Bharatiya Vidya Bhavan's
Sardar Patel Institute of Technology
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous College Affiliated to University of Mumbai)

Electronics and Telecommunication Department
BTech. Program

PROPOSED-Program Outcomes -Competencies – Performance Indicators

PO1: 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 basic sciences.	1.1.1	Apply laws of basic science to an engineering problem.
1.2	Demonstrate competence in engineering fundamentals.	1.2.1	Apply engineering fundamentals.
1.3	Demonstrate competence in specialized engineering knowledge to the program.	1.3.1	Apply theory and principles of Electronics and Telecommunication engineering to solve an engineering problem.
1.4	Demonstrate competence in mathematical modelling	1.4.1	Apply the knowledge of linear algebra, statistics and numerical techniques to solve problems.
		1.4.2	Apply the concepts of probability, electronics, signals and electromagnetic waves in modelling of wired and wireless systems, and networks.
PO2: Problem analysis: Identify, formulate, research literature, and analyse 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	Articulate problem statements and identify objectives.
		2.1.2	Identify engineering systems, variables, and parameters to solve the problems.
		2.1.3	Identify the mathematical, engineering and other relevant 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 complex problems into interconnected sub problems.
		2.2.2	Identify, integrate and evaluate information and resources.
		2.2.3	Identify existing processes/solution methods for solving the problem, including forming justified approximations and assumptions.
		2.2.4	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	Combine scientific principles and engineering concepts to formulate model/s (mathematical or otherwise) of a system/ process that is appropriate in terms of applicability and required performance metrics.
		2.3.2	Identify assumptions (mathematical and physical) necessary to allow modelling of a system/process at the level of performance metrics required.
2.4	Demonstrate an ability to execute a solution process and analyze results.	2.4.1	Apply engineering mathematics and computations to solve mathematical models.
		2.4.2	Produce and validate results through skilful use of contemporary engineering tools / models/ process.
		2.4.3	Identify limitations and scope of the solution.
		2.4.4	Extract desired understanding and conclusions consistent with objectives

			and limitations of the analysis.
PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.			
Competency		**Indicators**	
.1	Demonstrate an ability to define a complex / open-ended problem in engineering terms.	3.1.1	Recognize the need for analysis for precise problem definition.
		3.1.2	Elicit and document, engineering requirements from various resources/ stakeholders.
		3.1.3	Synthesize engineering requirements from a review of the state-of-the-art.
		3.1.4	Extract engineering requirements from relevant engineering professional standards/bodies.
		3.1.5	Explore and synthesize engineering requirements considering health, safety risks, and environmental, cultural and societal issues.
		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	Apply formal idea generation tools to develop multiple engineering design solutions.
		3.2.2	Build models/prototypes to develop diverse set of design solutions.
		3.2.3	Identify suitable criteria for evaluation of alternate design solutions.
3.3	Demonstrate an ability to select optimal design scheme for further development.	3.3.1	Apply formal decision making tools to select optimal engineering design solutions for further development.

		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	Refine a conceptual design into a detailed design within the existing constraints (of the resources).
		3.4.2	Generate information through appropriate tests and modifications to improve or revise design.
PO4: 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, its scope and importance for purpose of investigation.
		4.1.2	Examine the relevant methods, tools and techniques of experiment design, data acquisition, analysis and presentation.
		4.1.3	Apply appropriate instrumentation and/or software tools to make measurements of physical quantities.
		4.1.4	Establish a relationship between measured data and underlying physical principles.
4.2	Demonstrate an ability to design experiments to solve open ended problems.	4.2.1	Design and develop experimental approach, specify appropriate equipment and procedures.
		4.2.2	Understand the importance of proposed design of experiments and choose an appropriate experimental design plan 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 conduct experiments and

			collect data.
		4.3.2	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.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.			
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 discipline specific tools, techniques and resources.	5.2.1	Identify the strengths and limitations of tools for (i) acquiring information, (ii) modelling 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 performance metrics and limitations.
PO6: 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 awareness of knowledge of societal, health, safety, legal and cultural issues.	6.1.1	Demonstrate an attitude of responsible citizen by actively participating in activities related to awareness of societal, health, safety, security, legal and cultural issues.
6.2	Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, health, safety, legal and public welfare.	6.2.1	Identify and describe various engineering roles; particularly as pertains to protection of the public and public interest at global, regional and local level.
6.3	Demonstrate an understanding of professional engineering regulations, legislation and standards .	6.3.1	Interpret legislation, regulations, codes, and standards relevant to professional engineering practice and explain its contribution to the protection of the public.
PO7: 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 the belongingness to mother earth.	7.1.1	Demonstrate sensitivity towards environmental issues.
		7.1.2	Demonstrate an attitude of responsible citizen by actively participating in community service related to environmental issues.
7.2	Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts.	7.2.1	Identify risks/impacts in the life-cycle of an engineering product or activity.
		7.2.2	Understand the relationship between the technical, socio-economic and environmental dimensions of sustainability.
7.3	Demonstrate an ability to apply	7.3.1	Describe management techniques for

	principles of sustainable design and development.		sustainable development.
		7.3.2	Apply principles of preventive engineering and sustainable development to an engineering activity or product relevant to the discipline.
PO8: 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 professional code of ethics.
		8.2.2	Examine and apply moral & ethical principles to known case studies.
PO9: Individual and team work: 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, agendas, etc.) of effective team work, to accomplish a goal.
9.2	Demonstrate effective individual and team operations--communication, problem solving, and conflict resolution and leadership skills.	9.2.1	Demonstrate effective communication, problem solving, and 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.
PO10: 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.
		10.1.4	Comprehend literature, carry out background search & prior art and prepare a patent draft.
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 nontechnical 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.
PO11: Project management and 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 in 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.
PO12: Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.			
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.
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 connected with the new developments in our field.
		12.2.2	Recognize the need and be able to clearly explain why it is vitally important to stay connected with new developments in our field.
12.3	Demonstrate an ability to identify and access sources for new	12.3.1	Source and comprehend technical literature and other credible sources of

	information.		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.
		12.4.2	Demonstrate an ability to respond in an emergency situation by applying life saving skills.
12.5	Demonstrate entrepreneur mindset.	12.5.1	Recognize the importance of entrepreneurship and participate in activities related to business formation.

Program Specific Outcomes -Competencies – Performance Indicators

PSO1: The ability to troubleshoot hardware and software faults/ bugs in Communication systems.			
Competency		**Indicators**	
13.1	Ability to identify faults/ debugging errors in Communication systems.	13.1.1	Select and use the suitable tools and methodology for identification of faults/ debugging errors in Communication systems.
		13.1.2	Able to locate and classify the faults/ debugging errors in Communication systems.
		13.1.3	Follow safety precautions and standard procedures used in testing.
13.2	Ability to rectify faults/ debugging errors in Communication systems.	13.2.1	Select and use the suitable tools and methodology for rectification on of faults/ debugging errors in Communication systems.
		13.2.2	Able to eliminate faults/ debugging

			errors with optimum efforts for proper functioning of Communication systems.
PSO2: The ability to apply open source tools for solving technical problems.			
Competency		**Indicators**	
14.1	Ability to use open source tools	14.1.1	Recognize need of open source tools.
		14.1.2	Identify and use the available open source tool for a given task.
		14.1.3	Develop or modify open source tool for custom applications.