



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

SECOND YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 200: COMPUTER AIDED DRAWING AND DESIGN

DATE: 22/3/2021

TIME: 2.00-4.00 PM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTIONS ONE (30 MARKS)

- a) Describe in details the following components of a CAD system.
 - i. Hardware (3 marks)
 - ii. Application software (3 marks)
 - iii. Operating system (3 marks)
- b) State three advantages and three disadvantages of CAD over the conventional methods of drawing and design. (6 marks)
- c) Describe the functions of the following tools.
 - i. Array tool (2 marks)
 - ii. Offset tool (2 marks)
- d) Define Layers as used in computer aided design (2 marks)
- e) State the functions of the following tabs found at the bottom corner ribbon in AutoCAD.
 - i. Ortho mode (1 mark)
 - ii. Snap mode (1 mark)
 - iii. Grid display (1 mark)
 - iv. Polar tracking (1 mark)

- f) What is the function of a Graphical User Interface (GUI) (2 marks)
- g) Define what is a drawing template in CAD (2 marks)
- h) State at least two ways of inputting commands on AutoCAD (1 mark)

QUESTIONS TWO (20 MARKS)

- a) Describe the following types of 3-D modelling techniques. Cite an example of its application, advantages and disadvantages for each.
 - i. Wire frame modelling (5 marks)
 - ii. Surface modelling (5 marks)
 - iii. Solid Modelling (5 marks)
- b) Briefly describe the following solid representation schemes.
 - i. Spatial occupancy enumeration (SOE) (2 marks)
 - ii. Boundary representation (B-Rep) (2 marks)
- c) List any two surface modelling techniques (1 mark)

QUESTIONS THREE (20 MARKS)

- a) Explain the following 2-D draughting techniques
 - i. Pixel painting technique (3 marks)
 - ii. Vector-based technique (3 marks)
- b) A line with end points A(2, 3, 2) and B(10, 12, 8) is rotated 60° counter-clockwise about the z-axis, then translated by a vector $[5 \ 4 \ 8]^T$ and finally scaled by (2, 2, 3). Determine the final coordinates of the line (10 marks)
- c) Discuss how to draw figure Q3c using the following point entry techniques
 - i. Using absolute co-ordinates (2 marks)
 - ii. Using relative co-ordinates (2 marks)

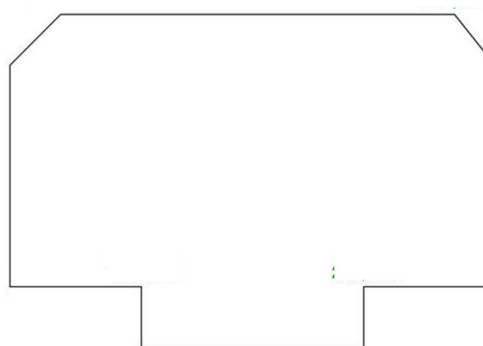


Figure Q3c

QUESTIONS FOUR (20 MARKS)

- Explain the procedure of adding text to drawings on AutoCAD (3 marks)
- Define hatching as used in sectional views (2 marks)
- Describe how blocks are inserted into other drawings in AutoCAD (3 marks)
- Outline the steps utilised in constructing the drawings of the objects in the following figures
 - Figure Q4d(i) (6 marks)

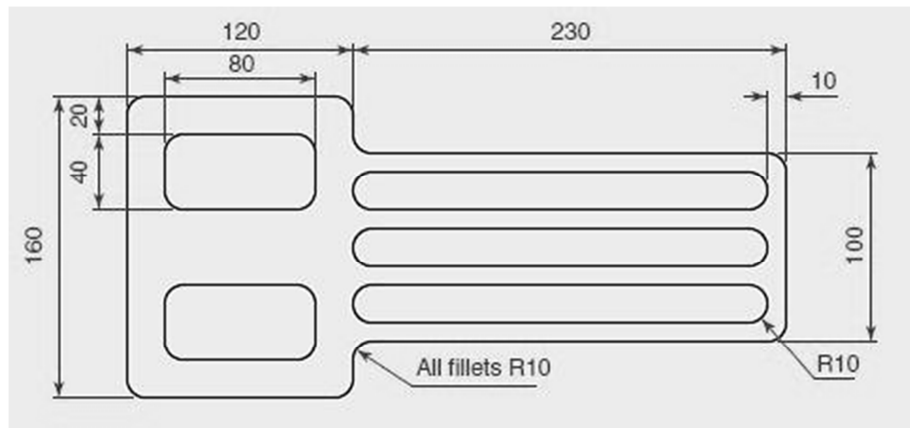


Figure Q4d(i)

- Figure Q4d(ii) (6 marks)

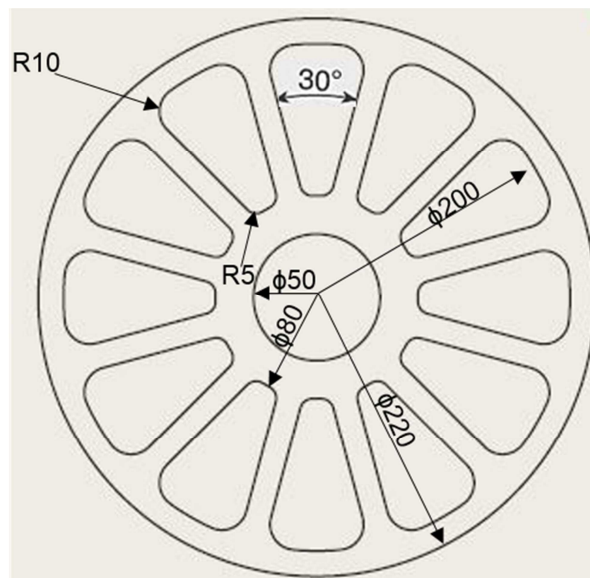


Figure Q4d(ii)

QUESTION FIVE (20 MARKS)

- a) Using diagrams, describe the functions of the following 3-D tools
- i. Revolve tool (2 marks)
 - ii. Lofting tool (2 marks)
 - iii. Extrude tool (2 marks)
 - iv. Sweep tool (2 marks)
 - v. Union tool (2 marks)
- b) Outline the steps involved in creating a 3-D solid model from the provided information in figure Q5(d) (10 marks)

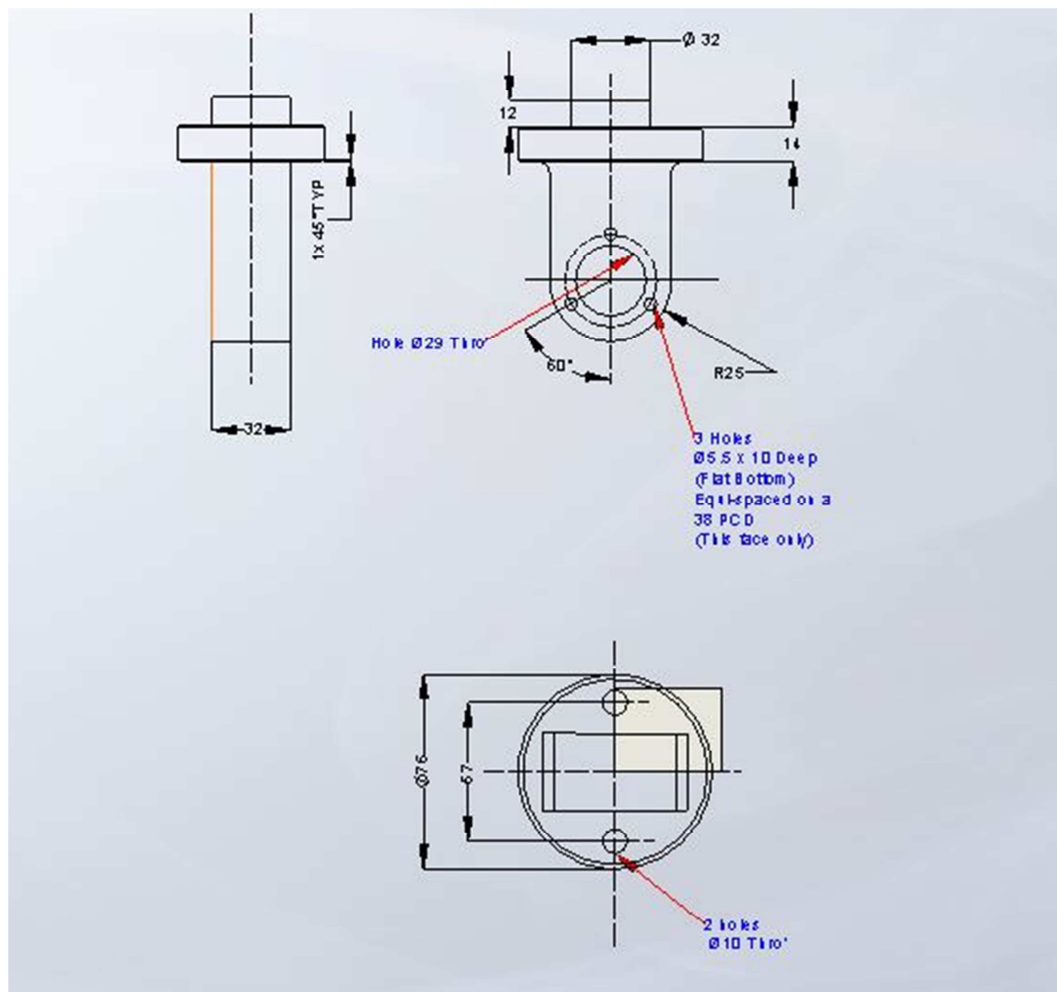


Figure Q5(d)