GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering
Level: UG
Branch: ALL (Except Mechanical Engineering and Allied Branches)
Subject Code: BE05000481
Subject Name: Project Management

w. e. f. Academic Year:	2024-25
Semester:	5
Category of the Course:	MOPEC-1

Prerequisite:	Nil
Rationale:	Project Management is an essential subject that prepares students to effectively plan, organize, and control projects in various engineering and industrial domains. It provides a structured approach to managing resources, time, cost, and quality to achieve project objectives efficiently. In modern industries, where projects are complex and multidisciplinary, the application of project management principles is crucial for successful execution. The subject introduces students to key concepts such as project life cycle, scheduling techniques (CPM and PERT), risk analysis, budgeting, and team coordination. It also enhances soft skills like leadership, communication, and decision-making, which are vital for managing teams and stakeholders. By learning Project Management, students gain the ability to handle real-world challenges, improve productivity, and minimize risks. This subject increases employability and prepares graduates for careers in engineering, IT, construction, manufacturing, and entrepreneurship, aligning academic knowledge with industry requirements.

Course Outcomes: students are able to

Sr. No.	CO statement
CO-1	Explain the definition of a project, its key characteristics, and distinguish between project management and general management.
CO-2	Analyze and design effective project organizational structures and comprehensive project plans
CO-3	Develop and justify project budgets by applying appropriate cost estimation methods, while accounting for uncertainty and risk to ensure financial feasibility and control.
CO-4	Evaluate and optimize project schedules by applying resource allocation, resource leveling, multi-project scheduling, and project crashing techniques to achieve efficient time–cost balance and improved project execution.
CO-5	Apply Earned Value Analysis (EVA) techniques to evaluate project performance in terms of cost and schedule.

GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering
Level: UG
Branch: ALL (Except Mechanical Engineering and Allied Branches)
Subject Code: BE05000481
Subject Name: Project Management

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	PBL	Total no of hours per semester		ESE (E)	PA / CA (M)	PA/CA (I)	PBL (I)	ESE (V)	
45	00	00	15	60	2	70	30	00	30	00	130

**** Problem-Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.***

Content:

Sr. No.	Content	Total Hrs
1	**Project Management:** Definition of project, Project Management Vs. General Management, Three goals of project, The life cycle of projects, Selecting projects to meet organizational goals, Confronting Uncertainty, Project portfolio process, An approach to Project Formulation Characteristics of projects, Characteristics of project management, Projects in contemporary organizations, Project life cycle.	**8**
2	**Organizing and Planning the project:** Organizing: The PM's Roles, The PM's responsibility to the project, Selection of a Project Manager, Cross-functional team, Dedicated project organization, Influence project organization, Matrix organization, Advantages and disadvantages of project organizations, Selection of Project organization, Fitting projects into the parent organization. Work Breakdown Structure (WBS), Integration of project organization and WBS, WBS and responsibility matrix. Planning: The contents of a project plan, The planning process-overview, The planning process. The work breakdown structure and other aids, Multidisciplinary Teams: Balancing Pleasure and Pain.	**12**
3	**Budgeting the Project:** Methods of budgeting, Cost estimating, Improving Cost Estimates, Budget Uncertainty and risk management.	**06**
4	**Project Network Theory:** Gantt chart, Milestone chart, Network techniques: PERT and CPM, AON and AOA representation, three-time estimates, Probability distributions for time computation, Probability of project completion, Time scale version of network, Early start and late start schedules, Extensions to PERT/CPM, Project Simulation, Resource allocation, Resource loading and levelling, Constrained resource scheduling, Multi-project scheduling and resource allocation, Crashing a project.	**12**

5	**Monitoring and Controlling the Project:** The plan-monitor-control cycle, Data collection and reporting, Earned Value Analysis, abandonment Analysis, Project control, Designing the control system, Scope creep and change control. Project Evaluation, Auditing and Project Termination.	**07**
	TOTAL	**45**

Suggested Specification table with Marks (Theory): (For B.E. only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**20**	**25**	**15**	**10**	**10**

R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

The syllabus of Project Management directly contributes to

SDG 1	**No Poverty**
SDG 2	**Zero Hunger**
SDG 3	**Good Health and Well-being**
SDG 4	**Quality Education**
SDG 5	**Gender Equality**
SDG 6	**Clean Water and Sanitation**
SDG 7	**Affordable and Clean Energy**
SDG 8	**Decent Work and Economic Growth**
SDG 9	**Industry, Innovation and Infrastructure**
SDG 10	**Reduced Inequalities**
SDG 11	**Sustainable Cities and Communities**
SDG 12	**Responsible Consumption and Production**
SDG 13	**Climate Action**
SDG 14	**Life Below Water**
SDG 15	**Life on Land**
SDG 16	**Peace, Justice and Strong Institutions**
SDG 17	**Partnerships for the Goals**

Reference Books:

1. Project Management by Samuel J. Mantel, Jr., Jack R. Meredith, Scott M. Shafer, Margaret M. Sutton with M. R. Gopalan (WILEY-INDIA)
2. Project Management: A Managerial Approach, Meredith, J. R. and Mantel Jr., S. J., John Wiley, New York. 2004

3. Project Management and Appraisal by Sitangshu Khatua (Oxford)
4. Project Management for Business and technology: Principles and Practice, John M. Nicholas, Pearson Prentice Ha l, New Delhi, 2005.
5. A Guide to the Project management Body of Knowledge (PMBOK Guide) 5 th Edition, PMI.
6. Project Management-Case Studies, Harold Kerzner, John Wiley & Sons, New Jersey, 2006
7. Quantitative Methods in Project Management, Good pasture, J. C., J Ross Publishing, Boca Raton, Florida, USA.2003
8. Project Management: Engineering, Technology and Implementation, Shtub, A., Bard, J. F. and Globerson, S., Prentice Ha l, Englewood Cliffs, USA. 1994

Standards and Act:

1. IS/ISO 21500:2012 – Guidance on Project Management
2. IS 15656:2006 – Code of Practice for Project Management for Construction
3. IS/ISO 10006:2017 – Quality Management in Projects
4. ISO 21500, PMBOK: Fundamentals
5. IS 15656, CPWD Manual: Planning & Execution
6. ISO 9001, ISO 10006: Quality & Risk:
7. NITI Aayog & Finance Ministry guidelines: for Public Projects

List of Experiments:

1. Study and Analysis of Project Life Cycle and Characteristics in Contemporary Organizations.
2. Exercise on Selection and Formulation of Projects Aligned with Organizational Goals under Uncertainty.
3. Exercise on different project organizational structures.
4. Exercise to develop a WBS and integrate it with responsibility assignment.
5. Exercise to analyze the roles and responsibilities of a Project Manager (PM). (Study a real project case (industry or academic).)
6. Exercise to understand project planning and team dynamics.
7. Preparation and Analysis of Project Budget using Different Budgeting and Cost Estimation Methods.
8. Assessment of Budget Uncertainty and Application of Risk Management Techniques in Project Costing.
9. Exercise for Preparation of Gantt Chart and Milestone Chart for Project Scheduling.
10. Exercise for Development of Project Network using PERT/CPM Techniques with AON and AOA Representation and time calculation.
11. Exercise for Time Estimation and Probability Analysis for Project Completion using PERT.
12. Exercise for Resource Allocation, Levelling, and Project Crashing for Optimized Project Scheduling.
13. Exercise for Application of Earned Value Analysis (EVA) for Monitoring and Controlling Project Performance.
14. Exercise for Design and Implementation of Project Control System with Scope Change and Project Evaluation Techniques.

Major Equipment:

Nil

List of Open Source Software

1. Project Management software: for concepts like WBS, Gantt charts, PERT/CPM, resource allocation, etc.
2. Web base:
   a) OpenProject: Features: Gantt charts, Scrum boards, cost tracking, complete project lifecycle (planning to control)
   b) Freedcamp: Includes tasks, milestones, dashboards, Kanban boards, Easy for beginners
   c) Odoo: Supports portfolio management and collaboration

List of learning website:

1. http://nptel.ac.in/courses/

List of suggested activities for Problem-based Learning (PBL):

Sr. No.	PBL category	Name of the activity	No. of hours	Evaluation Criteria
1.	Complex Problem-Solving targeting relevant SDGs / Mini Project	Mini Project	15h (need to be changed as per total PBL hours)	Based on the novelty of project, technical understanding, report quality and presentation
2.	Case Study Analysis / Seminar	Seminar	15h (need to be changed as per total PBL hours)	Based on the quality of report and presentation, technical understanding
3.	Micro project	Micro project	8h (need to be changed as per total PBL hours)	Based on the novelty of project, technical understanding, quality of report and demonstration
4.	Industry/Research laboratory visit	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h Total = 10h	Based on report submitted. Report should contain observations and calculations based on industry/ lab data.
5.	Video Based Learning	Technical video-based learning related to the subject	Duration of video = 5h Report preparation = 5h Total = 10h	Report /presentation based on the video learning outcomes.
6.	Assignment / Technical Writing / Research Writing	Assignment writing. Numerical based assignment is preferable.	5 assignments of 4 h each Total = 20h	Based on the correctness of submitted assignment
7.	Group Discussion / Quiz / Simulation	Problem solving/Coding using C, C++, MATLAB, Python, SCILAB, modeling and Analysis software or any other software	5 small coding-based assignment of 2h each Total = 10h	Based on the coding solution submitted.
8.	Video Based Learning	Self-learning online course	Minimum duration of the course should be 10h	Examination based assessment at the end of course. Based on the

				certificate produced.
9.	Complex Problem-Solving targeting relevant SDGs / Mini Project	Identification and solution of Complex problem	Maximum 2 problems. Study of the problem and solution finding, Total = 10h	Based on the depth of the solution submitted.
10.	Video Based Learning	Videos on Industrial safety/Disaster Management aspects based on subject	Duration of video = 5h Report preparation = 5h Total = 10h	Based on quiz/report submitted
11.	Research Paper Review / Analysis	Technical paper reading and summarization of research papers based on relevant subject	5 research papers = 20h	Summarize research paper and evaluation critical parameters
12.	Poster / Chart / PowerPoint presentation	Poster/chart/power point preparation on technical topics	Duration = 6h	Based on poster/chart preparation and presentation skills
13.	Industry/Research laboratory visit	Industrial exposure for 2-3 days to observe and provide tentative solutions on society/environment/health/sustainability/any other issue	Duration = 15h for industrial exposure Problem identification and tentative solution = 10h Total = 20h	Based on evaluation of critical problems and solutions
14.	Group Discussion / Quiz / Simulation	Group Discussion on emerging/trending technical topics based on subject	Duration = 1h – 3h per topic	Based on performance in group discussion, technical depth, knowledge etc.
15.	Case Study Analysis / Seminar	Real world case studies-based learning	Duration of data collection/study = 5h Report preparation = 5h Total = 10h	Based on in-depth study, technical depth, data collected, fact finding, etc.
16.	Group Discussion / Quiz / Simulation	Application/Software development	Duration = 10h	Depending on the complexity of the Application/Software
17.	Assignment / Technical Writing / Research Writing	Research paper publication	Duration = 10h	Based on submission of proof of publication
18.	Micro project	Upgradation/Reverse engineering studies of existing equipment of the laboratory	Duration 10h	Based on the performance of the equipment
19.	Industry/Research laboratory visit	Expert lecture/session	Duration 3h For attending the lecture/session– 2h and for report writing 1h	Based on the proof of attendance and report submitted
20.	Video Based Learning	Annotated Video Explanation of Concept/Problem	10h (Preparation + Recording + Submission)	Based on accuracy of explanation, clarity, and presentation style.
21.	Assignment / Technical Writing	Patent Search and Innovation Gap Identification	10h (Search + Report)	Based on number of relevant patents analyzed

	/ Research Writing			and identification of innovation scope.
22.	Assignment / Technical Writing / Research Writing	Preparation of a report on Indian Standard(s)	10h (study of Indian Standard(s) + report	Based on report quality and understanding of the relevant Indian Standard(s).

Note:

1. In alignment with Outcome-Based Education (OBE) and NBA accreditation requirements, the subject **Project Management compulsorily incorporates Micro Project and 5 marks as PBL activities.** These activities are incorporated as integral Project-Based Learning (PBL) components. These activities are designed to foster experiential learning, encourage innovation, and strengthen problem-solving skills by engaging students in practical applications of power converter design, simulation, and analysis. The inclusion of PBL ensures that learners develop higher-order cognitive abilities mapped to Bloom's taxonomy, while simultaneously enhancing teamwork, communication, and research competencies essential for professional engineering practice.
2. The hours allocated to specific activities should be proportionate to the total no. of PBL hours and marks.
3. All the suggested activity should be related to the subject.
4. The number of hours is suggestive. Faculty can sub-divide the number of hours based on the activity. However, total number of hours is fixed.
5. Rubrics for the evaluation can be prepared by the faculty.
6. Subject teacher can add the relevant activities other than those listed above, with the consent of head of the department and DQAC.

****