

Instructions to candidates

Duration: Two (02) hours

Number of questions: Four (04) Essays

Mark allocation: 100 marks

Answer all questions.

1.
 - a. Describe the "Sequential Product Development Process". (06 mark)
 - b. Define the Simultaneous / Integrated Product Development Process. (04 mark)
 - c. Define the Generic Product Development Process. (05 mark)
 - d. Briefly explain the conceptual design and detail design. (04 mark)
 - e. Explain the Needs Recognition Process in the Product Development Cycle. (06 mark)

2.
 - a. Define Computer Aided Manufacturing. (05 mark)
 - b. Discuss the functions associated with the CAM. (05 mark)
 - c. Give five advantages of CAM. (05 mark)
 - d. Draw the typical model of CIM implementation. (05 mark)
 - e. Give two definitions for "Features". (05 mark)

3.
 - a. Draw and name all the solid primitives. (07 mark)
 - b. Draw the CSG tree for the objects shown in Figure 01 and Figure 02. (18 mark)

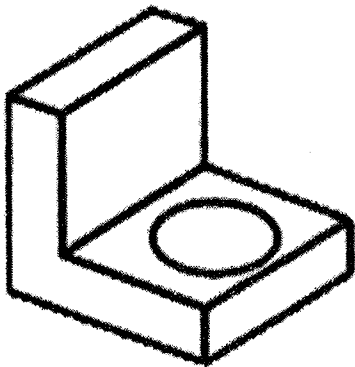


Figure 01

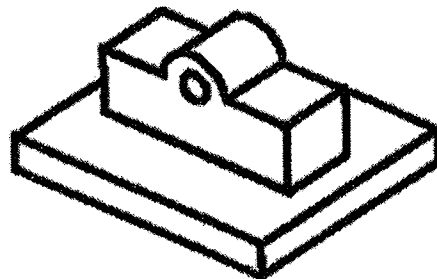
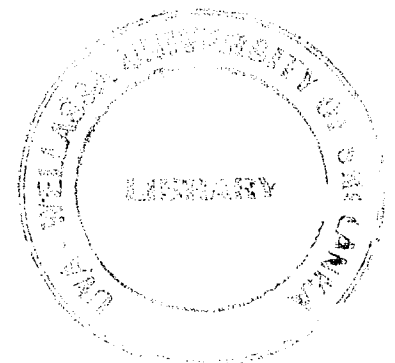


Figure 02



4.

- a. Discuss three applications of CNC machines. (05 mark)
- b. Give advantages and drawbacks of CNC machines. (05 mark)
- c. Write G-code for the part shown in Figure 03. List of G-codes and M-codes are given at the end of the question paper. Thickness of the part is 8mm. Give the diameter of the tool used, selected origin for the work coordinate system and other assumed data. (15 mark)

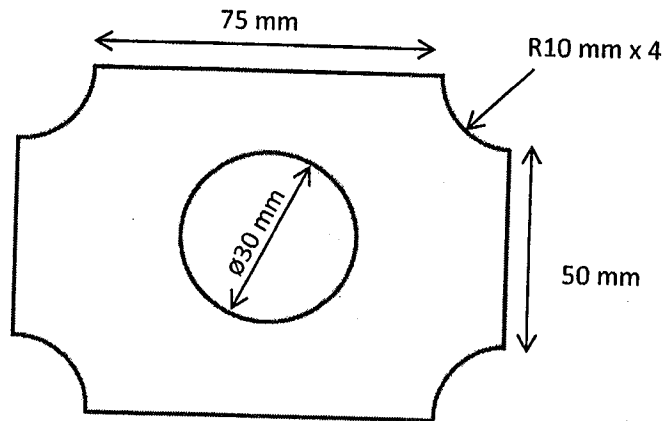


Figure 03

M-Code	Function
M00	Program stop
M02	End of program
M03	Spindle ON FWD
M04	Spindle ON REV
M05	Spindle stop
M06	Tool change
M08	Coolant ON
M09	Coolant OFF
M30	Jump to new program
M98	Call sub-program
M99	End sub program
M100	Mirror image
M105	Dry-run, all axes
M106	Dry-run, NO Z axes
M107	Dry-run off (cancels M105 or M106)

G-Code	Function	G-Code	Function
G00	Positioning (rapid traverse)	G04	Dwell
G01	Linear interpolation (feed)	G05	Ellipse
G02	Circular interpolation CW	G09	Exact stop check
G03	Circular interpolation CCW	G28	Return to machine home
G22	Stored stroke limit ON	G29	Return from machine home
G40	Tool radius compensation cancel	G31	Probe move
G41	Tool radius compensation (left)	G45	Mold rotation
G42	Tool radius compensation (right)	G49	Elbow milling
G53	Work coordinate system	G62	Automatic feed override for arc
G59	Model corner rounding	G63	Automatic feed override for arc cancel
G60	Model corner rounding off	G65	User macro single call
G61	Exact stop check mode	G66	User macro modal call
G64	Cutting mode (continuous path on)	G67	User macro modal call cancel
G66	User macro modal call	G68	Coordinate system rotation
G67	User macro modal call cancel	G73	Draft pocket milling cycle
G68	Coordinate system rotation ON	G75	Frame milling
G70	Inch programming	G76	Hole milling cycle
G71	MM programming	G77	Circular pocket cycle
G72	Axis scaling	G78	Rectangular pocket cycle
G90	Absolute programming	G79	Bolt hole circle cycle
G91	Incremental programming	G80	Cancel modal drilling
G94	Per minute feed	G169	Area clearance
G95	Per revolution feed	G170	Facing cycle
G81	BASIC drilling cycle	G171	Circular profile cycle
G82	Counter bore drilling cycle	G172	Rectangular profile cycle
G83	Basic peck cycle	G177	Plunge circular pocket
G84	Tapping cycle	G178	Plunge rectangular pocket
G85	Basic bore cycle	G179	Hole pattern drilling
G86	Uni-directional boring cycle	G181	Thread mill cycle
G87	Chip break drilling cycle		
G89	Flat bottom bore cycle		
G92	Absolute zero Preset		

