



MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

## VII SEMESTER B.TECH. (AUTOMOBILE ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: PRODUCT DESIGN AND MANUFACTURING [AAE 4029]

## REVISED CREDIT SYSTEM (01/12/2018)

Time: 3 Hours

MAX. MARKS: 50

## Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed
- **1A.** What are the product requirement in the design criteria in the case of **(02)** conceptual design of a motorcycle tire dismounting tool for One-handed use?
- 1B. Define quality function deployment. Discuss with block diagram various (04) modules of House of Quality.
- 1C. Explain with neat sketch relevance of ribs, gussets, webs and corrugations in (04) the product design process. What is the objective of material reduction in product design?
- 2A. What is the role of Theory of inventive problem solving in the process of (05) product design? Explain any four principles of TRIZ recommended in automotive field.
- 2B. What is optimization? Discuss the role of linear programming in optimization. (05) How the problem formulation or modeling is accomplished in respect of design of a metallic can to hold at least 500 ml of liquid?
- 3A. Explain why strength is considered as an important factor in the design (05) process. Discuss with neat sketch how design is balanced in the case of 'C' clamp? Explain the significant difference in design consideration of 'C' clamp and 'screw gauge'.
- **3B.** Describe the relevance of locators and clamps. Sketch and explain 3-2-1 **(03)** locating principle
- **3C.** Explain various parameters considered for the product design (02)

- 4A. Explain the following: Need, functionality, Utility, Ergonomics, Aesthetics, (06) Manufacturability in respect of any one of the product given below i) Fruit / vegetable peeler ii) Water tap.
- **4B.** Illustrate with neat sketch an expression to show that the connecting rod is **(04)** four times strong in buckling about Y-axis than about X-axis.
- **5A.** Differentiate design for manufacturing and design for assembly. Explain any **(03)** four principles of design for assembly with example.
- **5B.** Standardization covers a wide range of activity. Identify and illustrate five **(03)** important activity with suitable example.
- 5C. Discuss the following in respect of helmet design: (04)i) Objective of helmet ii) Design criteria.