

Changes to EAC Manual: 12 Program Outcomes (PO) with 5 Complex Engineering Problem

PROGRAMME OUTCOMES (PO)

- (i) Engineering Knowledge
- (ii) Problem Analysis
- (iii) Design/Development of Solutions
- (iv) Investigation
- (v) Modern Tool Usage
- (vi) The Engineer and Society
- (vii) Environment and Sustainability
- (viii) Ethics
- (ix) Communication
- (x) Individual and Team Work
- (xi) Life-long Learning
- (xii) Project Management and Finance

12 POs as in EAC manual 2012

- **PO1 Apply chemical engineering knowledge**
 - Ability to apply general knowledge, sciences, chemical engineering principles to solve **complex chemical engineering problems**
- **PO2 Demonstrate research skills**
 - Ability to investigate, design and conduct experiments, analyze and interpret data, and apply the research skills to **solve complex engineering problems.**
- **PO3 Able to design a system**
 - Ability to design a system or process for **solving complex chemical engineering problems** to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- **PO4 Inculcate computational techniques**
 - Ability to inculcate modern computational techniques and skills to solve **complex chemical engineering** activities.
- **PO5 Responsive to issues**
 - Ability to responsibly act as well as response to the societal health, safety, environment, legal and cultural issues that are relevant to the professional chemical engineering practice.
- **PO6 Practice knowledge for sustainable development**
 - Ability to practice professional chemical engineering knowledge for sustainable development.
- **PO7 Demonstrate problem-solving and thinking skills**
 - Ability to integrate the first principles of mathematics, natural sciences and chemical engineering for **solving complex engineering problems** through creative, innovative, lateral and critical thinking skills.
- **PO 8 Able to communicate effectively**
 - Ability to communicate effectively through written and oral modes to all levels of society.
- **PO9 Possess leadership skills and confidence to work independently and in a team**
 - Ability to work independently, and as a member or a leader in a team to manage project in multi-disciplinary environment.
- **PO 10 Demonstrate high ethical standards**
 - Ability to work ethically according to the norms of chemical - engineering practice.
- **Po11 Display life-long learning skills**
 - Ability to acquire knowledge and engage in life-long learning.
- **PO12 Acquire entrepreneurship skills**
 - Ability to acquire entrepreneurship skills and business insights.



Complex Problem Solving (*Taxonomy Level*)

Problems that can be resolved with in-depth forefront knowledge	
Range of conflicting requirements	Involve wide-ranging or conflicting technical, engineering and other issues.
Depth of analysis required	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models.
Depth of knowledge required	Requires research-based knowledge which allows a fundamentals-based, first principles analytical approach.
Familiarity of issues	Involve infrequently encountered issues
Extent of applicable codes	Beyond codes of practice
Extent of stakeholder involvement and level of conflicting requirements	Involve diverse groups of stakeholders with widely varying needs .
Consequences	Have significant consequences in a range of contexts.
Interdependence	Are high level problems including many component parts or sub-problems.

Complex Engineering Activities *(Scope & Taxonomy)*

Range of resources	Diverse resources (people, money, equipment, materials, information and technologies).
Level of interaction	Require resolution of significant problems arising from interactions between wide ranging or conflicting technical, engineering or other issues.
Innovation	Involve creative use of engineering principles and research-based knowledge in novel ways
Consequences to society and the environment	Have significant consequences in a range of contexts , characterised by difficulty of prediction and mitigation.
Familiarity	Can extend beyond previous experiences by applying principles-based approaches.

How does complexity relates?

- General Subjects
- Industrial Placement
- Core & Specialist (Engineering) Subjects – *Complex Problem Solving*
- Elective Subjects – *Complex Problem Solving*
- Design Project – *Complex Engineering Activities*
- Final Year Project – *Complex Problem Solving*

Design Projects

Design projects shall include **complex engineering problems** and design systems, components or processes integrating core areas and meeting specified needs with **appropriate consideration for public health and safety, cultural, societal, and environmental considerations.**



For FKK,

- We have include the complex engineering problem in

ITE, PSM, Design, Labs