TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOME IN MARINE ENGINEERING (DMAE3)

EMR 2203 ENGINEERING DRAWING AND DESIGN I

END OF SEMESTER EXAMINATION

SERIES: DEC 2016 PAPER-B

TIME: 2 HOURS

DATE: 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, 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 Q1 shows details of a small machine vice (drawn in first angle orthographic projection) and a key to its assembly. Draw, in full size and in correct orthographic projection, the following views (in third angle projection) of the completely assembled vice, the sliding jaw being approximately 25mm from the fixed jaw.

(a) A sectional front elevation on a vertical plane passing through the axis of the square threaded screw, in the direction indicated by X-X in the key.

(b) A plan in projection with the sectional front elevation

Include only **SIX** important dimensions in the assembly drawing. (30 Marks)

Question TWO

Plot the cam profile which meets the following specifications:

Shaft diameter = 20mm

Minimum cam diameter = 30mm

Performance:

$0 – 90^o$, 20mm rise with uniform velocity.

$90^o – 180^o$, 30mm rise with simple harmonic motion.

$180^o – 270^o$, dwell period.

$270^o – 315^o$, 20mm fall with uniform acceleration.

$315^o – 360^o$, 30mm fall with uniform retardation.

Take rotation of cam to be clockwise. (20 Marks)

Question THREE

(a) Describe the following spur gear terminologies:

(i) Module

(ii) Circular pitch

(iii) Addendum

(iv) Dedendum

(v) Pressure angle

(5 Marks)

(b) Draw three spur gear teeth given:

Module (m) = 10mm

Teeth (T) = 25

Pressure angle (ψ) = 20^o

Calculate the necessary data required in order to draw the gear teeth. (15 Marks)

Question FOUR

(a) With the aid of sketches, illustrate the following types of thread forms and clearly show their uniqueness and indicate the various proportions in terms of the thread pitch, P.

(i) Buttress thread

(ii) Metric thread

(6 Marks)

(b) Construct the profile for a single-start left-hand square thread with major diameter 90mm and pitch 40mm.

(14 Marks)

Question FIVE

(a) Define the following terms with reference to limits and fits:

(i) Tolerance

(ii) Allowance

(iii) Fundamental deviation (3 Marks)

(b) With the aid of sketches, explain the following types of fit:

(i) Clearance fit

(ii) Interference fit

(iii) Transition fit (6 Marks)

(c) (i) with the aid of suitable diagrams, briefly describe the following limit gauges: Plug, Gap and Ring gauges.

(ii) A hole is specified as $35^{+}_{-}0.016mm$ diameter. Determine the gauge limits for 'GO' and 'NOT GO' plug gauge to check this dimension. Take gauge maker's tolerance as 10% of the work tolerance.

(11 Marks)

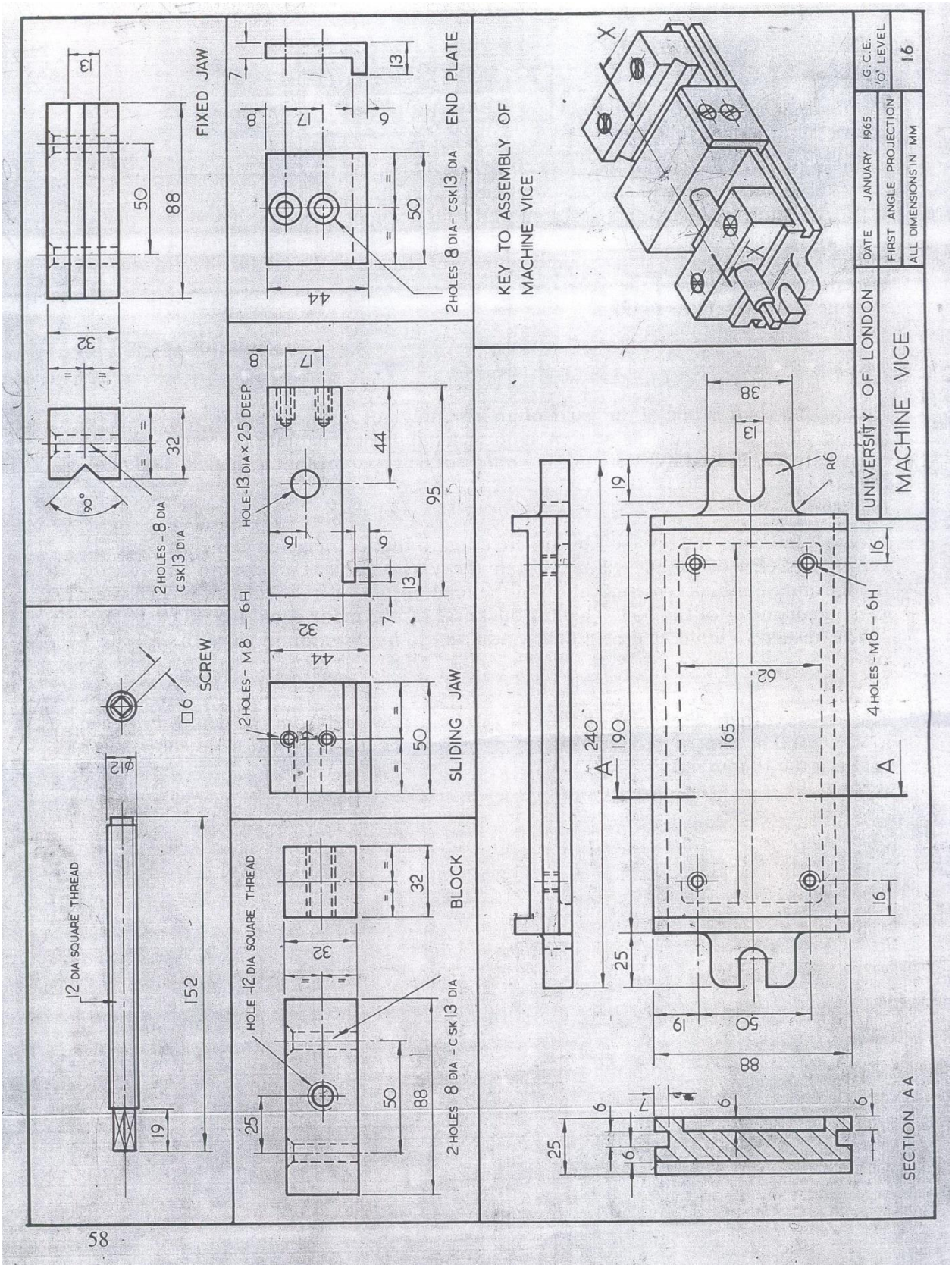
FIXED JAW
2 HOLES - 8 DIA CSK 13 DIA
90°
50
88
32
13
END PLATE
2 HOLES 8 DIA - CSK 13 DIA
44
50
SLIDING JAW
HOLE - 13 DIA × 25 DEEP
2 HOLES - M8 - 6H
95
BLOCK
HOLE - 12 DIA SQUARE THREAD
2 HOLES 8 DIA - C SK 13 DIA
SCREW
12 DIA SQUARE THREAD
152
19
□6
KEY TO ASSEMBLY OF MACHINE VICE
X
4 HOLES - M8 - 6H
240
190
165
62
38
R6
SECTION AA
UNIVERSITY OF LONDON
MACHINE VICE
DATE JANUARY 1965
FIRST ANGLE PROJECTION
ALL DIMENSIONS IN MM
G.C.E. 'O' LEVEL
16
58

Figure Q1