Department of Information Technology (PO, Competencies, and Indicators)

PO 1: Engineering knowledge:
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.

Competency	Indicators
1.1 Demonstrate competence in mathematical modelling	1.1.1 Apply the knowledge of discrete structures, linear algebra(vectors/matrices), statistics, and numericaltechniques to solve problems 1.1.2 Apply the concepts of probability, statistics, and queuing theory in modeling ofcomputer-based system, data, and network protocols.
1.2 Demonstrate competence in basic sciences	1.2.1 Apply laws of Physics, Chemistry and Management sciences 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 Information Technology to solve anengineering problem

PO 2: Problem analysis: An ability to conduct experiments by analyzing and interpreting data.

Competency	Indicators
2.1 Demonstrate an abilityto identify and formulate complex engineering problem	2.1.1 Evaluate problem statements and identifies objectives 2.1.2 Identify processes/modules/algorithms of a computer-based system andparameters 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 Identify 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 2.2.5 Compare and contrast alternative solution processes to select the best process.
2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply IT principles to formulate modules of a systemwith required applicability and performance. 2.3.2 Identify design constraints for required performance criteria.
2.4 Demonstrate an ability to execute a solution processand 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: An ability to design a system, component, or a process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	
Competency	**Indicators**
3.1 Demonstrate an abilityto 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 Able to review state-of-the-art literature to synthesize system requirements. 3.1.4 Able to choose appropriate quality attributes as defined by ISO/IEEE standard. 3.1.5 Explore and synthesize system requirements from larger social and professional concerns. 3.1.6 Able to develop software requirement specifications (SRS).
3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Able to explore design alternatives. 3.2.2 Able 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 abilityto select optimal design scheme for further development	3.3.1 Able to perform systematic evaluation of the degree to which several design concepts meet the criteria. 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 Able to refine architecture design into a detailed design within the existing constraints. 3.4.2 Able to implement and integrate the modules. 3.4.3 Able to verify the functionalities and validate the design.
PO 4: Conduct investigations of complex problems: An ability to identify, formulates and solves engineering problems.	
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 Able to choose appropriate procedure/algorithm, dataset, and test cases. 4.1.3 Able 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) 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 or Apply appropriate techniques and IT tools to complex engineering activities

Competency	Indicators
5.1 Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques, and resources for engineering activities 5.1.2 Create/adapt/modify/extend tools and techniques to solve engineering problems
5.2 Demonstrate an ability to select and apply IT 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, techniques, and resources 5.3.2 Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.

PO 6: The engineer and society: A knowledge of contemporary issues which are relevant to the professional engineering practice.

Competency	Indicators
6.1 Demonstrate an abilityto 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 the 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 disciplineand explain its contribution to the protection of the public

PO 7: Environment and sustainability: The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

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 abilityto 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

PO 8: Ethics Understanding and demonstration of professional and ethical responsibility.

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 the IEEE professional code of ethics 8.2.2 Examine and apply moral & ethical principles to known case studies
PO 9: Individual and teamwork: An ability to function in multidisciplinary teams.	
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 teamwork, 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 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: An ability to communicate effectively.	
Competency	**Indicators**
10.1 Demonstrate an abilityto 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
10.2 Demonstrate competencein 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 and finance: An ability to utilize experimental statistical and computational methods and tools necessary for engineering practice.	
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.

PO 12: Life-long learning: Recognition of the need for, and an ability to engage in life-long learning	
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 the 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
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 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.