



# TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

**UNIVERSITY EXAMINATION FOR:**

**DIPLOMA IN MECHANICAL ENGINEERING**

**EME 2108: ENGINEERING DRAWING II**

**SUPPLEMENTARY/SPECIAL EXAMINATIONS**

**SERIES:** Select series 2016

**TIME:** 2HOURS

**DATE:** Pick Date Select Month Pick Year

## **Instructions to Candidates**

You should have the following for this examination

-Answer Booklet, drawing instruments, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

## **Question ONE (COMPULSORY)**

Figure Q.1 shows details parts of a Vee block clamp. Draw to full scale in the first angle orthographic projection the following views

- i. Front elevation of correctly assembled block clamp
- ii. Sectional end elevation along plane A-A
- iii. Prepare a part list (20mks)

## **Question TWO**

A cam is to be designed for a knife-edge follower with the following data:

Cam lift = 40mm during  $90^\circ$  of cam rotation with simple harmonic motion.

Dwell for the next  $30^\circ$ .

During the next  $60^\circ$  of the cam rotation, the follower returns to its original position with a simple harmonic motion.

Dwell during the remaining  $180^\circ$ .

Draw the profile of the cam when the line of stroke is offset 20mm from the axis of the cam shaft. (20mks)

### Question THREE

- a) With the aid of neat sketches, define the following screw thread terminologies.
- Crest
  - Major diameter
  - Pitch
  - Effective diameter (*8mks*)
- b) Construct the profile for a single –start right –hand square thread with major diameter 100mm and lead 36mm, scale 1:1 (*12mks*)

### Question FOUR

Figure Q.4 shows a slider-crank mechanism. The crank OA rotates about a fixed centre O. The connecting rod AP slides in a trunnion, which pivots about point X. if OA = 35mm, AP = 130mm and OX = 85mm, construct the locus of point P.. (*20mks*)

### Question FIVE

- a) Illustrate with diagrams the following types of fits:
- clearance fit
  - transition fit
  - interference fit(*6mks*)
- b) Define the maximum and minimum limits of size, for the hole and shaft, in the following rating systems:
- 55mm H8/f6
  - 225mm H7/p7
  - 7.5mm H7/k6

Which kind of fit is achieved in each instance?(*6mks*)

- c) Figure Q.5 shows a sectional bush shaft assembly. Use BS4500 selected ISO fits table to find the limits and fits between:
- bush and housing
  - bush and shaft(*8mks*)

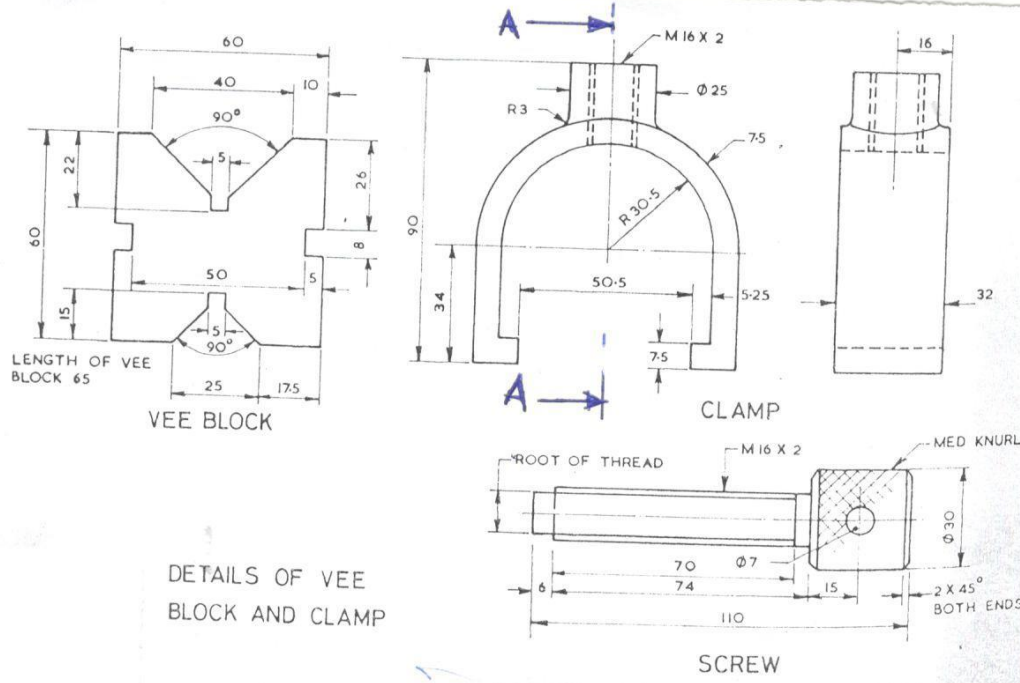


FIGURE Q.1

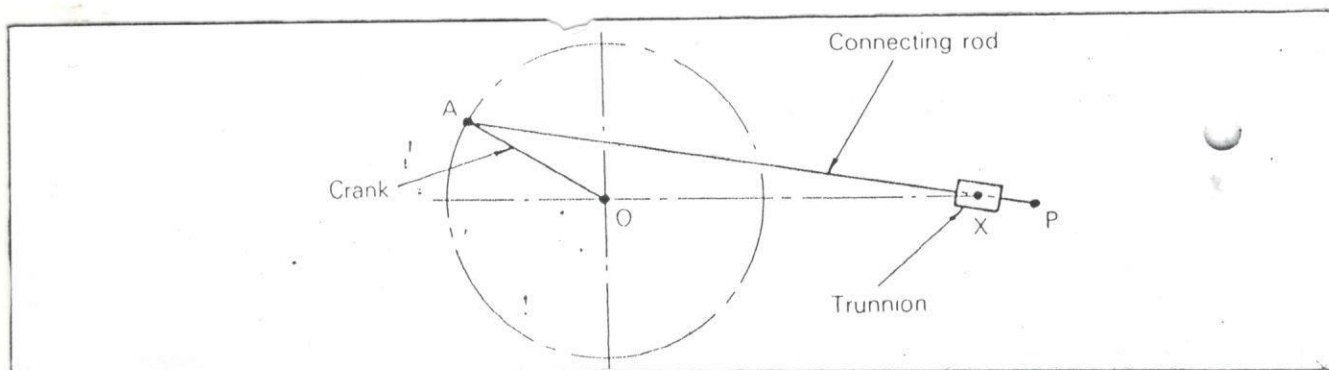


FIGURE Q.4

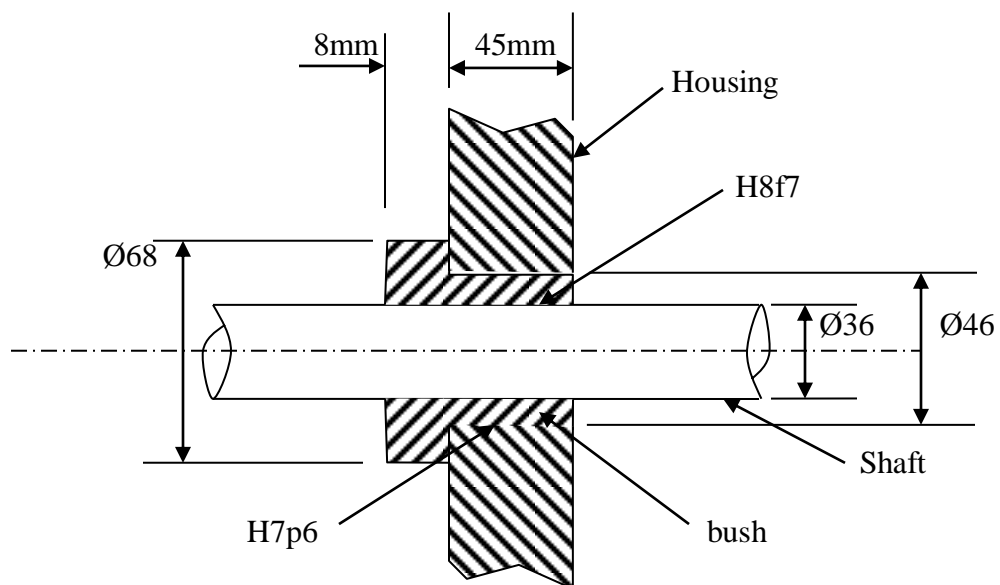
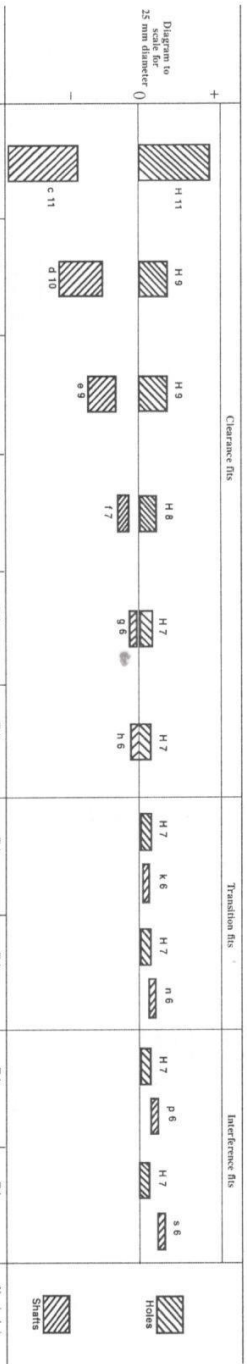


FIGURE Q.5

Extracted from  
BS 4500 : 1969

# BRITISH STANDARD SELECTED ISO FITS—HOLE BASIS

Data Sheet  
**4500A**  
Issue 1, February 1970  
confirmed August 1985



| Nominal sizes | H11   |          | H9    |          | H8    |          | H7    |          | H6    |          | H7    |          | H7    |          | P6    |          | H7    |          | H7    |          | s6    |          | Over | To  |
|---------------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|------|-----|
|               | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm | mm    | 0.001 mm |      |     |
| 3             | +0.60 | -0.60    | +0.25 | -0.25    | +0.25 | -0.25    | +0.14 | -0.14    | +0.10 | -0.10    | +0.06 | -0.06    | +0.04 | -0.04    | +0.03 | -0.03    | +0.02 | -0.02    | +0.02 | -0.02    | +0.02 | -0.02    | —    | 3   |
| 6             | +0.75 | -0.75    | +0.30 | -0.30    | +0.30 | -0.30    | +0.18 | -0.18    | +0.12 | -0.12    | +0.08 | -0.08    | +0.06 | -0.06    | +0.04 | -0.04    | +0.03 | -0.03    | +0.02 | -0.02    | +0.02 | -0.02    | 6    | 6   |
| 10            | +0.90 | -0.90    | +0.35 | -0.35    | +0.35 | -0.35    | +0.22 | -0.22    | +0.15 | -0.15    | +0.10 | -0.10    | +0.07 | -0.07    | +0.05 | -0.05    | +0.04 | -0.04    | +0.03 | -0.03    | +0.03 | -0.03    | 10   | 10  |
| 18            | +1.10 | -1.10    | +0.43 | -0.43    | +0.43 | -0.43    | +0.27 | -0.27    | +0.18 | -0.18    | +0.12 | -0.12    | +0.08 | -0.08    | +0.06 | -0.06    | +0.04 | -0.04    | +0.03 | -0.03    | +0.03 | -0.03    | 18   | 18  |
| 30            | +1.60 | -1.60    | +0.62 | -0.62    | +0.62 | -0.62    | +0.39 | -0.39    | +0.25 | -0.25    | +0.16 | -0.16    | +0.11 | -0.11    | +0.07 | -0.07    | +0.05 | -0.05    | +0.04 | -0.04    | +0.04 | -0.04    | 30   | 30  |
| 40            | +1.90 | -1.90    | +0.71 | -0.71    | +0.71 | -0.71    | +0.46 | -0.46    | +0.30 | -0.30    | +0.19 | -0.19    | +0.13 | -0.13    | +0.08 | -0.08    | +0.06 | -0.06    | +0.05 | -0.05    | +0.05 | -0.05    | 40   | 40  |
| 50            | +2.20 | -2.20    | +0.87 | -0.87    | +0.87 | -0.87    | +0.54 | -0.54    | +0.35 | -0.35    | +0.22 | -0.22    | +0.15 | -0.15    | +0.10 | -0.10    | +0.07 | -0.07    | +0.05 | -0.05    | +0.05 | -0.05    | 50   | 50  |
| 65            | +2.50 | -2.50    | +1.00 | -1.00    | +1.00 | -1.00    | +0.63 | -0.63    | +0.40 | -0.40    | +0.25 | -0.25    | +0.16 | -0.16    | +0.11 | -0.11    | +0.07 | -0.07    | +0.05 | -0.05    | +0.05 | -0.05    | 65   | 65  |
| 80            | +2.80 | -2.80    | +1.15 | -1.15    | +1.15 | -1.15    | +0.72 | -0.72    | +0.46 | -0.46    | +0.28 | -0.28    | +0.18 | -0.18    | +0.12 | -0.12    | +0.08 | -0.08    | +0.06 | -0.06    | +0.06 | -0.06    | 80   | 80  |
| 100           | +3.20 | -3.20    | +1.30 | -1.30    | +1.30 | -1.30    | +0.81 | -0.81    | +0.52 | -0.52    | +0.32 | -0.32    | +0.20 | -0.20    | +0.13 | -0.13    | +0.09 | -0.09    | +0.07 | -0.07    | +0.07 | -0.07    | 100  | 100 |
| 120           | +3.60 | -3.60    | +1.45 | -1.45    | +1.45 | -1.45    | +0.88 | -0.88    | +0.57 | -0.57    | +0.35 | -0.35    | +0.22 | -0.22    | +0.14 | -0.14    | +0.10 | -0.10    | +0.08 | -0.08    | +0.08 | -0.08    | 120  | 120 |
| 140           | +4.00 | -4.00    | +1.60 | -1.60    | +1.60 | -1.60    | +0.96 | -0.96    | +0.62 | -0.62    | +0.38 | -0.38    | +0.24 | -0.24    | +0.15 | -0.15    | +0.11 | -0.11    | +0.09 | -0.09    | +0.09 | -0.09    | 140  | 140 |
| 160           | +4.40 | -4.40    | +1.75 | -1.75    | +1.75 | -1.75    | +1.03 | -1.03    | +0.67 | -0.67    | +0.41 | -0.41    | +0.26 | -0.26    | +0.16 | -0.16    | +0.12 | -0.12    | +0.10 | -0.10    | +0.10 | -0.10    | 160  | 160 |
| 180           | +4.80 | -4.80    | +1.90 | -1.90    | +1.90 | -1.90    | +1.11 | -1.11    | +0.72 | -0.72    | +0.44 | -0.44    | +0.28 | -0.28    | +0.17 | -0.17    | +0.13 | -0.13    | +0.11 | -0.11    | +0.11 | -0.11    | 180  | 180 |
| 200           | +5.20 | -5.20    | +2.05 | -2.05    | +2.05 | -2.05    | +1.20 | -1.20    | +0.78 | -0.78    | +0.47 | -0.47    | +0.30 | -0.30    | +0.19 | -0.19    | +0.14 | -0.14    | +0.12 | -0.12    | +0.12 | -0.12    | 200  | 200 |
| 225           | +5.60 | -5.60    | +2.20 | -2.20    | +2.20 | -2.20    | +1.29 | -1.29    | +0.84 | -0.84    | +0.50 | -0.50    | +0.32 | -0.32    | +0.20 | -0.20    | +0.15 | -0.15    | +0.13 | -0.13    | +0.13 | -0.13    | 225  | 225 |
| 250           | +6.00 | -6.00    | +2.35 | -2.35    | +2.35 | -2.35    | +1.38 | -1.38    | +0.90 | -0.90    | +0.53 | -0.53    | +0.34 | -0.34    | +0.21 | -0.21    | +0.16 | -0.16    | +0.14 | -0.14    | +0.14 | -0.14    | 250  | 250 |
| 280           | +6.40 | -6.40    | +2.50 | -2.50    | +2.50 | -2.50    | +1.47 | -1.47    | +0.96 | -0.96    | +0.56 | -0.56    | +0.36 | -0.36    | +0.22 | -0.22    | +0.17 | -0.17    | +0.15 | -0.15    | +0.15 | -0.15    | 280  | 280 |
| 315           | +6.80 | -6.80    | +2.65 | -2.65    | +2.65 | -2.65    | +1.56 | -1.56    | +1.02 | -1.02    | +0.59 | -0.59    | +0.38 | -0.38    | +0.23 | -0.23    | +0.18 | -0.18    | +0.16 | -0.16    | +0.16 | -0.16    | 315  | 315 |
| 355           | +7.20 | -7.20    | +2.80 | -2.80    | +2.80 | -2.80    | +1.65 | -1.65    | +1.08 | -1.08    | +0.62 | -0.62    | +0.40 | -0.40    | +0.24 | -0.24    | +0.19 | -0.19    | +0.17 | -0.17    | +0.17 | -0.17    | 355  | 355 |
| 400           | +7.60 | -7.60    | +2.95 | -2.95    | +2.95 | -2.95    | +1.74 | -1.74    | +1.14 | -1.14    | +0.65 | -0.65    | +0.42 | -0.42    | +0.25 | -0.25    | +0.20 | -0.20    | +0.18 | -0.18    | +0.18 | -0.18    | 400  | 400 |
| 450           | +8.00 | -8.00    | +3.10 | -3.10    | +3.10 | -3.10    | +1.83 | -1.83    | +1.20 | -1.20    | +0.68 | -0.68    | +0.44 | -0.44    | +0.26 | -0.26    | +0.21 | -0.21    | +0.19 | -0.19    | +0.19 | -0.19    | 450  | 450 |
| 500           | +8.40 | -8.40    | +3.25 | -3.25    | +3.25 | -3.25    | +1.92 | -1.92    | +1.26 | -1.26    | +0.71 | -0.71    | +0.46 | -0.46    | +0.27 | -0.27    | +0.22 | -0.22    | +0.20 | -0.20    | +0.20 | -0.20    | 500  | 500 |

