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B.E. (FULL TIME) DEGREE – END SEMESTER EXAMINATION – APR / MAY 2012
VIII SEMESTER – MECHANICAL ENGINEERING – REGULATION 2008

40

MF – 9021: PRODUCT DESIGN & DEVELOPMENT

Max. Time: 3 hours

Answer all questions

Max. Marks: 100

PART – A (10 x 2 = 20 marks)

1. Define 'pipeline management' and list its factors.
2. Name the four commonly used methods for documenting interaction with customers.
3. List the four steps in the process of establishing 'target specification'.
4. What is 'gallery method' as in 'concept generation'?
5. What is 'story board' as in 'concept screening/testing'?
6. Differentiate between the three types of modularity with necessary diagram as in 'product architecture'.
7. What is 'control drawing' as in 'industrial design'?
8. Write the expression for 'Design For Assembly – Index'.
9. Differentiate between 'alpha' and 'beta' prototypes.
10. List the four steps in the 'economic analysis' of a product development project.

PART – B (5 x 16 = 80 marks)

11. (i) Explain the principles of prototyping with suitable graphs and drawings. (10)
(ii) Explain the limitations of quantitative analysis with respect to product development economics. (6)
- 12a. Compare the following types of 'product process' with a short description and application examples: (16)

(1) Generic products	(2) Technology push products
(3) Platform products	(4) Process intensive products
(5) Customized products	(6) High risk products
(7) Quick build products	(8) Complex system.

[OR]

- 12b. (i) Describe the four types of 'product development projects'. (4)
(ii) Write the 'Interpreted need' for the given below customer statements on a hand-held, battery operated, portable screw driver. (12)

Prompt

Typical Uses

Customer Statement

1. I need to drive screws fast, faster than by hand.
2. I sometimes do duct work; use sheet metal screw.
3. A lot of electrical; switch screw covers, outlets, fans, kitchen appliances.

Likes – Current tool	4.	I like pistol grip; it feels the best.
	5.	I like magnetized tip.
Dislikes – Current tool	6.	I don't like it when the tip slips off the screw.
	7.	I would like to be able to lock it so I can use it with a dead battery.
	8.	Can't drive screws into hard wood.
	9.	Sometimes I strip tough screws.
Suggested improvements	10.	An attachment to allow me to reach down skinny holes.
	11.	A point so I can scrape paint off of screws.
	12.	Would be nice if it could punch a pilot hole.

13a. Explain the five step process in 'setting final specifications' as in 'product specification'. **(16)**

[OR]

- 13b.** (i) Explain the four guidelines that are used in improving both individual and group 'internal search' as in 'concept generation'. **(8)**
(ii) Explain the four benefits of 'concept classification tree' with a neat example diagram. **(8)**

- 14a.** (i) Describe six potential benefits of structured 'concept selection' method. **(12)**
(ii) Explain the following format used for survey in 'concept testing'. **(4)**
(1) Face to face interaction. (2) Electronic mail.

[OR]

14b. Explain the eight factors that aid 'clustering' of elements in schematic as in 'product architecture'. **(16)**

- 15a.** (i) Explain the importance of 'aesthetic needs' in industrial design of a product. **(6)**
(ii) Given in figure – 1 (at page 3) is a **cast** Drill Base. Neatly sketch an isometric view and or multi-view of the redesigned Drill Base for **welding** process. Add details of the DFM (Design for Manufacturing) recommendations for **welded** design of Drill Base. **(10)**

[OR]

- 15b.** (i) Draw the flow chart for 'design for manufacturing' process steps. **(6)**
(ii) Given in figure – 2 (at page 4) is a **welded** Swing Bracket. Neatly sketch an isometric view and or multi-view of the redesigned Swing Bracket for **casting** process. Add details of the DFM (Design for Manufacturing) recommendations for **cast** design of Swing Bracket. **(10)**