

Program: B. Sc. Engg. (IPE)
Semester: 6th

Date: 11 March 2024
Time: 10.00 pm to 11:30 pm

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

Mid Semester Examination
Course Number: IPE 4609
Course Title: Product Design I

Summer Semester: 2022-2023
Full Marks: 75
Time: 1 hour and 30 mins

Answer all the 3 (three) questions below. The distribution of marks and the CO-PO mapping are given in brackets.

- Q1.** A cellphone company needs to launch a new series of cellphone to sustain in the competitive market. The company may include all types of design possibilities for its new cellphone design. It needs to consider many factors associated with product development phase. [5+9+3+8] (CO2, PO1)
- i) Define different types of designs.
 - ii) Draw the Ulrich-Eppinger model including the rapid iteration process for the cellphone development phases and briefly discuss the phases.
 - iii) Illustrate various elements of the cellphone development team in a figure.
 - iv) Identify the challenges in the new cellphone development process.
- Q2.** Customers want some exciting features in the new series of smartwatch. As a product developer, you need to focus on the customer needs and design quality features to fulfill the needs. [5+7+9+4] (CO2, PO1)
- i) State the five guidelines for writing needs statements.
 - ii) Draw the diagram of the Kano model and provide concise explanations each Kano attribute. Match the features of your designed smartwatch with the relevant Kano attributes, ensuring that at least one feature is aligned with each attribute.
 - iii) Draw the house of quality (HOQ) matrix and discuss the main sections of the house. Identify the steps involved in the HOQ for translating the customer requirements into quantifiable design variables.
 - iv) Find out the sources of resistance to benchmark the smartwatch.

Q3.

The average annual sales of new cars in Bangladesh are reported to be 14,300 according to a reliable source. A new car manufacturing company is gearing up to produce an environmentally friendly car model. After conducting a thorough market analysis to identify customer needs, the company has entered the concept generation phase. As a car designer:

[10+7+8]
(CO2, PO2)

- i. Describe two concept generation techniques from the following options, which could be employed to generate design concepts for the new car:
 - The Six Thinking Hats
 - 6-3-5 Brainwriting
 - Delphi method
- ii. Construct a PMI analysis format for screening those concepts and state the potential risks associated with selecting or deselecting any concept at this stage.
- iii. Assuming a concept has been selected, a survey was conducted among 1,250 car drivers aged between 20 to 50 years to assess its potential in the market. The survey report data is as follows.

Preference	Definitely not purchase	Probably not purchase	Might or might not purchase	Probably purchase	Definitely purchase
No.	260	110	205	225	450

Assuming that 20% of the average sold cars will be available to customers aware of the new designed car, calculate the estimated number of cars that may be sold after being introduced to the market. Note that calibration constants are unavailable from previous history.