Product Design and Development (315367)

MSBTE Diploma · K-Scheme · Model Question Paper — Set A

Time: 3 Hours **Max. Marks: 70**

Instructions:

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following: **10**

a) Define customer need identification. State its importance in product design.

b) Define product architecture. Give one example.

c) Define ‘design by evolution’. Give one example.

d) Classify consumer products into four types with one example of each.

e) Write the expression for value of a product and name any two types of value.

f) State any four needs of QFD (Quality Function Deployment) in new product development.

g) Compare FDM and SLA 3-D printers on any two points.

Q.2 Attempt any THREE of the following: **12**

a) Explain the five-step concept generation method with a neat flow chart.

b) Explain any four principles of good product design.

c) Explain slot-modular, bus-modular and sectional-modular product architectures with neat sketches.

d) Explain the following aspects of aesthetics in product design: i) Form ii) Proportion iii) Contrast iv) Surface finish.

Q.3 Attempt any THREE of the following: **12**

a) Draw the flow chart of the Design for Manufacturing (DFM) method and explain any two steps.

b) Explain the importance of Voice of Customer (VOC) in QFD with a block diagram.

c) Explain the concept of rapid prototyping. Draw the general process of rapid prototyping.

d) What is concept screening? Prepare a concept-screening matrix for four concepts of a kitchen vegetable chopper and select the best concept.

Q.4 Attempt any THREE of the following: **12**

a) Draw the product life cycle curve and explain its stages.

b) Explain the man–machine closed loop system with a neat sketch.

c) Explain the steps for establishing the architecture of a product, taking a trailer as an example.

d) State the criteria of patentability of an invention. State any two benefits of a patent.

e) Explain the construction and working of a Selective Laser Sintering (SLS) 3-D printer with a neat sketch.

Q.5 Attempt any TWO of the following: **12**

a) Explain the Tyco product development process with a neat flow chart.

b) Explain the industrial design process with a block diagram.

c) What is value engineering? Explain the Value Engineering Job Plan (VEJP) with the example of a bicycle side stand.

Q.6 Attempt any TWO of the following: **12**

a) Draw the House of Quality for a ceiling fan. Customers want low noise, high air delivery, low power consumption, long life and attractive look.

b) What is concept scoring? Using concept scoring, select the best of three back-rest lifting mechanisms for a hospital bed: screw jack, gas spring and ratchet-and-pawl.

c) Explain the impact of DFM decisions on development time, development cost, product quality and external factors.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in