

Product Design and Development (315367)

MSBTE Diploma · K-Scheme · Mechanical Engineering, Semester 5 · Important Questions

How this list was made: Based on MSBTE papers **W-2025** and **S-2026** available on msbte.ac.in (the only two K-scheme papers of this course available so far). Every question of both papers was grouped by topic. **High** = asked in both papers, **Medium** = asked in one paper, **Low** = in the K-scheme syllabus but not asked yet. Practice guidance only — not a prediction of the exam.

Most repeated topics

#	Topic	Unit	Times asked
1	House of Quality – relationship matrix, roof / body ranking for a product	4	4 (W-25, S-26)
2	Product life cycle – stages, importance, determination for a product (bicycle, motorcycle)	3	3 (W-25, S-26)
3	Industrial design process / elements / control drawings and models	3	3 (W-25, S-26)
4	Customer need identification – definition / steps with example	1	2 (W-25, S-26)
5	Types of products (consumer products / product types in development)	1	2 (W-25, S-26)
6	Design by evolution	1	2 (W-25, S-26)
7	Product architecture – definition	2	2 (W-25, S-26)
8	Aesthetics – definition, necessity, aspects (symmetry, colour ...)	2	2 (W-25, S-26)
9	DFM – concept with example / steps flow chart	3	2 (W-25, S-26)
10	Value engineering Job Plan (VEJP) – phases with example	4	2 (W-25, S-26)

Unit I – Product Development

Question / topic	Marks	Asked in	Probability
Customer need identification – definition / steps with example <ul style="list-style-type: none"> Define term Customer need identification. (W-25 Q.1a) Using a practical example, explain steps in the process of identifying customer needs. (S-26 Q.5a) 	2 M, 6 M	W-25, S-26	High
Types of products (consumer products / product types in development) <ul style="list-style-type: none"> Name four types of consumer products. (W-25 Q.1b) Which types of products are involved in product development? (S-26 Q.1a) 	2 M	W-25, S-26	High
Design by evolution <ul style="list-style-type: none"> Define term 'Design by Evolution'. (W-25 Q.1c) Explain the concept of design by evolution with suitable real-world example. (S-26 Q.3a) 	2 M, 4 M	W-25, S-26	High

Principles of good product design • Explain any four principles of Good Product Design. (W-25 Q.2a)	4 M	W-25	Medium
Characteristics of successful product development (development time, development cost) • Explain characteristics of new product development with example: i) Development time ii) Development cost. (W-25 Q.3a)	4 M	W-25	Medium
Phases of product development process / flow chart • State eight phases of process development. (W-25 Q.4a)	4 M	W-25	Medium
Tyco product development process • Explain Tyco Product Development with suitable example. (W-25 Q.5a)	6 M	W-25	Medium
Five-step concept generation method • State the five steps involved in concept generation method. (S-26 Q.4a)	4 M	S-26	Medium
Concept combination table • What is concept combination table? State its purpose. (S-26 Q.1f)	2 M	S-26	Medium
Concept scoring • What is concept scoring? State its purpose. (S-26 Q.2a)	4 M	S-26	Medium
Concept classification tree In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Concept screening matrix In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Seven-step method of concept testing In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Design by innovation; definition of product design In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit II – Product Architecture (incl. Ergonomics, Aesthetics)

Question / topic	Marks	Asked in	Probability
Product architecture – definition • Define product architecture. (W-25 Q.1d) • Define product architecture. (S-26 Q.1b)	2 M	W-25, S-26	High
Aesthetics – definition, necessity, aspects (symmetry, colour ...) • Explain importance of following aspects of Aesthetics in product design: i) Symmetry ii) Colour. (W-25 Q.4b) • What is aesthetics in design? State its necessity. (S-26 Q.5b)	4 M, 6 M	W-25, S-26	High
Steps for establishing product architecture (spanner, trailer) • Explain process of development of 'Product Architecture of a Spanner'. (W-25 Q.2b)	4 M	W-25	Medium

Types of modularity – slot / bus / sectional • Differentiate between Slot and Bus architecture on the basis of flexibility, simplicity, scalability and cost effectiveness. (W-25 Q.3b)	4 M	W-25	Medium
Component standardization • What is component standardization? Also write its examples. (S-26 Q.3b)	4 M	S-26	Medium
Principles of ergonomics • List any two principles of 'Ergonomics'. (W-25 Q.1e)	2 M	W-25	Medium
Man-machine closed loop system • Explain the Man-Machine Closed Loop System with neat sketch. (S-26 Q.2b)	4 M	S-26	Medium
Design considerations for controls (hand wheel, knob, lever, toggle switch) • What are the key design considerations for a hand wheel? (S-26 Q.4b)	4 M	S-26	Medium
Modular vs integral architecture In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Design considerations for qualitative and quantitative displays In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit III – Industrial Design (incl. DFM, Product Life Cycle)

Question / topic	Marks	Asked in	Probability
Product life cycle – stages, importance, determination for a product (bicycle, motorcycle) • State importance of Product Life cycle with diagram. (W-25 Q.4d) • Determine PLC (Product Life Cycle) of a bicycle. (W-25 Q.5b) • How the product life cycle of a motorcycle is determined? Explain with example. (S-26 Q.5c)	4 M, 6 M	W-25, S-26	High
Industrial design process / elements / control drawings and models • Draw block diagram indicating main elements of Industrial Design. (W-25 Q.2c) • Explain Industrial Design Process. (W-25 Q.6a) • Discuss why control models are important in industrial design. (S-26 Q.4c)	4 M, 6 M	W-25, S-26	High
DFM – concept with example / steps flow chart • Explain term DFM (Design for Manufacturing) with suitable example. (W-25 Q.4c) • Draw the flow chart for various steps in design for manufacturing. (S-26 Q.2c)	4 M	W-25, S-26	High

Factors affecting DFM • State the factors that affect on DFM. (S-26 Q.1c)	2 M	S-26	Medium
Impact of DFM on development time, cost and quality • Explain the impact of DFM decision on Development Time and product quality. (S-26 Q.6a)	6 M	S-26	Medium
Importance of industrial design; design principles for manufacturability In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit IV – Value Engineering and QFD

Question / topic	Marks	Asked in	Probability
House of Quality – relationship matrix, roof / body ranking for a product • Draw House of Quality relationship matrix for 'Air compressor' (noise, safety, air delivery, power consumption). (W-25 Q.6b) • Draw House of Quality (HoQ) diagram for a helmet manufacturing company (safety, light weight, stylish, cost). (W-25 Q.6c) • Explain how the house of quality linking customer complaints to technical requirements. (S-26 Q.3c) • Describe the process of designing a drone using roof ranking. (S-26 Q.4d)	4 M, 6 M	W-25, S-26	High
Value engineering Job Plan (VEJP) – phases with example • Explain term VEJP (Value Engineering Job Plan) with example. (W-25 Q.2d) • What is Value Engineering Job Plan (VEJP)? State its various phases. (S-26 Q.6b)	4 M, 6 M	W-25, S-26	High
Value engineering concept / types of product value • Classify term 'Product Value'. (W-25 Q.1f) • What is concept of value engineering? (S-26 Q.1d)	2 M	W-25, S-26	High
QFD – necessity, importance, symbols • State the necessity of QFD during development of new products. (W-25 Q.1g) • State the importance of symbols of QFD? (S-26 Q.1g)	2 M	W-25, S-26	High
Voice of Customer (VOC) – importance, block diagram • Explain 'Importance of VOC (Voice of Customer)' using block diagram. (W-25 Q.3c)	4 M	W-25	Medium
SCAMPER / creative thinking technique • Explain the SCAMPER Technique for creativity with example. (S-26 Q.2d)	4 M	S-26	Medium
Steps in value engineering; problem identification In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit V – Rapid Prototyping and Patent Filing

Question / topic	Marks	Asked in	Probability
Rapid prototyping – principles, advantages, disadvantages, applications <ul style="list-style-type: none"> State principles related to Rapid Prototyping: i) Iterative Development ii) Layer by layer approach. (W-25 Q.3d) State the advantages, disadvantages and applications of rapid prototyping. (S-26 Q.6c) 	4 M, 6 M	W-25, S-26	High
Comparison of 3-D printers (FDM / SLA / SLS) <ul style="list-style-type: none"> Differentiate between FDM and SLS 3-D printer based on resolution, accuracy, material used and applications. (W-25 Q.4e) Compare fused deposition modeling with stereolithography. (S-26 Q.1e) 	2 M, 4 M	W-25, S-26	High
SLA 3-D printer – working with sketch <ul style="list-style-type: none"> Explain working of 'SLA 3-D Printer' with neat sketch. (W-25 Q.5c) 	6 M	W-25	Medium
3-D printing – definition and applications <ul style="list-style-type: none"> What is 3-D printing? State its applications. (S-26 Q.3d) 	4 M	S-26	Medium
Planning for prototyping (PackBot wheel geometry / impact test) <ul style="list-style-type: none"> Explain the PackBot Wheel Geometry/Impact Test in relation with planning for prototyping. (S-26 Q.4e) 	4 M	S-26	Medium
Types of prototypes – proof-of-concept, looks-like, works-like In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
FDM and SLS – construction and working In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Patents and IPR – importance, rights, criteria, filing process In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Exam tips from the two papers

- With only two papers, “High” simply means **asked in both W-2025 and S-2026**. It is a guide for revision order, not a promise.
- House of Quality** was the most repeated topic (4 questions, 4–6 marks). Practise drawing a full HoQ for any product: customer needs with importance, technical requirements, ● ○ △ matrix, roof correlations and the technical-importance (body ranking) row.
- Product life cycle** came 3 times — learn the curve with all four stages and how to determine the stage of a given product (bicycle, motorcycle, EV) from sales trend.
- Diagrams expected: PD process / Tyco flow chart, concept-generation steps, modular architecture types, man–machine loop, hand wheel, ID process, DFM flow chart, PLC curve, VEJP phases, HoQ, SLA / SLS / FDM sketches.

- Patents and IPR (Unit V) and concept screening / testing have **not been asked yet** but are in the syllabus — prepare short answers.

Note: This is a **important-question list 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

