



**National Institute of Technology, Rourkela**  
**Department of Industrial Design**  
*End Semester Examination 2021-22 (Spring Session)*

**Subject Code:** ID 2202

**Subject:** Materials and Processes for Design

**Max. Marks:** 50

**Duration:** 3hrs.

**Instructions:** Answer any FIVE of the following questions

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- 1 A Explain the shaping of plastic materials with a neat sketch for the following processes:  
i. Expanded foam molding                      ii. Polymer and Ceramic Extrusion [8]  
iii. Vacuum Bag Lay-Up Method      iv. Plug Assisted Thermoforming  
B Briefly describe plastic and wood utilization in domestic applications. [2]
- 2 A Explain the shaping of sheet metals with a neat sketch for the following processes:  
i. Blanking              ii. Nibbling              iii. Drawing              iv. Spinning [8]  
B What is the role of sheet metal utilization in product design of consumer goods? [2]
- 3 A Represent following tools used to perform a typical turning operation:  
i. Parting Tool                      ii. Right Hand Turning [2]  
iii. Radius Turing Form Tool      iv. Chamfering Tool  
B Differentiate Planing and Shaping operations while representing the mechanism used for material removal process. [4]  
C Represent the following joint profiles typically used in joining process:  
i. Cylinder to Cylinder Sleeve Joint                      ii. Cylinder Plain Intersect Joint  
iii. Plate to Plate double Lap Joint                      iv. Stud Through Joint [4]
- 4 A List out the properties of Adhesives that are used for joining of different materials and represent the same in Matrix form. [4]  
B Describe the joining processes with the aid of following mechanical fasteners with neat diagrams:  
i. Riveting      ii. Stapling      iii. Screws      iv. Snip Fits [4]  
C What type of products can be produced from sewing as principal joining process? [2]
- 5 A What is the role of surfacing in product design? Give the classification of various surfacing processes. [2]  
B Describe the following surfacing processes with supporting diagrams and its applications:  
i. Etching                      ii. Texturing [4]  
C Differentiate between the following surfacing processes with neat sketches:  
i. Water-based painting              ii. Solvent based Painting [4]
- 6 A Explain the working of Mechanical Polishing with appropriate diagrams in order to enhance the surface characteristics of a product. [2]  
B Compare the following plating methods in order to enhance the dimensional accuracy of the component surfaces: [4]  
i. Electro-plating                      ii. Electro-less plating  
C Describe the following printing processes with neat sketches which can be performed on the component surfces: [4]  
i. Screen Printing                      ii. Hot Stamping