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(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS 2021/2022 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER SPECIAL/SUPPLIMENTARY EXAMINATIONS

FOR THE BACHELOR OF SCIENCE IN MECHANICAL AND INDUSTRIAL ENGINEERING

COURSE CODE: MIE 482

COURSE TITLE: MATERIAL FORMIMG TECHNOLOGY

DATE: 6 – 10 - 2022 **TIME:** 3:00 PM – 5:00 PM

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory
Answer Any Other TWO (2) questions

TIME: 2 Hours

QUESTION ONE (30 marks)

a) By the use of a flow chart, classify material forming processes **(4 marks)**

b) With reference to drawing, what are the differences between wire and bar drawing? **(4 marks)**

c) With regards to bending, explain the concept of spring back **(2 marks)**

d) With the use of an appropriate diagram, derive an expression for determining the rolling force during rolling and the power required to drive each roll **(8 marks)**

e) Cold upset forging of a cylindrical billet of initial height 60 mm and initial diameter 30 mm, results in a final reduced height of 40 mm. The material of the billet has flow stress given as 208.65 MPa. The coefficient of friction between the billet and die surfaces can be assumed to be 0.1. What is the forging force required at the reduced height?**(4 marks)**

f) What is the main difference between metal and plastic extrusion? **(2 marks)**

g) With regards to material forming, explain the nature of plastic deformation and how it aids in material forming **(6 marks)**

QUESTION TWO (20 marks)

a) Using a pressure –ram travel curve, explain the variation of the extrusion pressure versus ram travel for both direct and indirect extrusion and explain what is responsible for this variation **(10 marks)**

b) With regards to plastic molding processes and using appropriate diagrams, explain how Thermoforming and plastic extrusion are done **(10 marks)**

QUESTION THREE (20 marks)

a) By the use of appropriate diagrams, explain four (4) types of extrusion processes **(8 marks)**

b) A mild steel sheet with a mean flow stress of $100N/m^2$ has a width of 60 mm. It is rolled from its initial thickness of 15 mm to a reduction in thickness of 30% when passing between rolls of 500 mm diameter. If an allowance of 20% is to be made for friction, then calculate:

I. the required roll load

II. the power required if the rolls rotate at 500 rev/min

(6 marks)

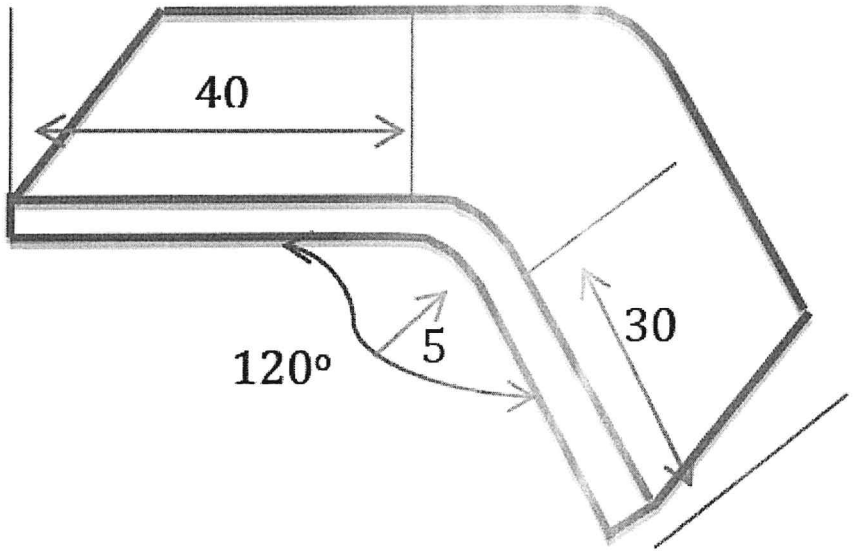
c) with regards to injection molding, outline the steps in designing of an injection mould

(6 marks)

QUESTION FOUR **(20 marks)**

a) With reference to bending, explain any four (4) bending processes **(8 marks)**

b) A certain sheet metal(Ultimate tensile strength = 300 MPa), having a thickness of 3 mm and width 40 mm is subjected to bending in a v-die with opening of 22 mm. The other dimensions are as shown in figure. What are the blank size and bending force required? Ignore springback. **(7 marks)**



c) Explain any five (5) rolling processes in material forming **(5 marks)**