



BHARATIYA VIDYA BHAVAN'S
SARDAR PATEL INSTITUTE OF TECHNOLOGY
 Autonomous Institute Affiliated Under Mumbai University
Department of Computer Engineering

Program Outcomes -Competencies – Performance Indicators

PO1:Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems			
Competency		Indicators	
1.1	Demonstrate competence in mathematical modeling.	1.1.1	Apply the knowledge of discrete structures, linear algebra, statistics, numerical techniques and theoretical computer science to solve problems
		1.1.2	Apply the concepts of probability, statistics and queuing theory in modeling of computer based system, data and network protocols.
1.2	Demonstrate competence in basic sciences	1.2.1	Apply laws of natural science to an engineering problem
1.3	Demonstrate competence in engineering fundamentals	1.3.1	Apply engineering fundamentals
1.4	Demonstrate competence in specialized engineering knowledge to the program	1.4.1	Apply theory and principles of computer science and information technology to solve an engineering problem.
PO2:Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences			
Competency		Indicators	
2.1	Demonstrate an ability to identify and formulate complex engineering problem	2.1.1	Evaluate problem statements and identify objectives
		2.1.2	Identifies processes/modules/algorithms of a computer based system and parameters to solve a problem
		2.1.3	Identify mathematical algorithmic knowledge that applies to a given problem
2.2	Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.2.1	Reframe the computer based system into interconnected subsystems
		2.2.2	Identifies functionalities and computing resources.
		2.2.3	Identify existing solution/methods to solve the problem, including forming justified approximations and assumptions.
		2.2.4	Compare and contrast alternative solution/methods to select the best methods.
2.3	Demonstrate an ability to	2.3.1	Able to apply computer engineering principles



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	formulate and interpret a model		to formulate modules of a system with required applicability and performance.
		2.3.2	Identify design constraints for required performance criteria
2.4	Demonstrate an ability to execute a solution process and analyze results	2.4.1	Applies engineering mathematics to implement the solution.
		2.4.2	Analyze and interpret the results using contemporary tools.
		2.4.3	Identify the limitations of the solution and sources/causes.
		2.4.4	Arrive at conclusions with respect to the objectives.
PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental			
Competency		Indicators	
3.1	Demonstrate an ability to define a complex / open-ended problem in engineering terms	3.1.1	Able to define a precise problem statement with objectives and scope
		3.1.2	Able to identify and document system requirements from stake holders.
		3.1.3	Ability to review state of the art literature to synthesize system requirements.
		3.1.4	Ability to choose appropriate quality attributes as defined by ISO/IEC/IEEE standard.
		3.1.5	Explore and synthesize system requirements from larger social and professional concerns. Ability to develop software requirement specifications (SRS).
		3.1.6	Determine design, objectives, functional requirements and arrive at specifications
3.2	Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1	Ability to explore design alternatives.
		3.2.2	Ability to produce a variety of potential design solutions suited to meet functional requirements.
		3.2.3	Identify suitable non functional requirements for evaluation of alternate design solutions
3.3	Demonstrate an ability to select optimal design scheme for further development	3.3.1	Ability to perform systematic evaluation of the degree to which several design concepts meet the criteria



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		3.3.2	Consult with domain experts and stakeholders to select candidate engineering design solution for further development
3.4	Demonstrate an ability to advance an engineering design to defined end state	3.4.1	Ability to refine architecture design into a detailed design within the existing constraints.
		3.4.2	Ability to implement and integrate the modules.
		3.4.3	Ability to verify the functionalities and validate the design.
PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.			
Competency		Indicators	
4.1	Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.1	Define a problem for purposes of investigation, its scope and importance
		4.1.2	Ability to choose appropriate procedure/algorithm, data set and test cases.
		4.1.3	Ability to choose appropriate hardware/software tools to conduct the experiment
4.2	Demonstrate an ability to design experiments to solve open ended problems	4.2.1	Design and develop appropriate procedures/methodologies based on the study objectives
4.3	Demonstrate an ability to analyze data and reach a valid conclusion	4.3.1	Use appropriate procedures, tools and techniques to collect and analyze data
		4.3.2	Critically analyze data for trends and correlations, stating possible errors and limitations.
		4.3.3	Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions
		4.3.4	Synthesize information and knowledge about the problem from the raw data to reach appropriate conclusions
PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.			
Competency		Indicators	
5.1	Demonstrate an ability to identify / create modern	5.1.1	Identify modern engineering tools, techniques and resources for engineering activities



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	engineering tools, techniques and resources	5.1.2	Create/adapt/modify/extend tools and techniques to solve engineering problems
5.2	Demonstrate an ability to select and apply discipline specific tools, techniques and resources	5.2.1	Identify the strengths and limitations of tools for (i) acquiring information, (ii) modeling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs.
		5.2.2	Demonstrate proficiency in using discipline specific tools
5.3	Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	5.3.1	Discuss limitations and validate tools
		5.3.2	Verify the credibility of results from tool use with reference to the accuracy and limitations
PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.			
Competency		Indicators	
6.1	Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, health, safety, legal and public welfare	6.1.1	Identify and describe various engineering roles; particularly as pertains to protection of the public and public interest at global, regional and local level
6.2	Demonstrate an understanding of professional engineering regulations, legislation and standards	6.2.1	Interpret legislation, regulations, codes, and standards relevant to your discipline and explain its contribution to the protection of the public
PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			
Competency		Indicators	
7.1	Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts	7.1.1	Identify risks/impacts in the life-cycle of an engineering product or activity
		7.1.2	Understand the relationship between the technical, socio economic and environmental dimensions of sustainability
7.2	Demonstrate an ability to apply principles of sustainable design and development	7.2.1	Describe management techniques for sustainable development
		7.2.2	Apply principles of preventive engineering and sustainable development to an engineering activity or product relevant to the discipline



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PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
Competency		Indicators	
8.1	Demonstrate an ability to recognize ethical dilemmas	8.1.1	Identify situations of unethical professional conduct and propose ethical alternatives
8.2	Demonstrate an ability to apply the Code of Ethics	8.2.1	Identify tenets of code of ethics given by the professional bodies like IEEE.
		8.2.2	Examine and apply moral & ethical principles to known case studies
PO9: Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
Competency		Indicators	
9.1	Demonstrate an ability to form a team and define a role for each member	9.1.1	Recognize a variety of working and learning preferences; appreciate the value of diversity on a team
		9.1.2	Implement the norms of practice (e.g. rules, roles, charters, agendas, etc.) of effective team work, to accomplish a goal.
9.2	Demonstrate effective individual and team operations- communication, problem solving, conflict resolution and leadership skills	9.2.1	Demonstrate effective communication, problem solving, conflict resolution and leadership skills
		9.2.2	Treat other team members respectfully
		9.2.3	Listen to other members in difficult situations
		9.2.4	Maintain composure in difficult situations
9.3	Demonstrate success in a team based project	9.3.1	Present results as a team, with smooth integration of contributions from all individual efforts
PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions			
Competency		Indicators	
10.1	Demonstrate an ability to comprehend technical literature and document project work	10.1.1	Read, understand and interpret technical and non- technical information
		10.1.2	Produce clear, well-constructed, and well-supported written engineering documents
		10.1.3	Create flow in a document or presentation – a logical progression of ideas so that the main point is clear



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10.2	Demonstrate competence in listening, speaking, and presentation	10.2.1	Listen to and comprehend information, instructions, and viewpoints of others
		10.2.2	Deliver effective oral presentations to technical and non- technical audiences
10.3	Demonstrate the ability to integrate different modes of communication	10.3.1	Create engineering-standard figures, reports and drawings to complement writing and presentations
		10.3.2	Use a variety of media effectively to convey a message in a document or a presentation
PO 11: Project management & Finance: demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments			
Competency		Indicators	
11.1	Demonstrate an ability to evaluate the economic and financial performance of an engineering activity	11.1.1	Describe various economic and financial costs/benefits of an engineering activity
		11.1.2	Analyze different forms of financial statements to evaluate the financial status of an engineering project
11.2	Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an engineering activity	11.2.1	Analyze and select the most appropriate proposal based on economic and financial considerations.
11.3	Demonstrate an ability to plan/manage an engineering activity within time and budget constraints	11.3.1	Identify the tasks required to complete an engineering activity, and the resources required to complete the tasks.
		11.3.2	Use project management tools to schedule an engineering project so it is completed on time and on budget.
11.4	Demonstrate an ability to do financial planning by considering aspects of taxation and investment	11.4.1	Ability to prepare financial plan, calculate relevant taxes and propose suitable investment by considering real life constraints
PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological			
Competency		Indicators	
12.1	Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps	12.1.1	Describe the rationale for requirement for continuing professional development
		12.1.2	Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap



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12.2	Demonstrate an ability to identify changing trends in engineering knowledge and practice	12.2.1	Identify historic points of technological advance in engineering that required practitioners to seek education in order to stay current
		12.2.2	Recognize the need and be able to clearly explain why it is vitally important to keep current regarding new developments in your field
12.3	Demonstrate an ability to identify and access sources for new information	12.3.1	Source and comprehend technical literature and other credible sources of information
		12.3.2	Analyze sourced technical and popular information for feasibility, viability, sustainability, etc.
12.4	Demonstrate an attitude to pursue life skills	12.4.1	Recognize the need and able to demonstrate life skills that are vitally important for overall development
		12.1.1	Demonstrate an ability to respond in an emergency situation by applying lifesaving skills
12.5	Demonstrate entrepreneur mindset	12.1.1	Recognize the importance of entrepreneurship and participate in activities related to business formation



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Program Specific Outcomes -Competencies – Performance Indicators

PSO1: Successfully complete internship offered by industries or other institutes of repute.		
Competency		Indicators
1. Demonstrate an ability to learn and implement knowledge into practice and innovate.	1.1	Able to define a precise problem statement during Internship
	1.2	Able to produce a variety of potential design solutions suited to meet industry requirements.
	1.3	Able to demonstrate the creativity/originality
PSO2: Develop software applications to solve real life problems.		
Competency		Indicators
2 .To Demonstrate an ability to design software application	2.1	Able to Participate in Innovation Competitions, Idea completions, Hackathons etc
	2.2	Able to participate successfully for Consultancy/ research projects/research grants in the institutes.