



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR

BACHELOR OF SCIENCE (ELECTRICAL AND ELECTRONIC ENGINEERING)

EEE 101: ENGINEERING DRAWING AND DESIGN II

DATE: 27/5/2022

TIME: 2.00-5.00 PM

INSTRUCTIONS

1. This paper contains FIVE questions.
2. Answer Question **ONE** and any other **TWO** questions
3. All dimensions are in millimetres unless otherwise stated.
4. Construction lines should be faint and should not be erased.
5. Accuracy and good line work are essential.

QUESTION ONE (COMPULSORY) (30 MARKS)

The part drawings of a Machine Vice are shown in **Figure Q1 (a) to (e)**. The components of the Machine Vice are assembled as shown in **Figure Q1(f)**.

Draw:

- a) **Sectional view of the assembly**, through the plane X-X as shown in the Figure Q1(a) viewed from the front elevation as indicated by the arrow on the Figure Q1(f) Machine vice assembly. (10 marks)
- b) **Top elevation of the assembly** (10 marks)
- c) **End elevation of the assembly** from the end elevation as indicated in Figure Q1 (f) Machine vice assembly.

Use first angle projection and do not indicate the dimensions and hidden details. (10 marks)

QUESTION TWO (20 MARKS)

Figure Q2 shows a machine casting. For this casting:

Draw:

- d) the sectional view, section XX, (10 marks)
- e) the left side view. (10 marks)

Indicate the major dimensions (Front view is as indicated by the arrow.)

QUESTION THREE (20 MARKS)

- a) Distinguish between the terms *Limits* and *Fits* as used in machining: (2 marks)
- b) Discuss briefly the two basic systems of ISO FITS (4 marks)
- c) With the aid of neat sketches, illustrate the three types of fits (6 marks)
- d) Using the data sheet BS 4500A, calculate the working limits of the different parts in the pulley assembly drawing shown in fig Q 3d. (8 marks)

QUESTION FOUR (20 MARKS)

Illustrate by using neat sketches the following features as represented in Engineering drawing:

Housing, bush, boss, curved slot, rib, fillet, key, keyway, slot and flat.

QUESTION FIVE (20 MARKS)

- a) Draw a double line sketch of an orthographic pipe network for the single line network shown in **Figure Q5 (a)** (11 marks)
- b) **Figure Q5 (b)** shows Light-sensitive Alarm Project circuit. Identify **the twelve** components labelled **1** to **12** in the circuit. (9 marks)

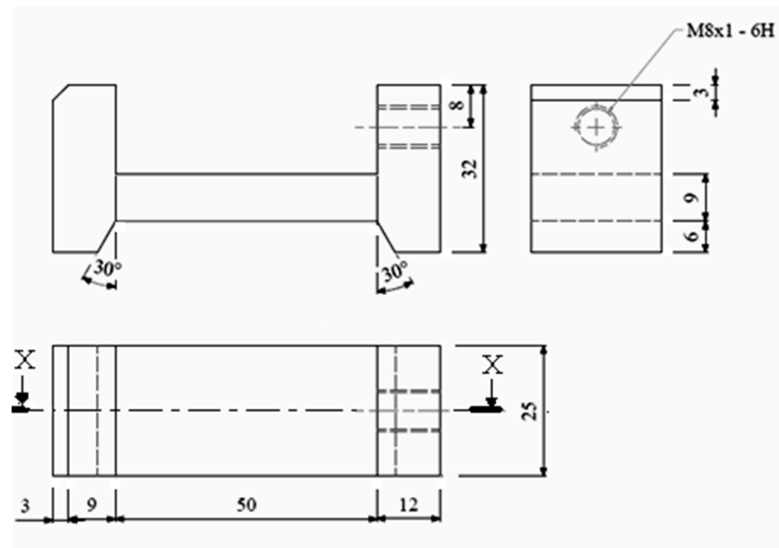


Figure Q1(a) Part 1

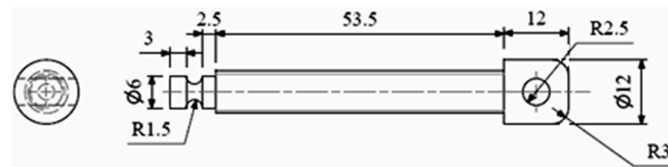


Figure Q1(b) Part 2

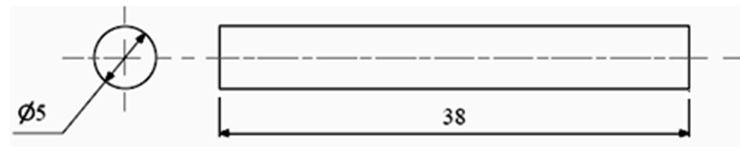


Figure Q1(c) Part 3

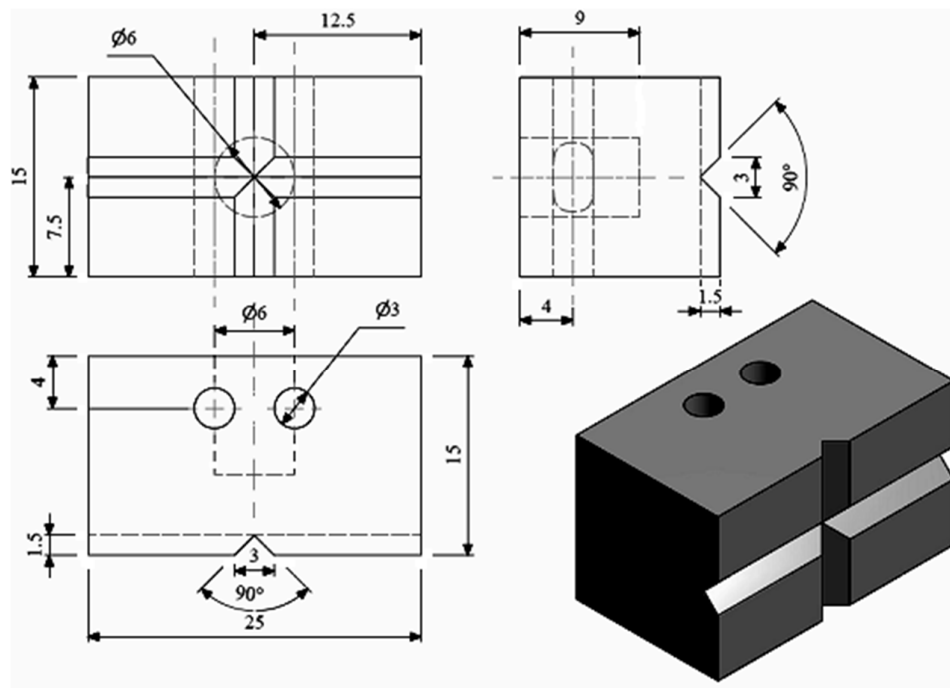


Figure Q1(d) Part 4



Figure Q1(e) Part 5

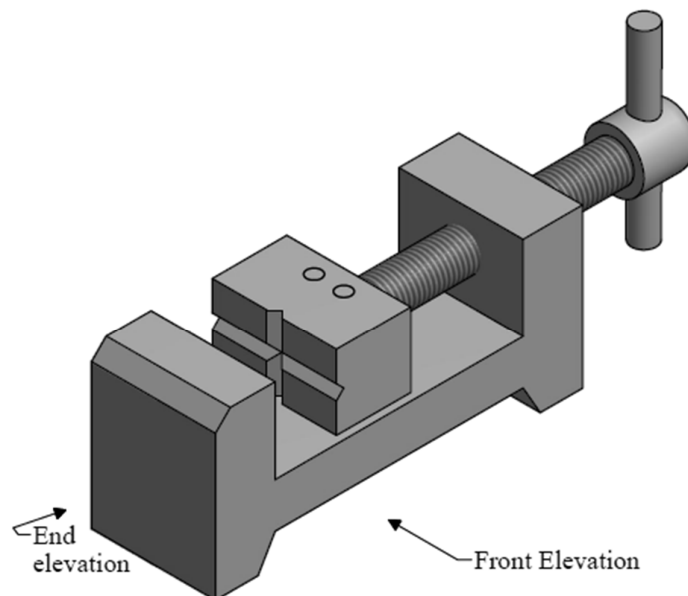


Figure Q1(f) Machine vice assembly

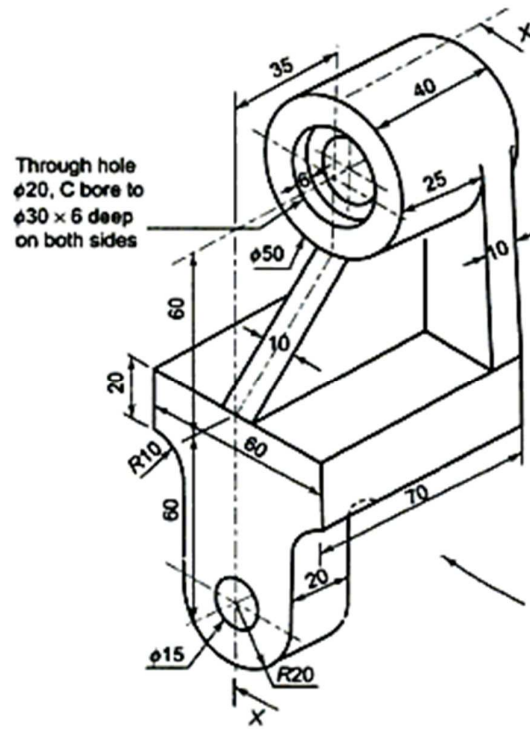


Figure Q2

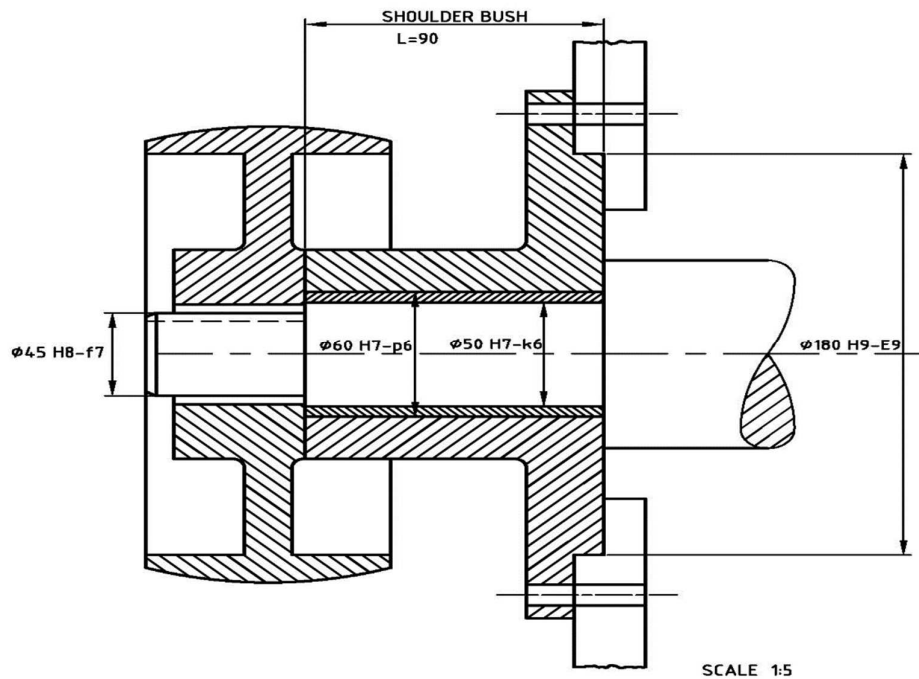


Figure Q2d

BRITISH STANDARD
SELECTED ISO FITS—HOLE BASIS
 Data Sheet
 4500A
 Issue 1, February 1970
 confirmed August 1985

Figure Q3d

Diagram to be used for 25 mm diameter	Clearance fits												Transition fits						Interference fits					
	Over	To	H11	c11	H9	d10	H9	e9	H8	f7	H7	g6	H7	h6	H7	k6	H7	n6	H7	p6	H7	s6	Over	To
mm	mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001 mm	mm	mm
—	3	+60 -120		+25 -60	-20 -60	+25 -39	+14 -39	-6 -16		+10 0	-2 -8	+10 0	-6 0	+10 0	+6 0	+10 0	+10 +4	+10 0	+12 +6	+10 0	+20 +14	—	3	
3	6	+75 -145		+30 -78	-30 -78	+30 -50	+18 -28	-10 -28		+12 0	-4 -12	+12 0	-8 0	+12 0	+9 +1	+12 0	+16 +8	+12 0	+20 +12	+12 0	+27 +19	3	6	
6	10	+90 -170		+36 -98	-40 -98	+36 -61	+22 -61	-13 -28		+15 0	-5 -14	+15 0	-9 0	+15 0	+10 +1	+15 0	+19 +10	+15 0	+24 +15	+15 0	+32 +23	6	10	
10	18	+110 -205		+45 -120	-50 -120	+45 -75	+38 -75	-16 -34		+18 0	-7 -17	+18 0	-1 0	+18 0	+12 +8	+12 0	+23 +12	+18 +8	+24 +18	+18 0	+38 +28	10	18	
18	30	+130 -240		+62 -149	-65 -149	+62 -92	+33 -92	-20 -41		+21 0	-7 -20	+21 0	-13 0	+21 0	+15 +2	+15 0	+28 +15	+21 0	+32 +21	+21 0	+48 +38	18	30	
30	40	+160 -280		+80 -180	-80 -180	+80 -112	+39 -112	-25 -50		+25 0	-9 -25	+25 0	-16 0	+25 0	+18 +2	+18 0	+33 +17	+25 0	+42 +26	+25 0	+59 +43	30	40	
40	50	+160 -290		+80 -190	-80 -190	+80 -112	+39 -112	-25 -50		+25 0	-9 -25	+25 0	-16 0	+25 0	+18 +2	+18 0	+33 +17	+25 0	+42 +26	+25 0	+59 +43	40	50	
50	65	+190 -330		+74 -220	-100 -220	+74 -134	+46 -134	-30 -60		+30 0	-10 -29	+30 0	-19 0	+30 0	+21 +2	+21 0	+39 +20	+30 0	+51 +32	+30 0	+72 +53	50	65	
65	80	+190 -340		+74 -220	-100 -220	+74 -134	+46 -134	-30 -60		+30 0	-10 -29	+30 0	-19 0	+30 0	+21 +2	+21 0	+39 +20	+30 0	+51 +32	+30 0	+72 +53	50	65	
80	100	+220 -390		+87 -260	-120 -260	+87 -159	+54 -159	-36 -71		+35 0	-12 -34	+35 0	-22 0	+35 0	+25 +3	+25 0	+45 +23	+35 0	+59 +37	+35 0	+93 +71	80	100	
100	120	+220 -400		+87 -400	-120 -400	+87 -159	+54 -159	-36 -71		+35 0	-12 -34	+35 0	-22 0	+35 0	+25 +3	+25 0	+45 +23	+35 0	+59 +37	+35 0	+93 +71	80	100	
120	140	+250 -430		+100 -300	-145 -300	+100 -185	+63 -185	-43 -83		+40 0	-14 -39	+40 0	-25 0	+40 0	+28 +3	+28 0	+52 +27	+40 0	+68 +43	+40 0	+117 +92	120	140	
140	160	+250 -430		+100 -300	-145 -300	+100 -185	+63 -185	-43 -83		+40 0	-14 -39	+40 0	-25 0	+40 0	+28 +3	+28 0	+52 +27	+40 0	+68 +43	+40 0	+117 +92	120	140	
160	180	+280 -480		+115 -350	-170 -480	+115 -215	+72 -215	-50 -96		+46 0	-15 -44	+46 0	-29 0	+46 0	+33 +4	+33 0	+60 +31	+46 0	+79 +50	+46 0	+159 +130	160	180	
180	200	+280 -500		+115 -350	-170 -480	+115 -215	+72 -215	-50 -96		+46 0	-15 -44	+46 0	-29 0	+46 0	+33 +4	+33 0	+60 +31	+46 0	+79 +50	+46 0	+159 +130	160	180	
200	225	+290 -550		+130 -400	-190 -400	+130 -240	+81 -240	-56 -108		+52 0	-17 -49	+52 0	-32 0	+52 0	+36 +4	+36 0	+66 +34	+52 0	+88 +56	+52 0	+190 +158	200	225	
225	250	+290 -560		+130 -400	-190 -400	+130 -240	+81 -240	-56 -108		+52 0	-17 -49	+52 0	-32 0	+52 0	+36 +4	+36 0	+66 +34	+52 0	+88 +56	+52 0	+190 +158	200	225	
250	280	+320 -600		+140 -440	-210 -440	+140 -265	+89 -265	-62 -119		+57 0	-18 -54	+57 0	-36 0	+57 0	+40 +4	+40 0	+73 +37	+57 0	+98 +62	+57 0	+232 +190	250	280	
280	315	+320 -630		+140 -440	-210 -440	+140 -265	+89 -265	-62 -119		+57 0	-18 -54	+57 0	-36 0	+57 0	+40 +4	+40 0	+73 +37	+57 0	+98 +62	+57 0	+232 +190	250	280	
315	355	+360 -720		+155 -480	-230 -480	+155 -290	+97 -290	-68 -131		+63 0	-20 -60	+63 0	-40 0	+63 0	+45 +5	+45 0	+80 +40	+63 0	+108 +68	+63 0	+272 +232	315	355	
355	400	+360 -760		+155 -480	-230 -480	+155 -290	+97 -290	-68 -131		+63 0	-20 -60	+63 0	-40 0	+63 0	+45 +5	+45 0	+80 +40	+63 0	+108 +68	+63 0	+272 +232	315	355	
400	450	+400 -840		+180 -520	-260 -520	+180 -320	+112 -320	-80 -160		+74 0	-24 -64	+74 0	-48 0	+74 0	+54 +6	+54 0	+96 +48	+74 0	+128 +74	+74 0	+312 +272	400	450	
450	500	+400 -880		+180 -520	-260 -520	+180 -320	+112 -320	-80 -160		+74 0	-24 -64	+74 0	-48 0	+74 0	+54 +6	+54 0	+96 +48	+74 0	+128 +74	+74 0	+312 +272	400	450	

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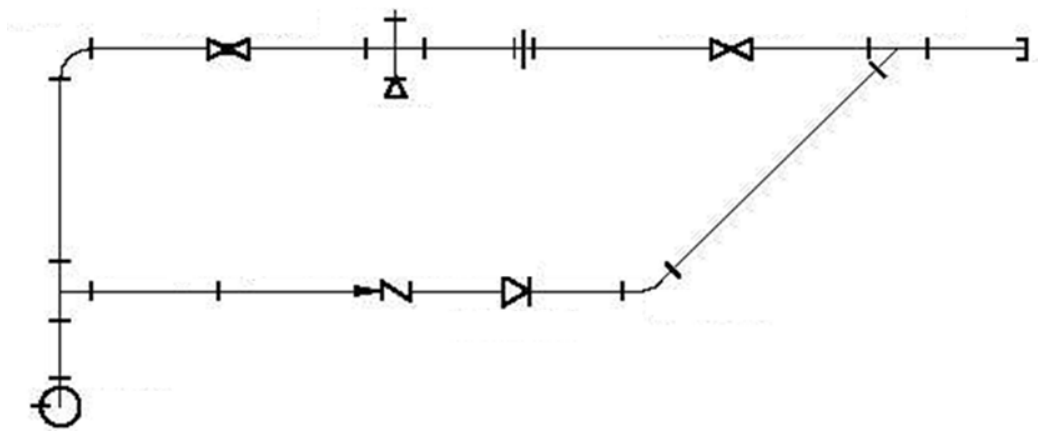


Figure Q5 (a)

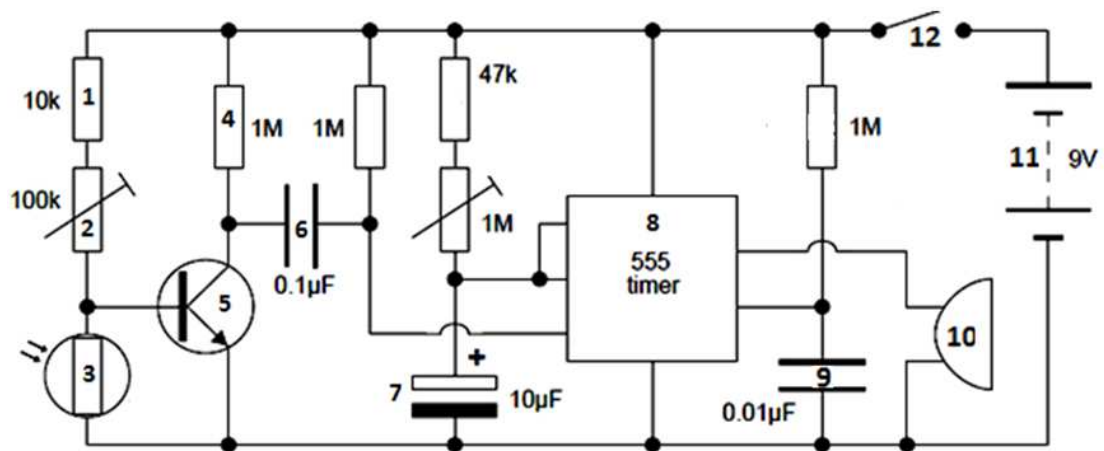


Figure Q5 (b)