes for Project with given inputs	Project Administration, Project Team, Project Design, Work Breakdown Structure (WBS), Project Execution Plan (PEP), Systems and Procedure Plan, Project Direction, Communication and Co-ordination, Project Success Case Study I	06-00-12
3 Project Lifecycle	Use project administration and project lifecycle knowledge to Assess and plan for project risk	Project Life Cycle, Phases - Project Planning, Project Execution, Project Closure, Project Risks, Project Cost Risk Analysis, Time and Cost overruns Case Study 2a	04-00-08
4. Project Planning, Project Scheduling and Project Monitoring and Implementation	Able to develop a detailed project plan given the inputs on manpower, funds availability and time availability	Project Planning Function, Structure, Project Scheduling, Project monitoring and Project evaluation Case Study 2b	06-00-12
5.Project Control, Review and Audit	Use Project Management lifecycle knowledge to Control project parameters, review and audit project performance	Project Control, Problems of Project Control, Gantt Charts, Milestone Charts, Critical Path Method (CPM), Network Technique in Project Scheduling, Crashing Project Duration through Network, Project Review, Initial Review, Performance Evaluation, Abandonment Analysis, Project Audit	06-00-12

		Case Study 2c	
6.Digital Project Management	Understand latest trends of digital technologies impacting the domain of project management and application of the same in multiple scenario	Digital Technology trends in Project management, Cloud Technology, IoT, Smart cities, Data and analytics, case studies Case study 3	02-00-04

1. **MAPPING OF CO WITH PO**

CO	Course Outcome	PO Mapped	UNIT Linked	CL R/U/A	Sessions in Hrs	TOTAL - Marks
CO1	Understand the concepts of Project Management in relation to real projects which are expressed in the form of the Project reports or Engineering drawings Case Study - I	**1, 2, 5, 7**	**1, 2**	**R/U/A**	**06**	10
CO2	Estimate Project resources needed – Time, Material and Effort, and Plan for execution Case study – 2a	**1, 2, 3, 7**	2, 3	**R/U/A**	**18**	**20**
CO3	Evaluate the risks involved in a project and Plan for managing them Case Study - 2a	**1,2,3,7**	2,3	**R/U/A**	**12**	**20**

CO4	Use Project Management methods with Software and/or processes to track and control Projects Case Study – 2b	**1, 4, 6, 7**	4	**R/U/A**	18	20
CO5	Conduct inspection of Projects and audit progress and bills Case Study 2c	**1, 2, 5, 7**	5	**R/U/A**	18	20
CO6	Understand the Digital Technology trends in Project management, and Engineering Industries Case Study 3	**1, 5, 7**	6	**R/U/A**	06	**10**
					78	**100**

	CO's	**Programme Outcomes (PO's)**						
		1	**2**	**3**	**4**	**5**	**6**	**7**
Project Management	CO1	3	3	0	0	2	0	1
	CO2	3	3	3	0	0	0	1
	CO3	3	0	0	3	0	3	1
	CO4	3	0	0	3	0	3	1
	CO5	3	2	0	0	2	0	1
	CO6	3	0	0	0	2	0	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0-Not Mapped

7. INSTRUCTIONAL STRATEGY

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes

1. Explicit instruction will be provided in intervention classes or by using different differentiation strategies in the main classroom.

2. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching method and media that are employed to develop the outcomes.
3. Observing the way their more proficient peers use prior knowledge to solve current challenges and persevere in problem solving will help struggling students to improve their approach to engaging with rich contextual problems.
4. Topics be introduced always with a reallife example and then answering What, how, why and when.
5. The teacher is able to show different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
6. In a perfect world, teacher would always be able to demonstrate how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. When a concept cannot be applied in that manner, we can still share how it might be applied within mathematics.

8. SUGGESTED LEARNING RESOURCES:

Sl No.	Author	Title of Books	Publication/Year
1	**Dr. Lalitha Balakrishnan & Dr. Gowri Ramachandran**	**Project Management**	**Himalaya Publishing, 2019**
2	Shailesh Kumar Shivakumar	Complete Guide to Digital Project Management	Apress, 2019
3	Prasanna Chandra	Project planning, analysis, selection, implementation and review	Tata McGraw Hill
4	Gopala Krishnan	Project Management	Mcmillan India Ltd.

9. COURSE ASSESSMENT AND EVALUATION CHART

Sl.No	Assessment	Duration	Max marks	Conversion
1	CIE Assessment 1 (Written Test -1) At the end of 3rd week	80 minutes	30	Average of three written tests 30
2	CIE Assessment 2 (Written Test -2) At the end of 7th week	80 minutes	30	

Sl.No	Assessment	Duration	Max marks	Conversion
3	CIE Assessment 3 (Written Test -3) At the end of 13th week	80 minutes	30	
4	CIE Assessment 4 (Group Assignment -1) At the end of 5th week	60 minutes	20	Average of three 20
5	CIE Assessment 5 (Group Assignment -2) At the end of 9th week	60 minutes	20	
6	CIE Assessment 6 (Individual Student activity/Assignment) At the end of 11th week	60 minutes	20	
Total Continuous Internal Evaluation (CIE) Assessment				**50**
8	Semester End Examination (SEE) Assessment (Written Test)	3 Hrs	100	**50**
Total Marks				**100**

Note:

1. SEE (Semester End Examination) is conducted for 100 Marks theory course for a time duration of 3 Hrs
2. Three CIE (written test), each of 30 marks for a time duration of 80 minutes shall be conducted. Also, three CIE (MCQ or Quiz/Group Assignment/Individual student activity or assignment) each of 20 marks for the time duration of 60 minutes shall be conducted. Any fraction at any stage during evaluation will be rounded off to the next higher digit
3. Assessment of assignment and student activity is evaluated through appropriate rubrics by the respective course coordinator. The secured mark in each case is rounded off to the next higher digit.

10 DETAILED COURSE CONTENT

Unit No And Name	DETAILED COURSE CONTENT	CONTACT HRS	TOTAL
	1.1 Introduction	3	

Unit No And Name	DETAILED COURSE CONTENT	CONTACT HRS	TOTAL
1. Introduction	1.2 Meaning of Project		6
	1.3 Definition and No Change Mode		
	1.4 Features of a Project		
	1.5 Types of Projects		
	1.6 Benefits of Project Management		
	1.7 Obstacles in Project Management		
	1.8 Project Management – A Profession		
	1.9 Project Manager and His Role		
	1.10 Project Consultants		
	1.11 What is Operation?	**3**	
	1.12 Difference between Project and Operation		
	1.13 What is Process in Project Management and Process Groups?		
	1.14 What is Scope? Difference between Project Group Objectives and		
	1.15 Project Scope		
2. Project Administration	2.1 Essentials of Project Administration	3	**18**
	2.2 Project Team		
	2.3 Project Design		
	2.4 Work Breakdown Structure (WBS)		
	2.5 Project Execution Plan (PEP)	6	
	2.6 Contracting Plan		
	2.7 Work Packing Plan		
	2.8 Organisation Plan	3	
	2.9 Systems and Procedure Plan		
	2.10 Project Procedure Manual		
	2.11 Project Diary	**3**	
	2.12 Project Execution System		
	2.13 Project Direction		
	2.14 Communication in a Project	**3**	
	2.15 Project Co-ordination		

	2.16 Pre-requisites for Successful Project Implementation		
3. Project Lifecycle	3.1 Introduction	6	12
	3.2 Phases of Project Life Cycle		
	3.3 Project Management Life Cycle – General		
	3.4 Project Planning		
	3.5 Project Execution		
	3.6 Project Closure		
	3.7 Project Risks	3	
	3.8 Types of Risks: Illustrations		
	3.9 Risk Assessment Techniques with Illustrations		
	3.10 Project Cost Risk Analysis	**3**	
	3.11 Estimating Time and Cost Overrun Risks		
	3.12 Organisation/Procedural/Systemic Reasons for Project Cost Overruns		
	3.13 Time Overruns		
4. Project Planning, Scheduling and Monitoring	4.1 Introduction	6	**18**
	4.2 Nature of Project Planning		
	4.3 Need for Project Planning		
	4.4 Functions of Project Planning		
	4.5 Steps in Project Planning		
	4.6 Project Planning Structure		
	4.7 Project Objectives and Policies		
	4.8 Tools of Project Planning		
	4.9 Project Scheduling	**6**	
	4.10 Time Monitoring Efforts		
	4.11 Bounding Schedules		
	4.12 Scheduling to Match Availability of Manpower		
	4.13 Scheduling to Match Release of Funds		
	4.14 Problems in Scheduling Real-life Projects		
	4.15 Introduction	**3**	

	4.16 Situation Analysis and Problem Definition		
	4.17 Setting Goals and Objectives		
	4.18 Generating Structures and Strategies		
	4.19 Implementation		
	4.20 What is Project Evaluation?	**3**	
	4.21 Why is Project Evaluation Important?		
	4.22 What are the Challenges in Monitoring and Evaluation?		
5. Project Control, Review and Audit	5.1 Introduction	6	**18**
	5.2 Projected Control Purposes		
	5.3 Problems of Project Control		
	5.4 Gantt Charts		
	5.5 Milestone Charts		
	5.6 Critical Path Method (CPM)	6	
	5.7 Construction of a Network		
	5.8 Network Technique in Project Scheduling		
	5.9 Crashing Project Duration through Network		
	5.10 Project Review	3	
	5.11 Initial Review		
	5.12 Post Audit		
	5.13 Performance Evaluation		
	5.14 Abandonment Analysis		
	5.15 Objectives of Project Audit	**3**	
	5.16 Functions of Project Auditor		
	5.17 Project Audit Programme		
	5.18 Difficulties in Establishing Audit Purpose and Scope		
6. Digital Project Management	6.1 Digital Technology trends in Project management	**1**	6
	6.2 Cloud Technology, IoT, AR and VR applications in Project management, Smart Cities	**1**	

	6.3 Data Science and Analytics in Project Management	**1**
	6.4 Case Studies	3

Case Studies:

Please note: The Tutors can either use the following Case studies and activities or Design on their own, with the overall Learning Outcomes being met.

Case Study I: Residential House – Project Execution Plan

1. Dr. Sunil Kulkarni wants to build a house on his 9000 square feet (90x100) vacant plot in Bengaluru. His requirements were given below.

   i) He lives with his wife, parents and two college going children.
   ii) He likes open space around his house and likes to do gardening during free time
   iii) His wife teaches Yoga and about 30 middle aged and old people attend the daily sessions.
   iv) He has a budget limitation of INR 230,00,000 for this project and wants to present to his wife on their 20th wedding anniversary which is 18 months away.
   v) His parents can not climb stairs and hence prefer a ground floor room
   vi) All the rooms should have attached bathrooms

How-ever the Civil contractor who took the work, overshot the time and money available and hence Dr Sunil was unhappy with the Architect firm who recommended the Contractor.

Task:

- Split the class into groups of three
- Ask them to prepare 2D drawings – with Plan, Elevation, Sections and perspectives.
- Prepare the detailed WBS, a Project execution plan and Project communication plan for contractors
- Estimate the quantities
- Discuss on the possible reasons for delay and methods with which performance to both time and budget could have been achieved
- Present it in a seminar, with each group getting 5-10 minutes to present their idea.

Case Study 2a:

The Columbus Hospital proposed in Hubli is a 200 bed speciality private hospital for treatment of Cancer. The hospital will come up on a 12 acre plot between Hubli-Dharwad. A leading construction company has come forward to complete the hospital works from concept to commissioning in 9 months. The promoters are willing to spend a premium to complete the hospital in 9 month time and are not particular about type of construction, ie, RCC, Steel frame etc. The key requirements are as follows:

i) 200 bed hospital of which 40 are for critical care (ICU), 40 for pre and post Operative care
ii) 4 Operation Theatres - 2 Major (Minimum 800 SFT each) and 2 minor (minimum 400 sft each)
iii) One full fledged Diagnostic laboratory (1500 Sft)
iv) One 24x7 pharmacy (360 Sft min)
v) Doctors rooms, Nurses enclosures, Change rooms
vi) Office with billing counters (min 2000 sft) for all administrative staff
vii) Wheel chair parking bays, Stretcher parking bays in all floors
viii) One Cafetaria with 50 person capacity
ix) One conference room with Multimedia equipment (300 sft min)
x) Parking for ambulances, 4 wheelers, two wheelers
xi) Reception and enquiry counter
xii) All amenities should be accessible for disabled persons
xiii) Incinerator, Waste storage and disposal area
xiv) Generator and fuel storage area

Discuss

i) The various alternative approaches available to complete the hospital.
ii) Look into National Building Code and BIS standards for arriving at approximate (+/- 10%) super built-up area required, amenities to be planned
iii) The various phases of the project according to Project lifecycle and durations
iv) Prepare the detailed WBS, Project Organisation required and Project Dairy template
v) Prepare a Project Plan with risks involved and the risk management plan.
vi) Estimate the cost of time overrun if the project is delayed by 114 calendar days due to issues with approvals

Case Study 2b:

For case study 2 above, prepare an Implementation Plan using a spreadsheet software.

Discuss

i) What happens if a pandemic affects the project in its 7th Month. How do you mitigate the possible issues in implementation?
ii) What happens if during the fourth month of projects the client decides to reduce funds for the month by 50% ?

Case Study 2c:

For case study 2 above, prepare a Critical Path method Chart (CPM) showing all main activities in the WBS with milestones.

Discuss

i) What happens if the client decides to complete the ground floor roof 15 days earlier ?
ii) What happens if the client reduces the inflow of project funds by 50% for the month 4 ?
iii) Write an Audit report for the project at the end of 6th month

Case Study 3:

This will be done as a student activity and has two components.

i) Research on 3D printing in any industry and prepare a three page article
ii) Study usage of Drones in different Industries and evaluate the Cost benefits of using the same for any one scenario.

Model Question Paper

I A Test (CIE)

Programme:	**Semester: I**
Course:	**Max Marks: 30**
Course Code:	**Duration: 1 Hr 20 minutes**
Name of the course coordinator:	**Test: I/II/III**

Note: Answer one full question from each section. One full question carries 10 marks.

Qn.No	Question	CL	CO	PO	Marks
	Section-1				
1.a)					
b)					
c)					
2.a)					
b)					
c)					
	Section-2				
3.a)					
b)					
c)					
4.a)					
b)					
c)					
	Section-3				
5.a)					
b)					
c)					
6.a)					
b)					
c)					

Model Question Paper
Semester End Examination

Programme:	**Semester: I**
Course:	**Max Marks: 100**
Course Code:	**Duration: 3 Hrs**

Instruction to the Candidate:
Answer one full question from each section. One full question carries 20 marks.

Qn.No	Question	CL	CO	Marks
	Section-1			
1.a)				
b)				
2.a)				
b)				
	Section-2			
3.a)				
b)				
4.a)				
b)				
	Section- 3			
5.a)				
b)				
6.a)				
b)				
	Section-4			
7.a)				
b)				
8.a)				
b)				
	Section-5			
9.a)				
b)				
10.a)				
b)				