MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATIONS FOR THE DEGRE OF BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMM 200: COMPUTER AIDED DRAWING AND DESIGN

DATE: MAY 2019 TIME: 2 HOURS

This paper contains FIVE questions

Question ONE is compulsory and carries 30 Marks

Questions TWO – FIVE carries 20 Marks each. Attempt any two.

QUESTIONS ONE

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

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

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)**

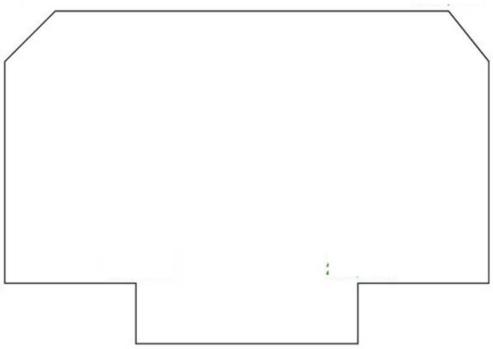

Figure Q3c

QUESTIONS FOUR

a) Explain the procedure of adding text to drawings on AutoCAD **(3 Marks)**

b) Define hatching as used in sectional views **(2 Marks)**

c) Describe how blocks are inserted into other drawings in AutoCAD **(3 Marks)**

d) Outline the steps utilised in constructing the drawings of the objects in the following figures

i. Figure Q4d(i) **(6 Marks)**

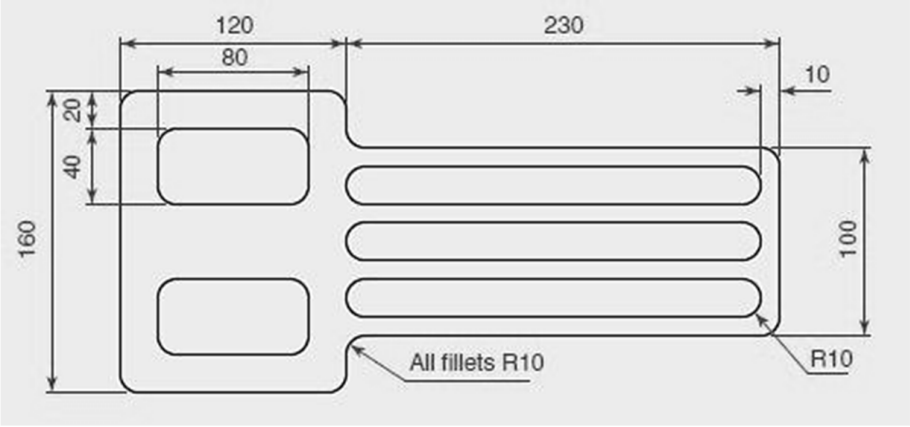

Figure Q4d(i)

ii. Figure Q4d(ii) **(6 Marks)**

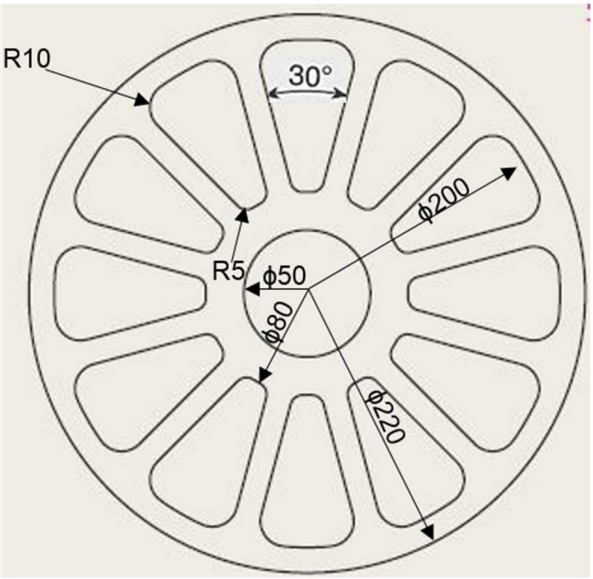

Figure Q4d(ii)

QUESTION FIVE

a) Using diagrams, describe the functions of the following 3-D tools

i. Revolve tool **(2 Mark)**

ii. Lofting tool **(2 Mark)**

iii. Extrude tool **(2 Mark)**

iv. Sweep tool **(2 Mark)**

v. Union tool **(2 Mark)**

b) Outline the steps involved in creating a 3-D solid model from the provided information in figure Q5(d) **(10 Marks)**

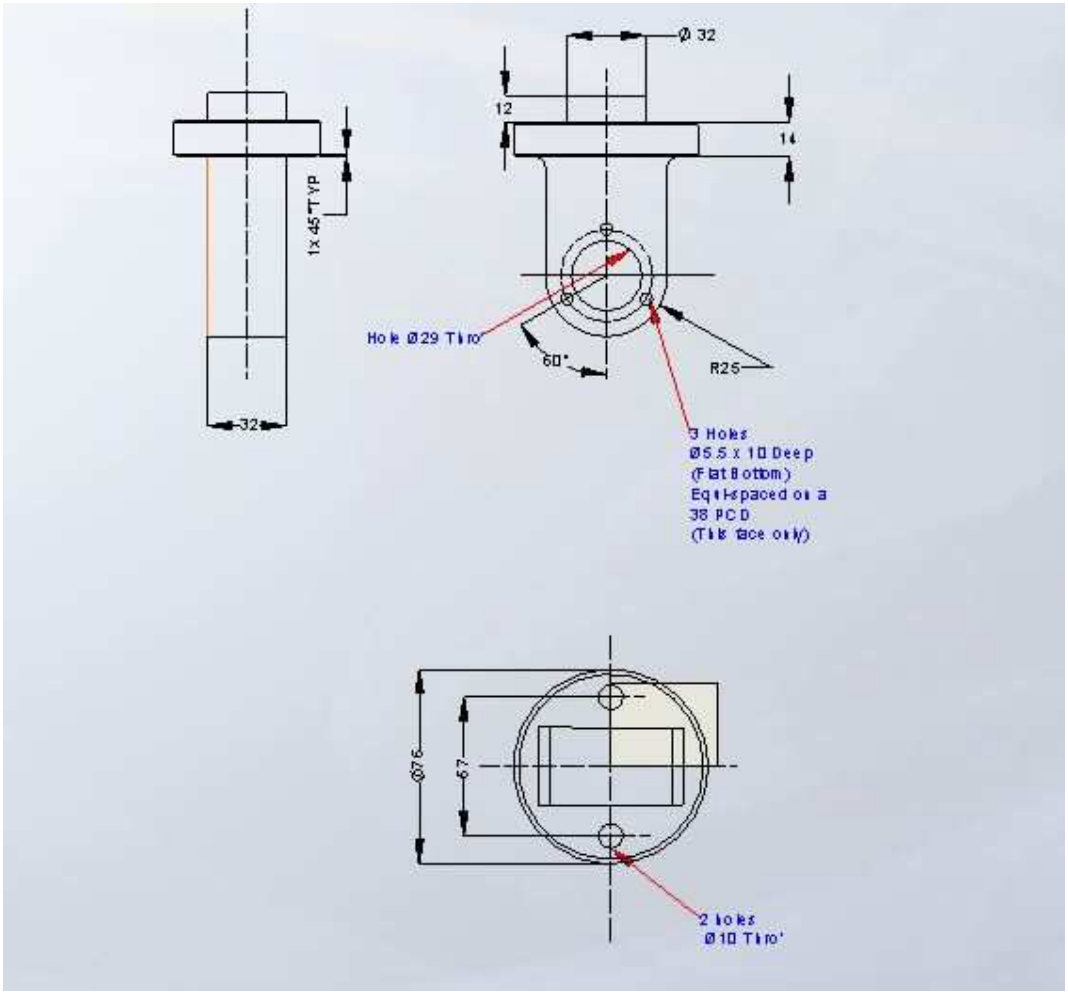
Ø 32
12
14
1x 45°TYP
32
Hole Ø29 Thro'
60°
R25
3 Holes
Ø5.5 x 10 Deep
(Flat Bottom)
Equi-spaced on a
38 PCD
(This face only)
Ø76
57
2 holes
Ø10 Thro'

Figure Q5(d)