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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

MAKE UP EXAMINATIONS, DEC 2018

SUBJECT: PRODUCT DESIGN AND MANUFACTURING [AAE 4029]

REVISED CREDIT SYSTEM

(02/01/2019)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ❖ Answer **ALL** the questions.
- ❖ Missing data may be suitable assumed

- 1A.** Explain the following terms with respect to design of helmet **(05)**
i) Design considerations ii) Structure of Helmet.
- 1B.** What is the role of ergonomics in product design? Discuss any three 'typical' **(03)**
ergonomic problems found in the workplace with solution.
- 1C.** Describe measures to be taken to prevent buckling while a 'circular tube' is **(02)**
under bending and torsional load.
- 2A.** Explain various methods of concept generation with suitable example. **(03)**
- 2B.** i) Solve the problem for maximization by graphical method: **(07)**
Max $Z = 0.65M + 0.45Y$
s.t. $3M + 1.5Y \leq 30,000$
 $2M + 3Y \leq 40,000$
 $M \leq 9,000$
 $M \geq 0$ and $Y \geq 0$
- 3A.** What is the objective of balancing of design? Illustrate with neat sketch how it **(05)**
is accomplished in respect of gear and pinion design process.
- 3B.** What is the role of locator in making ease of machining? Discuss with neat **(03)**
sketch three different forms of locators.

- 3C.** Differentiate design by evolution and design by innovation with suitable example. **(02)**
- 4A.** Explain the following terms: Need, functionality, Utility, Ergonomics, Aesthetics, Manufacturability in respect of any one of the product given below
i) door latch ii) nail clipper. **(05)**
- 4B.** Explain the following in respect of design of hollow square-cross-section cantilever beam with suitable example: **(05)**
i) Objective of design ii) data and information collection iii) design variables.
- 5A.** Explain with suitable example the role of surplus and slack variables in Optimization. **(03)**
- 5B.** Explain the role of the following in product design: **(03)**
i) Simplification ii) Specialization.
- 5C.** Identify various practical methods for material saving in design. What is the objective of material saving in product design? Discuss with suitable example and neat sketch any two methods. **(04)**