

**NEW PRODUCT DEVELOPMENT
(MECH 3223)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

**Group - A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) One of the important legal issues to be taken care of subsequent to a new product development is
(a) customer feedback (b) patent right
(c) design consideration (d) product profitability.
- (ii) FAST is a method used for finding
(a) product assembly steps (b) customer needs
(c) product function (d) project facilities.
- (iii) If a product is designed based on integral architecture, then
(a) product can become integral part of another product
(b) change of product design in future becomes easy
(c) copying the product by competitor becomes difficult
(d) none of the above.
- (iv) During concept generation and brain storming process
(a) too many ideas should not be generated to avoid confusion
(b) only those ideas that seem feasible should be considered
(c) the discussion should be completed within a predetermined fixed time.
(d) none of the above.
- (v) Components of a product designed following the guidelines of DFA will be
(a) easy to manufacture (b) easy to sell
(c) easy to assemble (d) easy to maintain.
- (vi) What the last letter of "PRIDE" principle stands for?
(a) Excellence (b) Enterprise
(c) Energy (d) Eagerness.

- (vii) It becomes easy for competitors to copy a product if the product has
(a) modular architecture (b) integral architecture
(c) mixed architecture (d) any architecture.
- (viii) Concurrent Engineering means
(a) latest design (b) concept to manufacture
(c) product modelling (d) doing design and manufacturing together.
- (ix) The first full scale functional prototype of a product, constructed from actual materials as the final product is called
(a) Alpha prototype (b) Beta prototype
(c) Gama prototype (d) DOE prototype.
- (x) Specification of a product are subject to the following external constraints
(a) size and weight (b) cost & schedule
(c) environmental regulations (d) all of the above.

Group- B

2. (a) In what way does a 'Product Development' effort differ from 'Product Design' effort. [(CO1)(Remember/LOCQ)]
(b) What team structures are considered for Product Development Team? Explain briefly. [(CO1)(Remember/LOCQ)]
(c) Name and elaborate the 5 steps of 'product development planning'. [(CO1)(Remember/LOCQ)]
4 + 4 + 4 = 12
3. Elaborate the activities under the following product development processes.
(i) Market Opportunity analysis
(ii) Competitive analysis
(iii) Functional Modelling
(iv) Physical & Analytical Modelling. [(CO1)(Remember/LOCQ)]
(3 + 3 + 3 + 3) = 12

Group - C

4. (a) What is S-curve and what does it say about the status of a product in the market? [(CO2)(Remember/LOCQ)]
(b) The cost of a project and its "Return on Investment" are arrived at? [(CO2)(Analyze/LOCQ)]
5 + 7 = 12
5. (a) What are the methods normally employed in finding out customer needs? [(CO2)(Understand/LOCQ)]
(b) Explain what is FAST method and what are it's steps. [(CO2)(Understand/LOCQ)]
6 + 6 = 12

Group - D

6. (a) In the context of new product development, outline the goal and steps of concept generation process. [(CO4)(Analyse/IOCQ)]
 (b) Describe the steps of Brain storming process. [(CO4)(Evaluate/HOCQ)]
 (c) Identify all cost elements to arrive at the final cost of a new product. [(CO3)(Evaluate/HOCQ)]
4 + 4 + 4 = 12
7. (a) What are the merits and demerits of Modular Architecture & Integral Architecture. [(CO3)(Remember/LOCQ)]
 (b) Present the following for Modular design of a Deskjet Printer by Clustering Method.
 (i) Create a function structure of the product
 (ii) Cluster the sub-functions into modular chunks. [(CO3)(Analyse/IOCQ)]
6 + 6 = 12

Group - E

8. (a) What are the uses of a prototype? Describe the characteristics of Beta and Preproduction prototypes. [(CO6)(Evaluate/HOCQ)]
 (b) What influences writing 'specification' of a new product. List six (6) parameters that should be specified for a new product giving reasons for specifying those. [(CO5)(Remember/LOCQ)]
6 + 6 = 12
9. (a) In the context of Design for Manufacture and Assembly of a product, briefly explain with relevant sketch the following :
 (i) Design for Joining guideline (give 1 example)
 (ii) Design for Assembly guideline (give 1 example). [(CO5)(Analyse/IOCQ)]
 (b) In the context of new product, what is 'Benchmarking' and what are its benefits? [(CO5)(Analyse/IOCQ)]
 (c) What are the three (3) things "Failure Mode & Effect Analysis" does for a product. List 4 (four) potential causes of failures of a product and their potential effects. [(CO6)(Analyse/IOCQ)]
4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	23	62.5	14.5

Course Outcome (CO):

On completion of the course, a student will be able to

- C01 Identify market opportunity for new products and initiate necessary actions for developing the product.
- C02 Forecast technology requirement, assess market demand and customer needs and work out project cost and ROI of a product.
- C03 Prepare detailed product architecture and product costing.
- C04 Conduct brainstorming and generate ideas.
- C05 Set final product specification taking into account its manufacturability, assembly and maintenance.
- C06 Create prototype of a product, validate its performance and carry out failure analysis.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question;
HOCQ: Higher Order Cognitive Question