

## Program Outcomes and Program Specific Outcomes

**Program Outcomes** (POs) as identified by National Board of Accreditation (NBA), India are what the graduates of an undergraduate engineering program should be able to do at the time of graduation. The POs are discipline non-specific.

	<b>Program Outcome</b>
PO1.	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.	<b>Problem analysis:</b> Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4.	<b>Conduct investigations of complex problems:</b> 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.
PO5.	<b>Modern tool usage:</b> 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.
PO6.	<b>The engineer and society:</b> 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.
PO7.	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8.	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9.	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10.	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with 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.
PO11.	<b>Project management and finance:</b> 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.
PO12.	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**Program Specific Outcomes (PSOs)** are what the graduates of a specific undergraduate engineering program should be able to do at the time of graduation. The PSOs are program specific. PSOs are written by the Department offering the program. PSOs should be two to four in number. A Department can differentiate its program through PSOs. Some sample PSOs are

### **Civil Engineering**

#### **Sample 1**

1. Survey, map and plan layouts for buildings, structures and alignments for canals and roads
2. Specify, design, supervise, test and evaluate foundations and superstructures for residences, public buildings, industries, irrigation structures, powerhouses, highways, railways, airways, docks and harbors.
3. Analyze water resources hydrological systems to estimate safe and assured withdrawals, and specify, design, and evaluate water conveying systems, hydraulic machines and surge systems
4. Specify, select and formulate environmental engineering systems

#### **Sample 2**

1. Survey, conduct geo-technical investigations collect data, make feasibility studies, and design as per codal provisions residences, public buildings, industries, irrigation structures, powerhouses and highways, dam, aligning a road or water way and creating a township in a region.
2. Understand the impact of water, air and noise pollution, and the methods of waste containment, and specify, design and analyze water, sewerage and industrial effluent conveying and treatment systems.
3. Analyze water resources and hydrological systems to estimate safe, flood discharges and assured withdrawals, and specify and design/select hydraulic machines/systems and surge systems
4. Understand modern management and construction techniques to complete the projects within the stipulated period and funds.

### **Electrical and Electronics engineering**

#### **Sample 1**

1. Specify, architect, design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power

2. Specify, design, prototype and test modern electronic systems that perform analog and digital processing functions.

### **Sample 2**

1. Specify, architect and analyze power systems that efficiently generate, transmit and distribute electrical power in the context of present ICT
2. Analyze and design modern electrical drive systems and modern lighting systems
3. Understand the principles and construction of electrical machines and determine their performance through testing
4. Specify, design, implement and test analog and embedded signal processing electronic systems using the state of the art components and software tools.

## **Mechanical Engineering**

### **Sample 1**

1. Analyze, design and evaluate mechanical components and systems using state-of-the-art IT tools
2. Plan the manufacturing of given mechanical components and systems (methods design, process plan, process automation and manufacturing methods)
3. Apply modern management methods to manufacturing of components and systems
4. Analyze and design quality assurance systems

### **Sample 2**

1. Analyze, design and evaluate mechanical components and systems using state-of-the-art IT tools.
2. Analyze, design and evaluate thermal systems including IC engines, refrigerating, air-conditioning, and power generating systems.
3. Plan, including methods design, process plan, process automation, and quality assurance systems for manufacturing of given mechanical components and systems.
4. Apply modern management methods to manufacture of components and systems.

### **Sample 2**

1. Design mechanical components and systems as per given specifications using EDA tools
2. Specify and design thermal systems including heat exchangers, condensers, evaporators, air-conditioners, refrigeration systems as per given specifications.
3. Specify and design turbo machines including air compressors, hydraulic turbines and pumps as per given specifications.
4. Plan, including methods design, process plan, quality assurance systems and process automation, the manufacturing of given mechanical components and systems.

## **Computer Science and Engineering**

### **Sample 1**

1. Specify, design, develop, test and maintain usable software systems that behave reliably and efficiently and satisfy all the requirements that customers have defined for them
2. Develop software systems that would perform tasks related to Research, Education and Training and/or E-governance

### **Sample 2**

1. Specify, design, and develop system software (Language Translators, Languages, Operating Systems and User Interface) to allow convenient use of a computer.
2. Determine and optimize the performance of a given algorithm on a given platform
3. Specify, design and develop software for intelligent systems.
4. Specify, design and develop concurrent and parallel programs

### **Sample 3**

1. Specify, design, develop, test and manage reliable and efficient application software systems as per user requirements.
2. Specify, design, and develop system software to allow convenient use of computing systems.
3. Specify, design, develop and test application software systems for world-wide network of computers.
4. Develop application software that would perform tasks related to Information Management and Mobiles.

## **Information Technology**

1. Explain and apply appropriate information technologies and employ appropriate methodologies to help an individual or organization achieve its goals and objectives
2. Manage the information technology resources of an individual or organization
3. Anticipate the changing direction of information technology and evaluate and communicate the likely utility of new technologies to an individual or organization
4. Develop IT systems that would perform tasks related to E-governance and/or Health Care Management

### **Sample 2**

1. Explain and plan appropriate information technology to help an individual or organization achieve his/its goals and objectives
2. Provide IT service to help an individual or organization achieve his/its goals and objectives
3. Manage the information technology resources of an individual or organization

4. Anticipate the changing direction of information technology and evaluate and communicate the likely utility of new technologies to an individual or organization

### **Electronics and Communication Engineering**

#### **Sample 1**

1. Specify, design, prototype and test modern electronic systems that perform analog and digital processing functions.
2. Architect, partition, and select appropriate technologies for implementation of a specified communication system.
3. Design essential elements (circuits and antennas) of modern RF/Wireless communication systems.

#### **Sample 2**

1. Specify, design, prototype and test electronic systems that perform analog and digital signal processing functions as per user requirements using currently available electronic components
2. Specify, design and test power supplies for electronic systems including battery management, and power amplifiers using currently available electronic components.
3. Architect, partition, and select appropriate technologies for implementation of a specified wired and wireless communication system.

### **Metallurgy**

1. Determine the performance of given metallurgical operations using the core concepts of Thermodynamics, and Heat and Mass Transfer.
2. Select processes of extraction of ferrous and non-ferrous metals and alloys from their ores using mineral dressing and extractive metallurgy.
3. Specify the processes to produce products as per specifications using powder technology, metal forming and foundry technology.
4. Specify the heat treatment processes to modify the properties of metals and alloys for use in specified engineering applications.
5. Specify the processes for metal joining, protecting engineering materials from degradation using the knowledge of principles of wear, electrometallurgy and corrosion.

### **Instrumentation and Control**

1. Develop mathematical models of the industrial process and laboratory systems
2. Specify, design, implement and test electronic analog and digital signal processing systems
3. Specify, design, build and test process and laboratory instrumentation systems
4. Develop hardware and software tools used in industrial automation systems