## PROGRAMME OUTCOME MAPPING

1. Apply the knowledge of mathematics, science, engineering fundamentals, and computing for the solution of complex engineering problems.

**Application of Knowledge:** The development of a chatbot involves the application of mathematics and computer engineering fundamentals to create algorithms for natural language processing, demonstrating the application of knowledge in mathematics, science, and computing.

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2. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using computer engineering foundations, principles, and technologies.

**Problem Identification and Analysis:** Chatbots are designed to identify and analyze user queries or problems and provide relevant responses. This involves researching literature on the topics the chatbot is designed to handle, contributing to problem identification and substantiated conclusions.

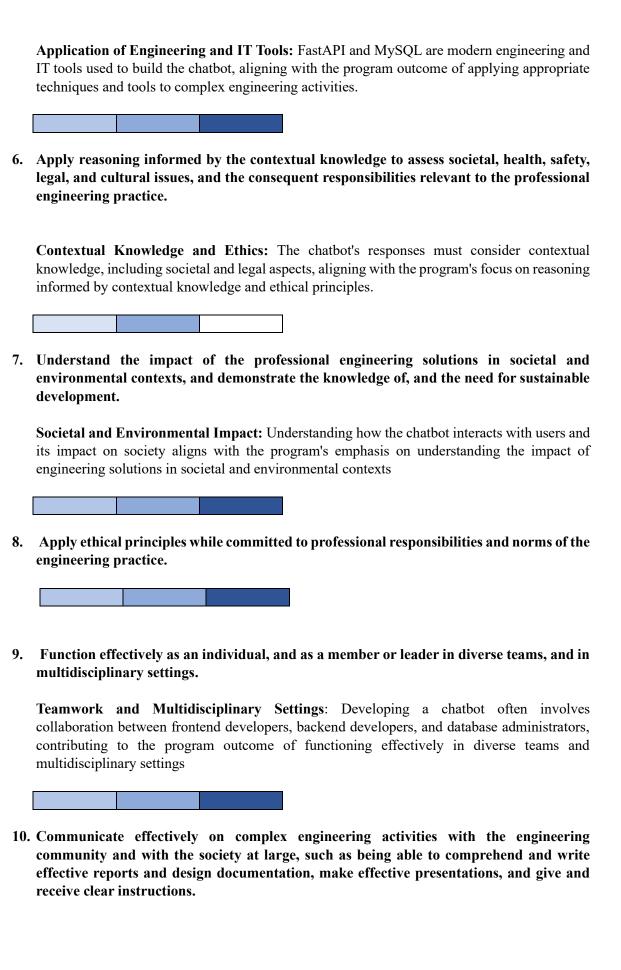
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

When designing a chatbot, considerations for public health and safety, as well as cultural and societal aspects, are important to ensure that the chatbot's responses are appropriate and respectful, aligning with the specified needs.

4. 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.

**Research-Based Knowledge:** Chatbot development may require research on natural language processing techniques and user behavior analysis, leading to valid conclusions about how to improve the chatbot's performance.

5. 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.



**Effective Communication:** The chatbot's ability to comprehend user queries and provide effective responses aligns with program outcome 10, emphasizing effective communication in complex engineering activities.

11. Apply the engineering and management principles to one's work, as a member and leader in a team.

**Engineering and Management Principles:** The project integrates engineering and management principles in the development process, as it involves coordinating tasks and managing project components across multiple technologies.

12. 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.

**Lifelong Learning:** Given the dynamic nature of technology, building and maintaining a chatbot requires ongoing learning and adaptation, demonstrating the need for and ability to engage in independent and lifelong learning.