# Complex Engineering Problem (CEP)

| COURSE NAME | Instrumentation and Measurements | COURSE CODE | EE304 |
|---|---|---|---|
| INSTRUCTOR | Dr. Abdul Basit & Dr. Arooj | MAX. MARKS | 100 |
| WEIGHTAGE | 05 % | DEADINE Week | 15th |

| KNOWLEDGE PROFILES | | |
|---|---|---|
| SK1 | A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences | ✓ |
| SK2 | Conceptually-based mathematics, numerical analysis, , data analysis, statistics and formal aspects of computer and information science to support detailed consideration and use of models applicable to the sub-discipline | ✓ |
| SK3 | A systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline | ✓ |
| SK4 | Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline | |
| SK5 | Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations using the engineering of a practice area | ✓ |
| SK6 | Knowledge of engineering applicable in the sub-discipline | |
| SK7 | Knowledge of the role of engineering in society and identified issues in applying engineering , such as public safety and sustainable development (Represented by the 17 UN Sustainable Development Goals (UN-SDG)) | |
| SK8 | Engagement with the current engineering literature of the discipline and awareness of the power of critical thinking | |
| SK9 | Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes | |

| CEP's Characteristic | | CEPs have characteristic SP1 and some or all of SP2 to SP7 | |
|---|---|---|---|
| SP1 | Depth of Knowledge Required | Cannot be resolved without engineering knowledge at the level of one or more of SK 4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed engineering | ✓ |
| SP2 | Range of conflicting requirements | Involve a variety of conflicting technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements | ✓ |
| SP3 | Depth of analysis required | Can be solved by application of well- proven analysis techniques and models | ✓ |
| SP4 | Familiarity of issues | Belong to families of familiar problems which are solved in well- accepted ways | |
| SP5 | Extent of applicable codes | Address problems that may be partially outside those encompassed by standards or codes of practice | |
| SP6 | Extent of stakeholder involvement and conflicting requirements | Involve different engineering disciplines and other fields with several groups of stakeholders with differing and occasionally conflicting needs | |
| SP7 | Interdependence | Address components of systems within complex engineering problems | |

**Instructions/Note:**
Solve your problem by yourself, you are strictly advised to avoid copying from your class fellow, else you will be awarded ZERO Marks. You can take help from internet only to understand the concept and should write the answer as per your own understanding. If you were unable to submit the deliverables as per deadline, it will not be considered for grading.

**Problem Statement:**

**Design** a circuit using sensor technology to solve a real-life challenge. Your design should detail the knowledge about type of sensors, selection of sensors, advantages & disadvantages and finally integration of a sensor/sensors using the development of theoretical circuits and the Arduino or microcontroller.

**Hints:**

- Compare the available sensors properties to design an efficient and cost-effective solution.
- Describe crisply why did you select a specific sensor out of many available for each of the task?

**Deliverables:**

1. Performance effective theoretical design  for solving a real-life problem
2. Cost effective design
3. A detailed report that must have the following
   a. Introduction
   b. Design Methodology
   c. Analysis
   d. Results
   e. Conclusion/Discussion

**Assessment Policy:**

| Sr. No. | Type | Weightage |
|---------|------|-----------|
|         |      | CLO 3 |
| 1 | Background Knowledge | 30 % |
| 2 | Selection of Sensor based on its feature and application | 30 % |
| 3 | Soft Copy of Detailed Report | 40% |