GOVT CO-ED POLYTECHNIC

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LAB MANUAL

Branch: Mechanical Engineering

Year & Semester: 3rd Year & 6th Semester

Computer aided modeling and manufacturing

EXPERIMENT LIST

EXPERIMENT No-1

Aim: - Draw the plan and elevation of the given drawing using autocad-2016.

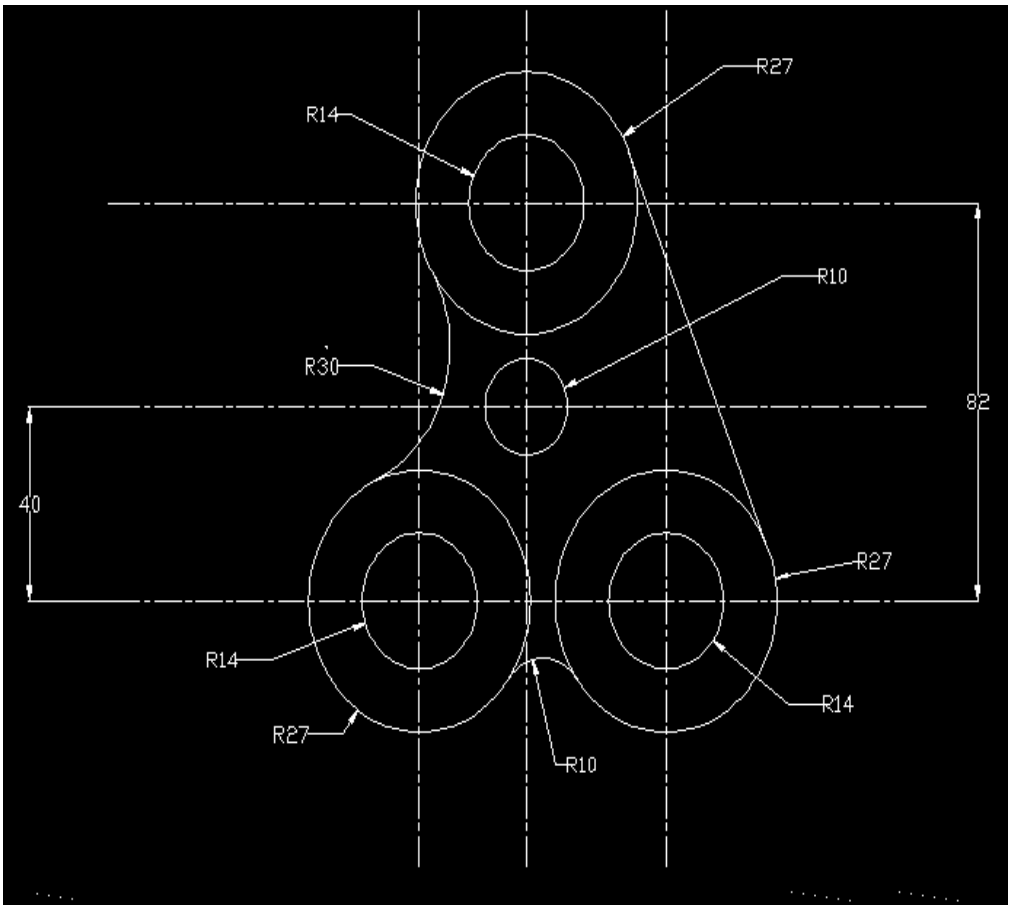
Hardware specification:-

Zenith premium PC with Intel Pentium 4 Processor 3.06GHZ, 533 MHZ FSB 1MB cache, Intel 615 chip set mother board, 8GB SATA hard disk.1GB DDR RAM. Maximum 3d/2d resolution of 2048×1536, 16 million colors (shared memory using dynamic video memory technology) On board 10/100 LAN chip. PS2, 107keys keyboard, Optical Mouse, 17" pure flat CRT monitor.

Commands used: - Construction line, circle, fillet, Tangent trim offset.

Procedure:-

1) Invoke auto cad -2008 from the menu or from shortcut icon on the desktop.
2) Set limits for the working window
   limits <enter> (0,0)<enter>(150, 150) <enter>
   xl <enter> select horizontal line and again.
   xl <enter> select vertical line. The origin is considered as O1.
3) Draw a circle of diameter 28 mm from the origin (O1)
4) Now take an offset command with a distance of 60mm and draw a vertical line on right side. The origin is considered as O2. From origin O2 draw a circle of diameter 28mm.
5) Draw the circle of radius 27mm from the originsO1 and O2.
6) With an offset command, draw a horizontal line with a distance of 40mm in the upward direction from the origins O1 and O2 lines. Draw a vertical line on the right side with an offset distance of 26mm from the origin O1 line. This gives us an origin O from the origin O3; draw a circle of dia 20mm.
7) With an offset command, draw a horizontal line with a distance of 82mm in the upward direction from the origin O1 andO2 line. We get origin O4 from origin O4draw a circle of 28mm dia and 27mm radius
8) Use the fillet command to get an arc on the large circle of origin O1 and O4 with a 30mm radius and on the large circle of origin O1 andO2 with a radius 10mm.
10) Using OSNAP function, ⊙ settings ⊙ tangent draw a line on O4 and O2.

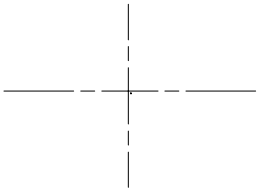

R27
R14
R10
R30
82
40
R27
R14
R14
R27
R10

Aim: To draw the following orthographic figure using ACAD

PROCEDURE

STEP 1: Draw axis lines in the respective format with their intersection point at **(0,0)**

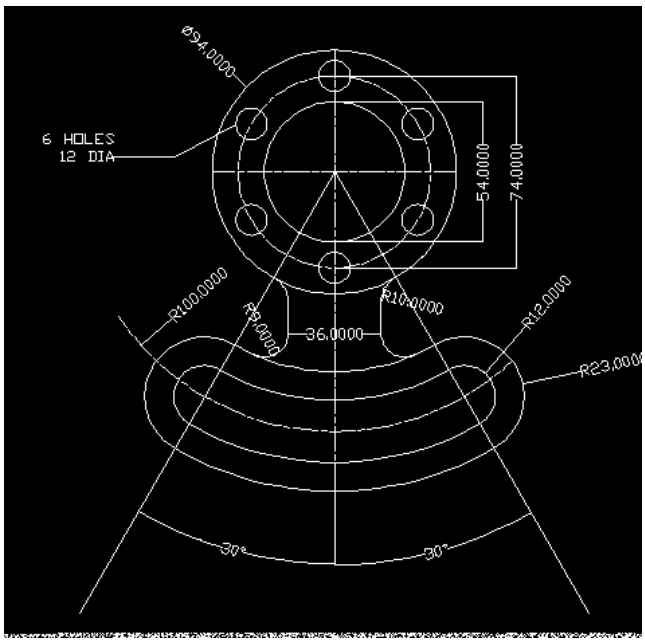
- Go to **PROPERTIES** tool bar
- Load line type as **ISO LONG DASH SHORT DASH** in the line type area.
- Select line type ISO LONG DASH SHORT DASH in the line type area.

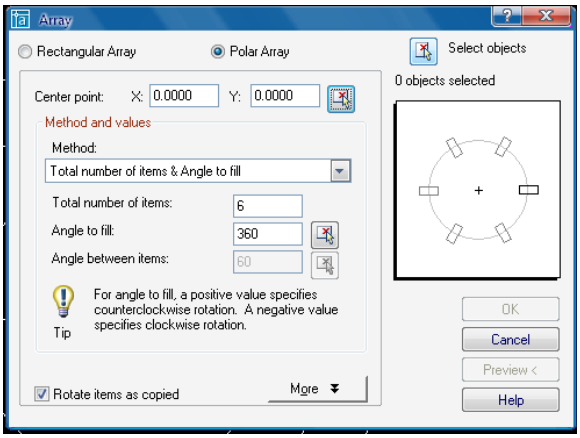


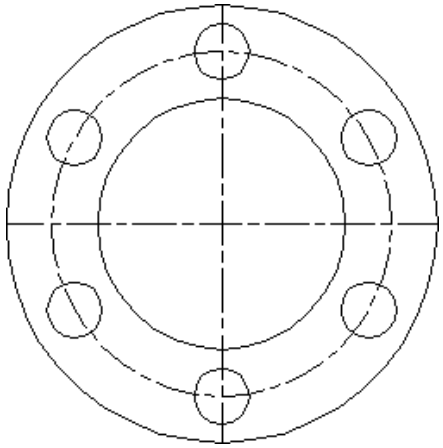
STEP 2 a: Draw circles of given dimensions using circle command with their centre as the intersection of the axis lines.

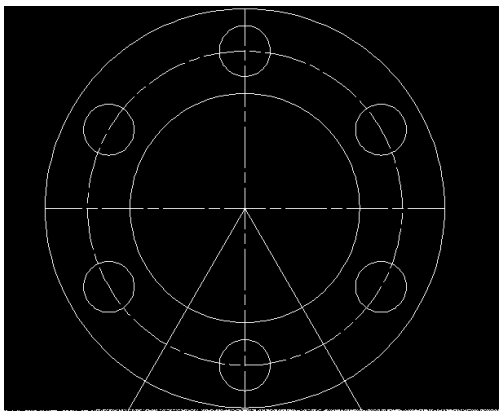
- 3 circles of diameters 94, 74 and 54 are to be drawn
- The circle with 74 diameter is of **ISO LONG DASH SHORT DASH** format

STEP 2 b: Using **POLAR ARRAY** draw the 6 holes on the circle of diameter 74 each of 12 dia as shown in the figure below









STEP 3: Draw two construction lines at an angle of 30^{o} to the vertical axis line

STEP 4: With A as center an radius 100 draw an arc between the above lines

STEP 5: Offset the arc on the either side by the distances as mentioned in the figure.

STEP 6: Complete the figure by using fillet command.

STEP 7: Give dimensions to the completed figure.

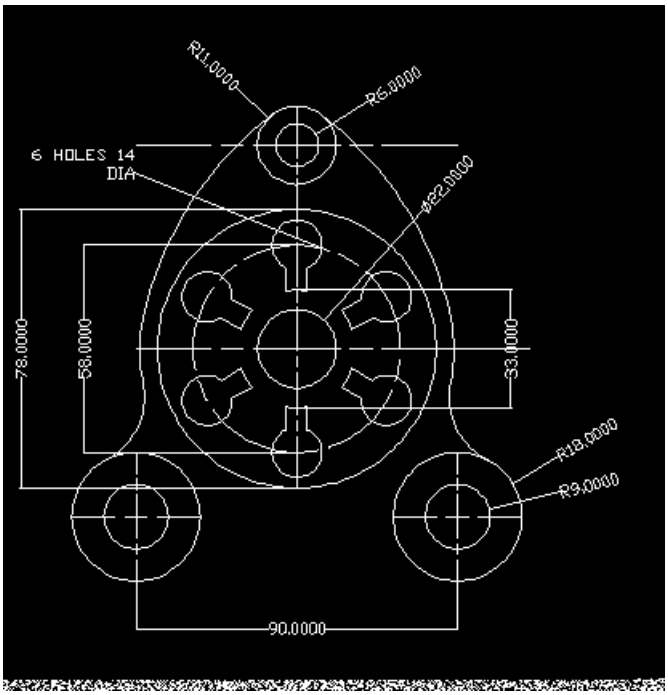
Command: _qsave

PRECAUTIONS:

Put **ORTHO ON** where ever necessary.

Use the required modify tool bar commands like **TRIM, ERASE, COPY, MIRROR** ETC.,

Aim: to draw the following figure using ACAD



PROCEDURE

Set the limits of the drawing screen

STEP 1: Draw axis lines in the respective format with their intersection point at **(0,0)**

STEP 2: Draw circles of given dimensions using circle command with their centre as the intersection of the axis lines.

STEP 3: Using **POLAR ARRAY** draw the 6 key holes on the circle of diameter 58 of given dimensions

STEP 4: For the outer cover use **CIRCLE** command and the in command prompt area type ***TAN TAN RADIUS***. This gives the idea of drawing the outer cover

STEP 7: Give dimensions to the completed figure.

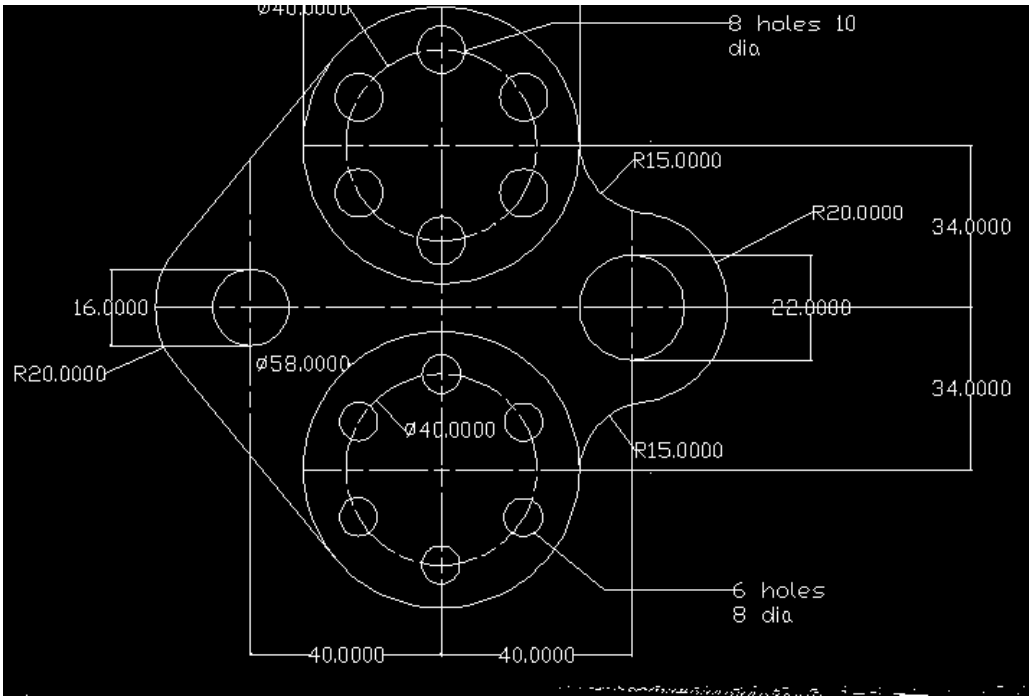
Command: _qsave

PRECAUTIONS:

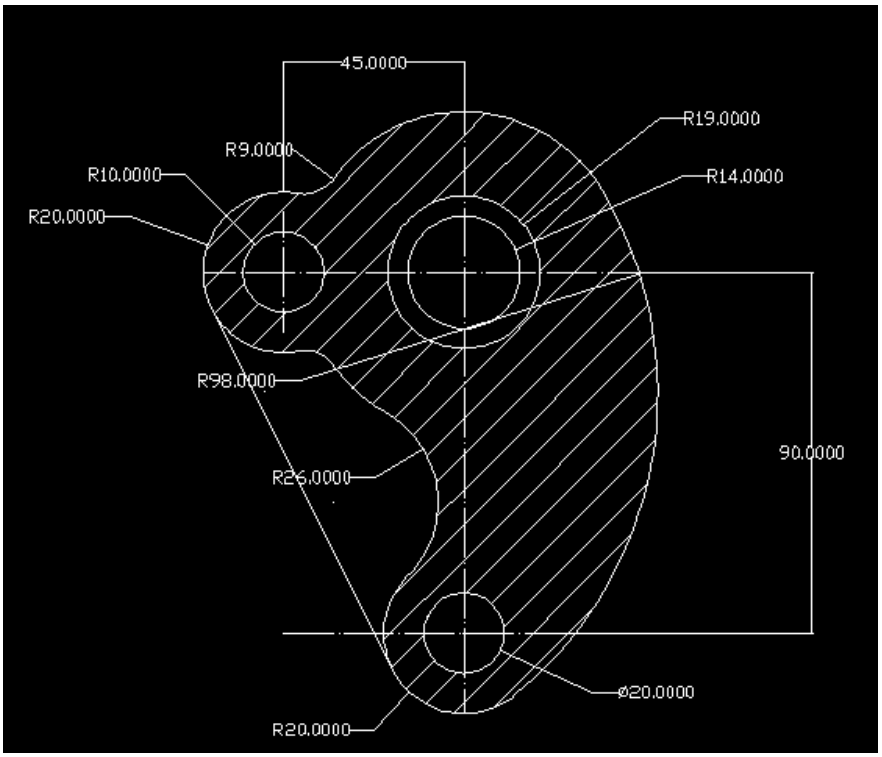
Put **ORTHO ON** where ever necessary.

Use the required modify tool bar commands like **TRIM, ERASE, COPY, MIRROR** ETC.,

PRACTICE FIGURE 1

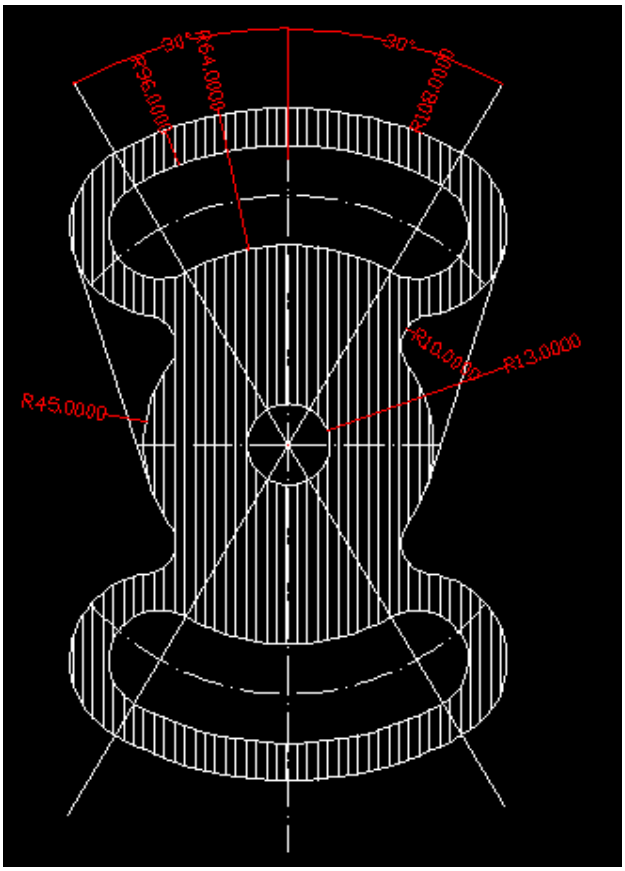


PRACTICE FIGURE 2

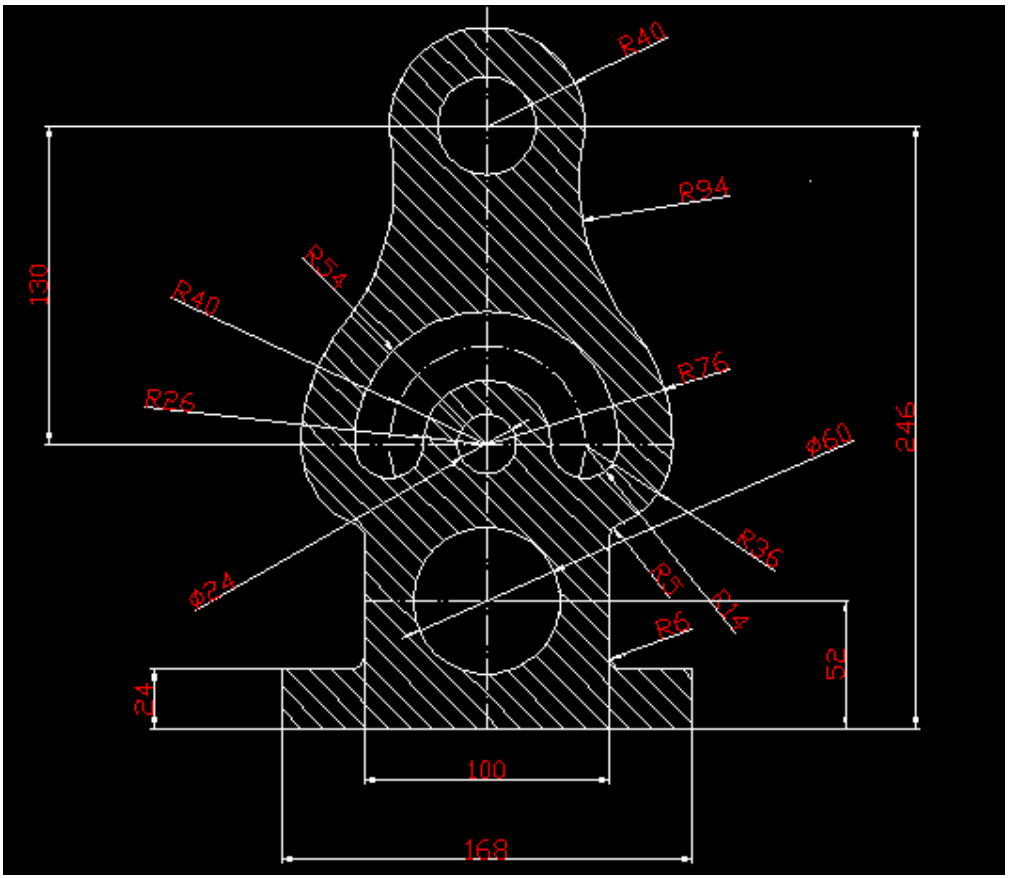


DO THE HATCHING USINH *HATCH* COMMAND IN THE DRAW TOOL BAR.

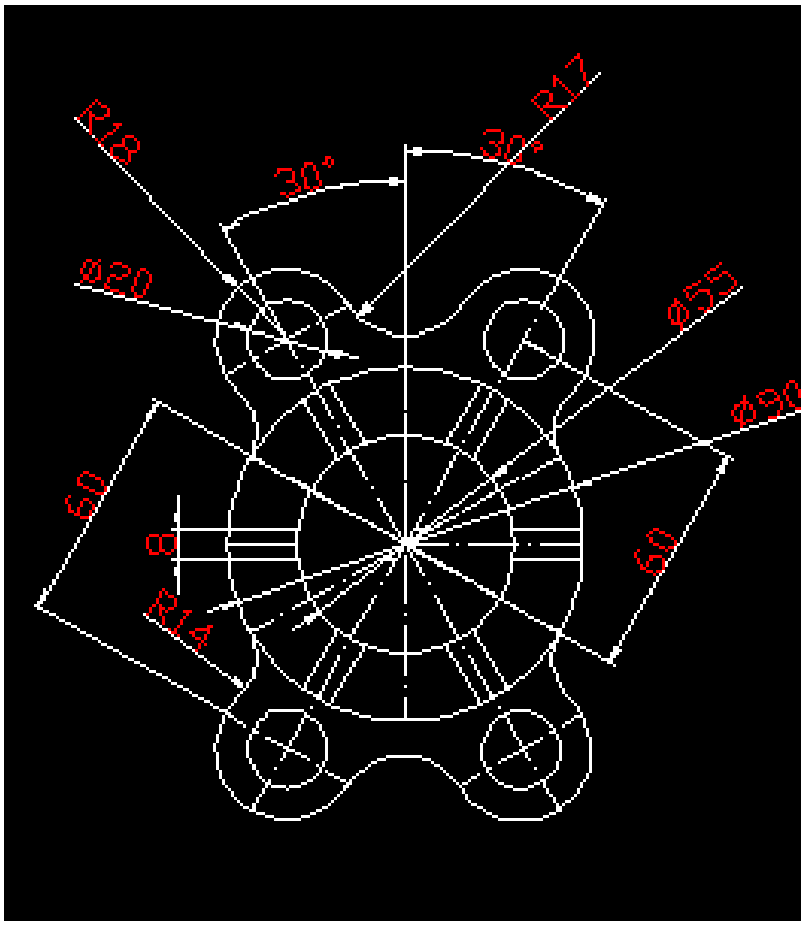
PRACTICE FIGURE 3



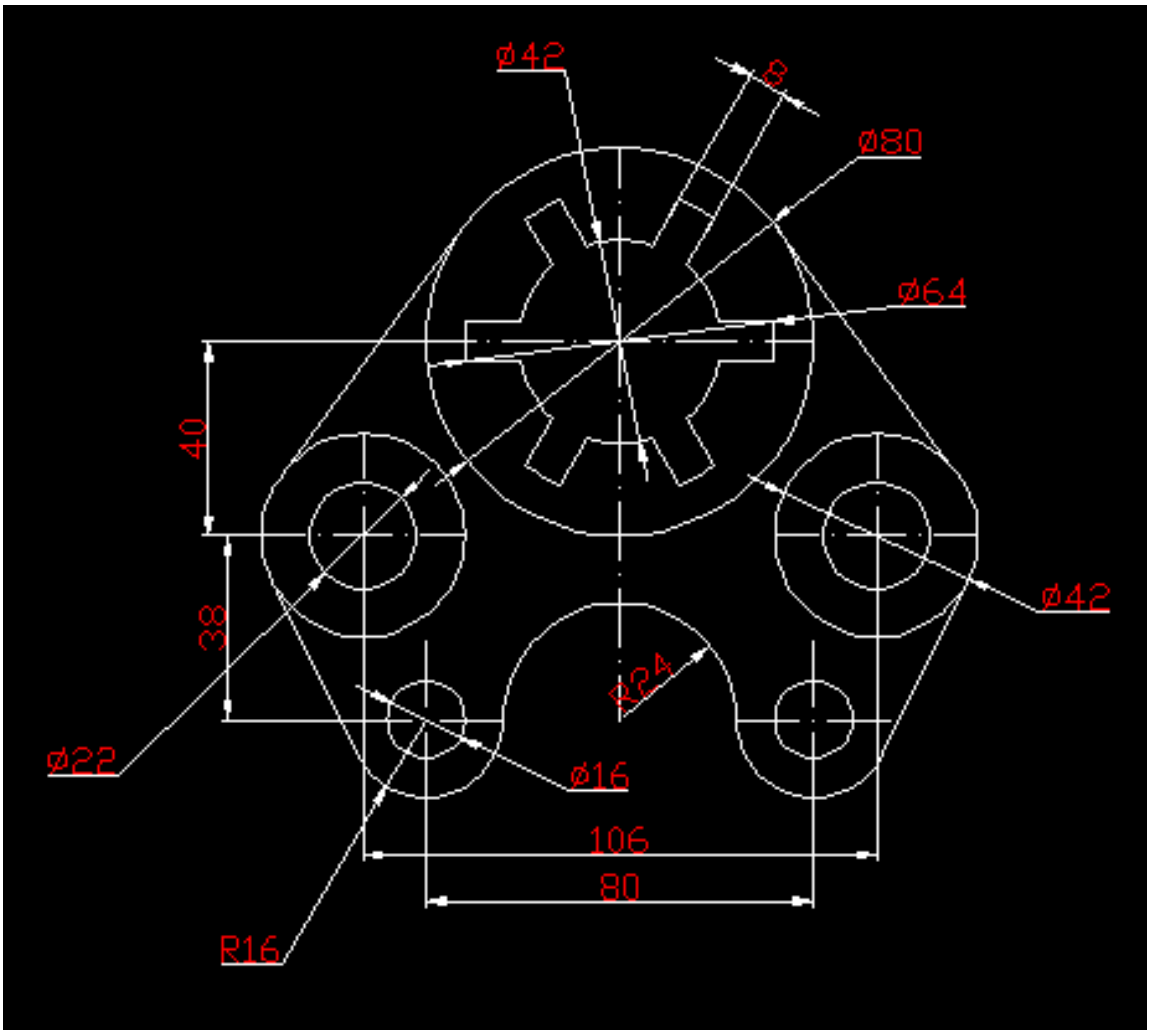
PRACTICE FIGURE 4



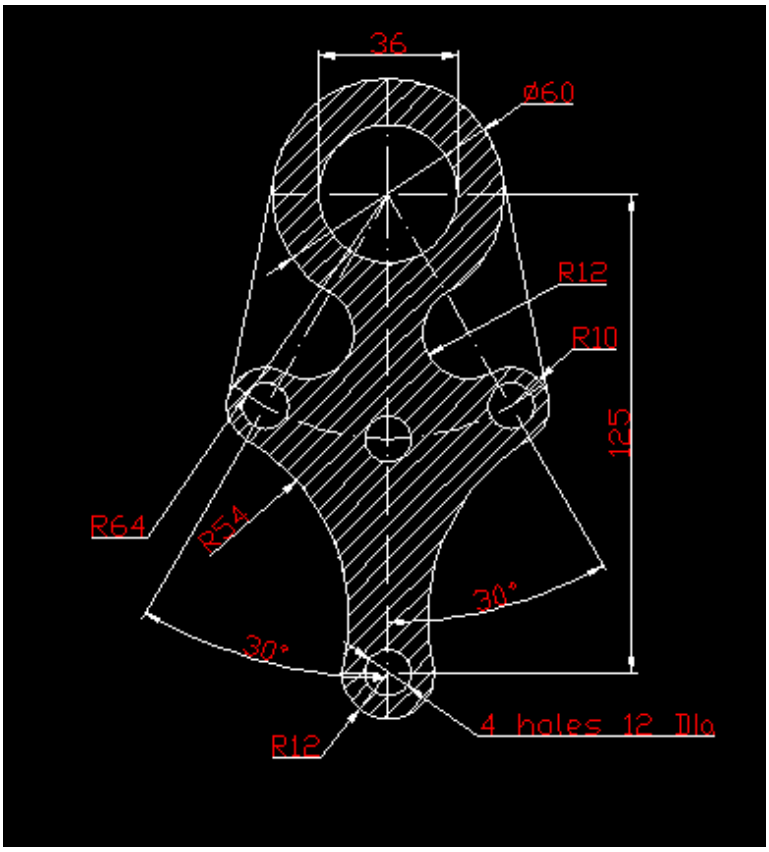
PRACTICE FIGURE 5

z 

PRACTICE FIGURE 6



PRACTICE FIGURE 7



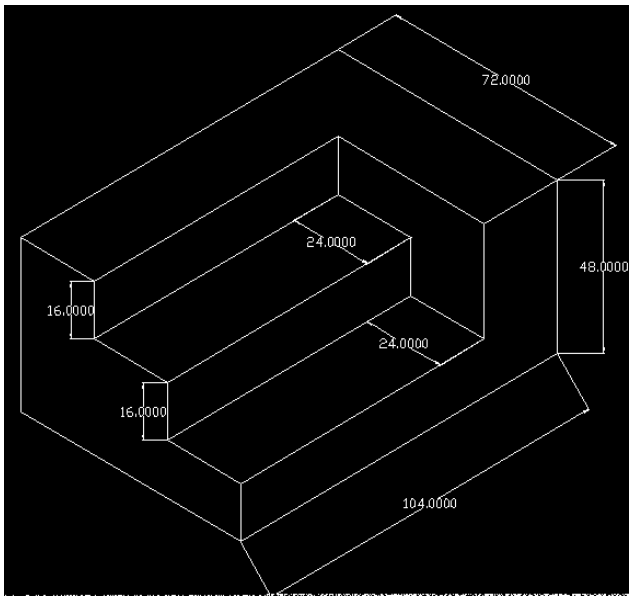
Experiment :-2
ISOMETRIC DRAWINGS

For all isometric figures right click **GRID** in drafting tool bar <setting> change grid snap to **ISOMETRIC SNAP**. And check **ORTHO ON**

F5 – TOGGLE KEY BETWEEN ISOPLANE TOP, ISOPLANE LEFT AND ISOPLANE RIGHT

FIGURE 1

Aim: to draw the following figure using ACAD



COMMANDS USED

Line, Dimensions, Drafting commands

PROCEDURE

<Ortho on> <Isoplane Top> <Osnap on>

Command: _line Specify first point:

Specify next point or [Undo]: **104**

Specify next point or [Undo]:

Command: _qsave

Command: _dimaligned

Specify first extension line origin or <select object>:

Specify second extension line origin:

Command: _dimlinear

Specify first extension line origin or <select object>:

Specify second extension line origin:

Specify dimension line location or [Mtext/Text/Angle/Horizontal/Vertical/Rotated]:

Dimension text = 48.0000

Command: _dimedit

Enter type of dimension editing [Home/New/Rotate/Oblique] <Home>: **_o**

Select objects: 1 found

Enter obliquing angle (press ENTER for none): **30** **Command: _qsave**

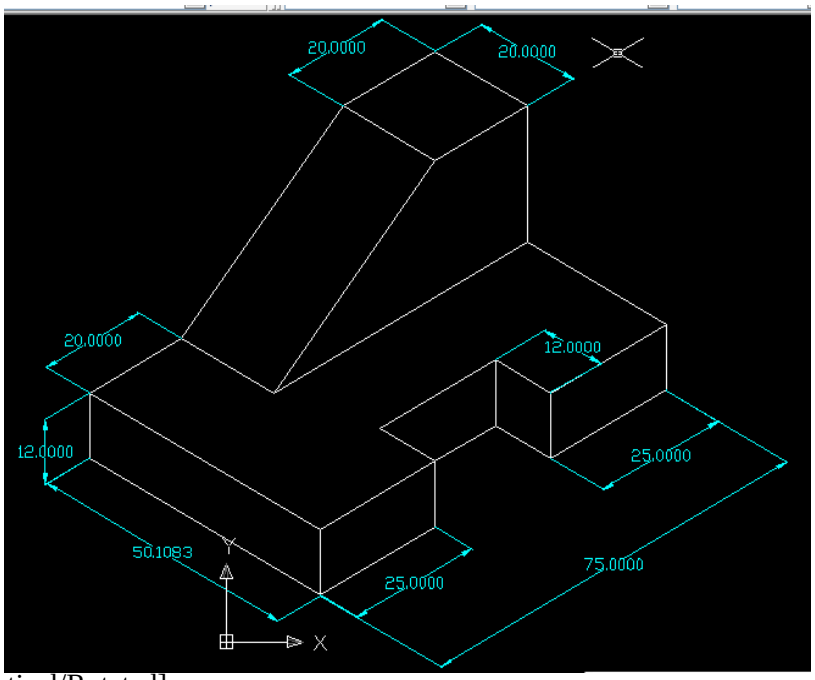
FIGURE 2

Aim: to draw the following figure using ACAD

COMMANDS USED

Line, Drafting commands, Dimension aligned, Dimension linear, Dimension oblique, Layers

Command: _line



Specify first point: <Isoplane Left>

Specify next point or [Undo]: 12

Specify next point or [Undo]: <Isoplane Top> 25

Command: _qsave

Command: _dimlinear

Specify first extension line origin or <select object>:

Specify second extension line origin:

Specify dimension line location or [Mtext/Text/Angle/Horizontal/Vertical/Rotated]:

Dimension text = 12.0000

Command: _dimaligned

Specify first extension line origin or <select object>:

Specify second extension line origin:

Specify dimension line location or [Mtext/Text/Angle]:

Dimension text = 25.0000

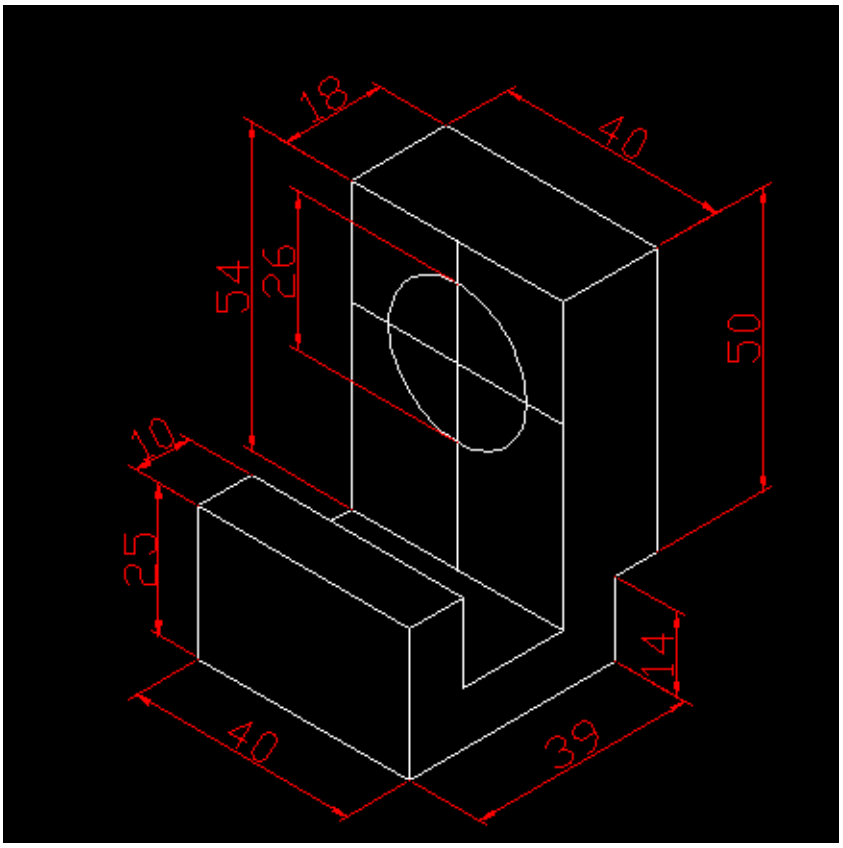
Command: _dimedit

Enter type of dimension editing [Home/New/Rotate/Oblique] <Home>: **_o**

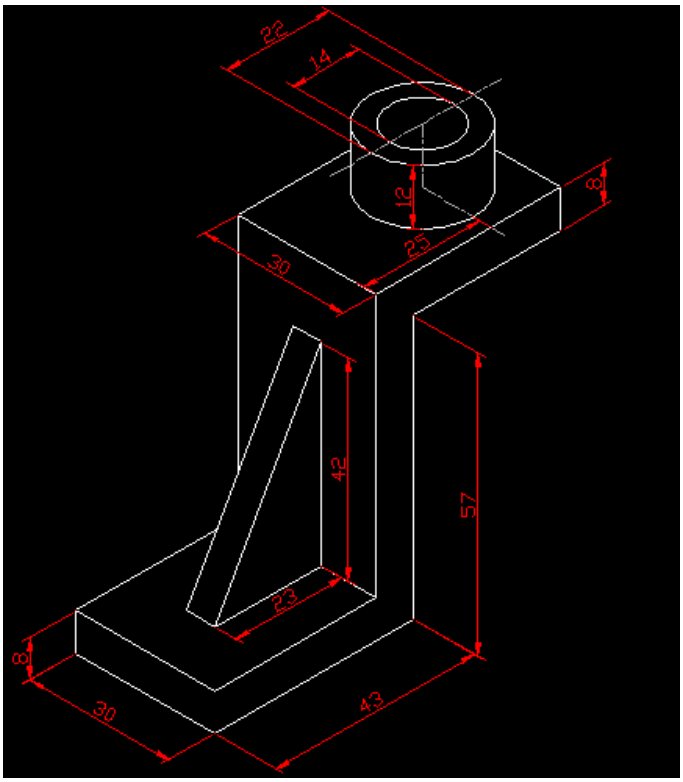
Select objects: 1 found

Enter obliquing angle (press ENTER for none): **30 or -30** **Command: _qsave**

PRACTICE FIGURE 1



PRACTICE FIGURE 2



AIM:

To write the part program for component shown in **Fig. 01**. Assuming the work piece is Aluminum and the speed is 1200 rpm, feed 20 mm/min and maximum depth of cut is 1 mm.

a. With Canned cycle
b. Without Canned cycle.

MATERIAL REQUIRED: Aluminum Rod of 30 mm diameter and 80 mm length.

PART DRAWING:

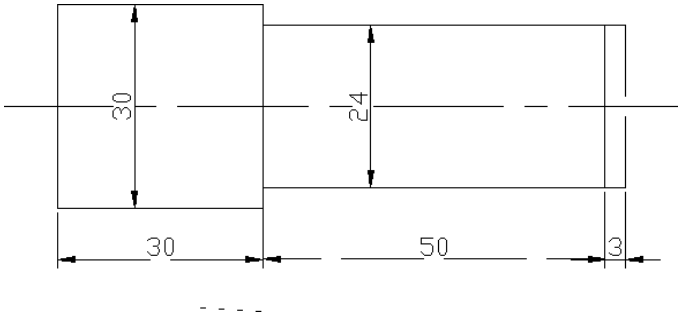


FIGURE: 01

PART PROGRAM:

(A) WITH CANNED CYCLE

N 00	G 21	G 90				<EOB>
N 01	M 03	S 1200				< EOB>
N 02	G 00	X 30	Z 0			<EOB>
N 03	G 71	Z -3	X 0	I 1	F 20	<EOB>
N 04	G 00	X 30	Z 0			<EOB>
N 05	G 72	X 24	Z -50	I 1	F 20	<EOB>
N 06	G 00	X 50	Z 10			<EOB>
N 07	M 30					<EOB>

(B) WITHOUT CANNED CYCLE

N 00	G 21	G 90			<EOB>
N 01	M 03	S 1200		<EOB>	
N 02	G 00	X 30	Z 1		<EOB>
N 03	G 01	Z –1		F 20	<EOB>
N 04	G 01	X 00		F 20	<EOB>
N 05	G 00	X 30	Z 00		<EOB>
N 06	G 01	Z –2		F 20	<EOB>
N 07	G 01	X 00		F 20	<EOB>
N 08	G 00	X 30	Z 00		<EOB>
N 09	G 01	Z –3		F 20	<EOB>
N 10	G 01	X 00		F 20	<EOB>
N 11	G 00	X 30	Z 00		<EOB>
N 12	G 01	Z -50		F 20	<EOB>
N 13	G 01	X 28		F 20	<EOB>
N 14	G 00	X 30	Z 00		<EOB
N 15	G 01	Z -50		F 20	<EOB>
N 16	G 01	X 26		F 20	<EOB>
N 17	G 00	X 30	Z 00		<EOB
N 18	G 01	Z -50		F 20	<EOB>
N 19	G 01	X 24		F 20	<EOB>
N 20	G 00	X 50	Z 10		<EOB
N 21	M 30				<EOB>

RESULT:

The program is written and simulated and stored in System No…and file name as…

STEP TURNING OPERATION

AIM:

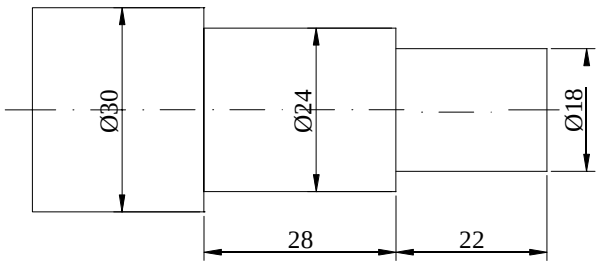
To write the part program for the component shown in fig 2. assuming work piece as AL the speed is 1200rpm, feed given is 20mm/min.

(a) Without canned cycle

(b) With canned cycle.

MATERIAL REQUIRED: Aluminum Rod of 30 mm diameter and 80 mm length.

PART DRAWING:



PART PROGRAM: (A) WITHOUT CANNED CYCLE

N 00	G 21	G 90		<EOB>
N 01	M 03	S 1200		<EOB>
N 02	G 04	X 02		<EOB>
N 03	G 00	X 30	Z 00	<EOB>
N 04	G 01	Z -50	F 20	<EOB>
N 05	G 00	X 30	Z 00	<EOB>
N 06	G 01	X 26	F 20	<EOB>
N 07	G 01	Z -50	F 20	<EOB>
N 08	G 00	X 30	Z 00	<EOB>
N 09	G 01	X 24	F 20	<EOB>
N 10	G 01	Z -50	F 20	<EOB>
N 11	G 00	X 30	Z 00	<EOB>

N 12 G 01 X 22 F 20 <EOB>

```
N 13    G 01   Z -22   F 20    <EOB>
N 14    G 00   X 30    Z 00    <EOB>
N 15    G 01   X 20    F 20    <EOB>
N 16    G 01   Z -22   F 20    <EOB>
N 17    G 00   X 30    Z 00    <EOB>
N 19    G 00   X 50    Z 10    <EOB>
N 20    M 30                   <EOB>
```

(B) <u>WITH CANNED CYCLE:</u>

```
N 00    G 21   G 90                          <EOB>
N 01    M 03   S 1200                        <EOB>
N 02    G 04   X 03                          <EOB>
N O3    G 00   X 30   Z 00                   <EOB>
N 04    G 72   X 24   Z -50   I 01   F 20   <EOB>
N 05    G 72   X 20   Z -22   I 01   F20    <EOB>
N 06    G 00   X 30   Z 00                   <EOB>
N 08    X 50   Z 10                          <EOB>
N 09    M 30                                 <EOB>
```

<u>RESULT:</u>

The program is written and simulated and stored in System No…and file name as…

AIM:

To write the part program for the component shown in **Fig. 3**. Assuming work piece is Aluminum and the speed is 1200 rpm, feed given is 20 mm/min,using pattern repeated cycle.

MATERIAL REQUIRED: Aluminum Rod of 30 mm diameter and 80 mm length.

PART DRAWING:

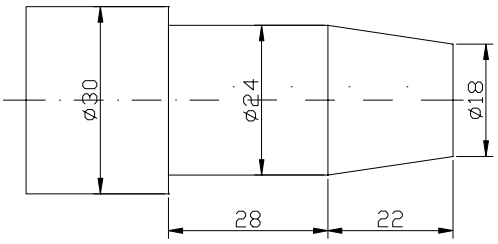


FIGURE. 3.

PART PROGRAM:

N 00	G 21	G 90			<EOB>
N 01	M 03	S 1200			<EOB>
N 02	G 04	X 04			<EOB>
N 03	G 00	X 30	Z 00		<EOB>
N 04	G 73	P 05	Q 09	I 01	<EOB>
N 05	G 01	X 18	F 20		<EOB>
N 06	G 01	X 24	Z -22	F 20	<EOB>
N 07	G 01	Z -50	F 20		<EOB>
N 08	G 00	X 30			<EOB>
N 09	G 00	Z 00			<EOB>
N 10	G 00	X 50	Z 05		<EOB>
N 11	M 30				<EOB>

RESULT: The program is written and simulated and stored in System No…and file

name as…

AIM:

To write the part programming for the component shown in **Fig 4**. Assuming work piece as Aluminum and the turning speed is 1200 rpm and feed is 20 mm / min and the depth of cut is 1 mm. For thread cutting reduce the speed to half of the turning speed and pitch is 0.1mm.

MATERIAL REQUIRED: Aluminum Rod of 30 mm diameter and 80 mm length.

PART DRAWING:

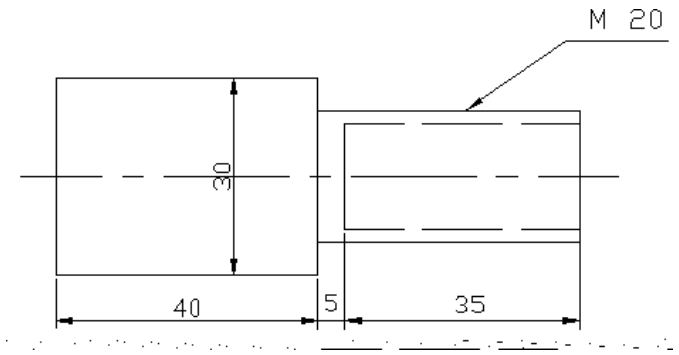


FIGURE.4.

PART PROGRAME:

N 00	G 21	G 90				<EOB>
N 01	M 03 S 1200					<EOB>
N 02	G 00	X 30	Z 00			<EOB>
N 03	G 01	Z -01	F 20			<EOB>
N 04	G 01	X 00	F 20			<EOB>
N 05	G 00	X 30	Z 00			<EOB>
N 06	G 72	X 20	Z -40	I 01	F 20	<EOB>
N 07	G 00	X 30	Z 05			<EOB>
N 08	M 05					<EOB>
N 09	T 0202					<EOB>
N 09	M 03 S 600					<EOB>

N 10	G 04	X 02					<EOB>
N 11	G 01	X 20	Z 00	F 20			<EOB>
N 12	G 93 (or) 92		X 20	Z -35	I 0.1	F 01	<EOB>
N 13	G 00	X 30	Z 01				<EOB>
N 14	M 30						<EOB>

RESULT:

The program is written and simulated and stored in System No…and file name as…

AIM:

To write the part programming for the figure shown in **Fig.5.** speed is 1200 rpm, feed is 20 mm / min. Assuming work piece as Aluminium.

MATERIAL REQUIRED: Aluminum Rod of 30 mm diameter and 80 mm length.

THEORY:

Circular interpolation is used to simplify the programming of arcs and circles. It required of four bits of information those are.

- The direction of cutter travel (GOZ for cw and G03 is for CCW)
- Start point for arc (x_s $z_{s)}$ for lathe and (x_s, y_s) for milling
- Center of arc (x_l,z_l) for lathe and (x_l,y_l) for milling machine
- The final point of the arc except for (x_f,z_f) for lathe and (x_f,y_f) for milling.

PART DRAWING:

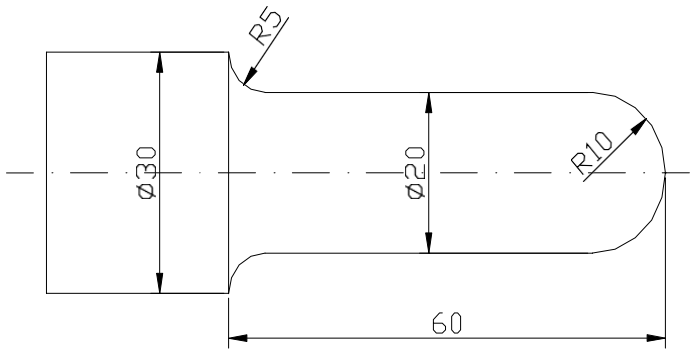


FIGURE.5.

PART PROGRAM:

N 00 G 21 G 90 <EOB>

N 01 M 03 S 1200 <EOB>

N 02 G 04 X 04 <EOB>

N 03 G 00 X 30 Z 00 <EOB>

N 04 G 72 X 20 Z -55 I 01 F 20 <EOB>

N 05 G 00 X 30 Z 00 <EOB>

N 06 G 00 X 20 Z 00 <EOB>

N 07 G 01 X 18 F 20 <EOB>

N 08 G 02 X 20 Z -01 K -1 I 0 F 20 <EOB>

N 09 G 00 Z 00 <EOB>

N 10 G 01 X 16 F 20 <EOB>

N 11 G 02 X 20 Z -02 K -2 I 0 F 20 <EOB>

N 12 G 00 Z 00 <EOB>

N 13 G 01 X 14 F 20 <EOB>

N 14 G 02 X 20 Z -03 K -3 I 0 F 20 <EOB>

N 15 G 00 Z 00 <EOB>

N 16 G 01 X 12 F 20 <EOB>

N 17 G 02 X 20 Z -04 K -4 I 0 F 20 <EOB>

N 18 G 00 Z 00 <EOB>

N 19 G 01 X 10 F 20 <EOB>

N 20 G 02 X 20 Z -5 K -5 I 0 F 20 <EOB>

N 21 G 00 Z 00 <EOB>

N 22 G 01 X 8 F 20 <EOB>

N 23 G02 X20 Z-6 K-6 I0 F20 <EOB>

N 24 G00 Z 00 <EOB>

N 25 G 01 X 6 F 20 <EOB>

N 26 G 02 X 20 Z -7 K -7 I 0 F 20 <EOB>

N 27 G 00 Z 00 <EOB>

N 28 G 01 X 4 F 20 <EOB>

N 29 G 02 X 30 Z -8 K-8 I 0 F 20 <EOB>

N 30 G 00 Z 00 <EOB>

N 31 G 01 X 2 F 20 <EOB>

N 32 G 02 X 20 Z -9 K -9 I 0 F 20 <EOB>

N 33 G 00 Z 00 <EOB>

N 34 G 01 X 0 F 20 <EOB>

N 35 G 02 X 20 Z -10 K -10 I 0 F 20 <EOB>

N 36 G 01 Z -31 F 20 <EOB>

N 37 G 01 X 28 F 20 <EOB>

N 38	G 03	X 30	Z -32	K 0	I 2	F 20	<EOB>
N 39	G 00	Z -31					<EOB>
N 40	G 01	X 26	F 20				<EOB>
N 41	G 03	X 30	Z-33	K 0	I 4	F 20	>EOB>
N 42	G 00	Z -31					<EOB>
N 43	G 01	X 24	F 20				<EOB>
N 44	G 03	X 30	Z -34	K 0	I 6	F 20	<EOB>
N 45	G 00	Z –31					<EOB>
N 46	G 01	X 22	F 20				<EOB>
N 47	G 03	X 30	Z -35	K 0	I 8	F 20	<EOB>
N 48	G 00	Z –31					<EOB>
N 49	G 01	X 20	F 20				<EOB>
N 50	G 03	X 30	Z -36	K 0	I 10	F 20	<EOB>
N 51	G 00	X 35	Z 10				<EOB>
N 52	M 30						<EOB>

RESULT:

The program is written and simulated and stored in System No…and file name