



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOME IN MARINE ENGINEERING (DMAE 3)

EMR 2203 ENGINEERING DRAWING AND DESIGN I

END OF SEMESTER EXAMINATION

SERIES: DEC 2016 PAPER-A

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 a three dimensional drawing of a V-block. You are required to:

- (a) Draw a two dimensional one view of the V-block, which clearly illustrates all the parts of the V-block with only THREE important dimensions of the assembly. Number the parts appropriately and include a parts list. The Screw and the Bracket are made of mild steel (MS) while the Block is made of cast iron (CS).
(12 Marks)
- (b) Make a detailed drawing of all the parts. (18 Marks)

Question TWO

Plot the cam profile which meets the following specifications:

Shaft diameter = 10mm

Minimum cam diameter = 25mm

Lift = 26mm

Performance:

- 0 – 90°, uniform velocity to ½ maximum lift.
- 90° – 180°, simple harmonic motion to maximum lift.
- 180° – 270°, uniform acceleration to ½ maximum lift
- 270° – 360°, uniform retardation to maximum fall.

Take rotation to be clockwise.

(20 Marks)

Question THREE

A pair of spur gears has a centre distance of 160mm, a pressure angle of 20° and the pinion has a pitch circle diameter of 100mm with 16 teeth. You are required to:

- (a) Calculate the necessary data for the meshing spur gears (8 Marks)
- (b) Draw three teeth of the wheel meshing with two teeth of the pinion. (9 Marks)
- (c) Name the parts (3 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) Square thread
- (ii) Acme thread

(6 Marks)

- (b) Construct the profile for a single-start right-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) Interchangeability
- (ii) Basic size
- (iii) Fit
- (iv) Fundamental deviation

(4 Marks)

- (b) Briefly, explain the following types of fit:

- (i) Clearance fit
- (ii) Interference fit
- (iii) Transition fit

(3 Marks)

- (c) (i) Given a hole of size $25^{+0.25}_{-0.00} \text{ mm}$ diameter with a shaft of $25^{+0.025}_{-0.050} \text{ mm}$ in diameter, determine:

- Tolerance on shaft
- Tolerance on hole
- Maximum clearance
- Minimum clearance
- Type of fit

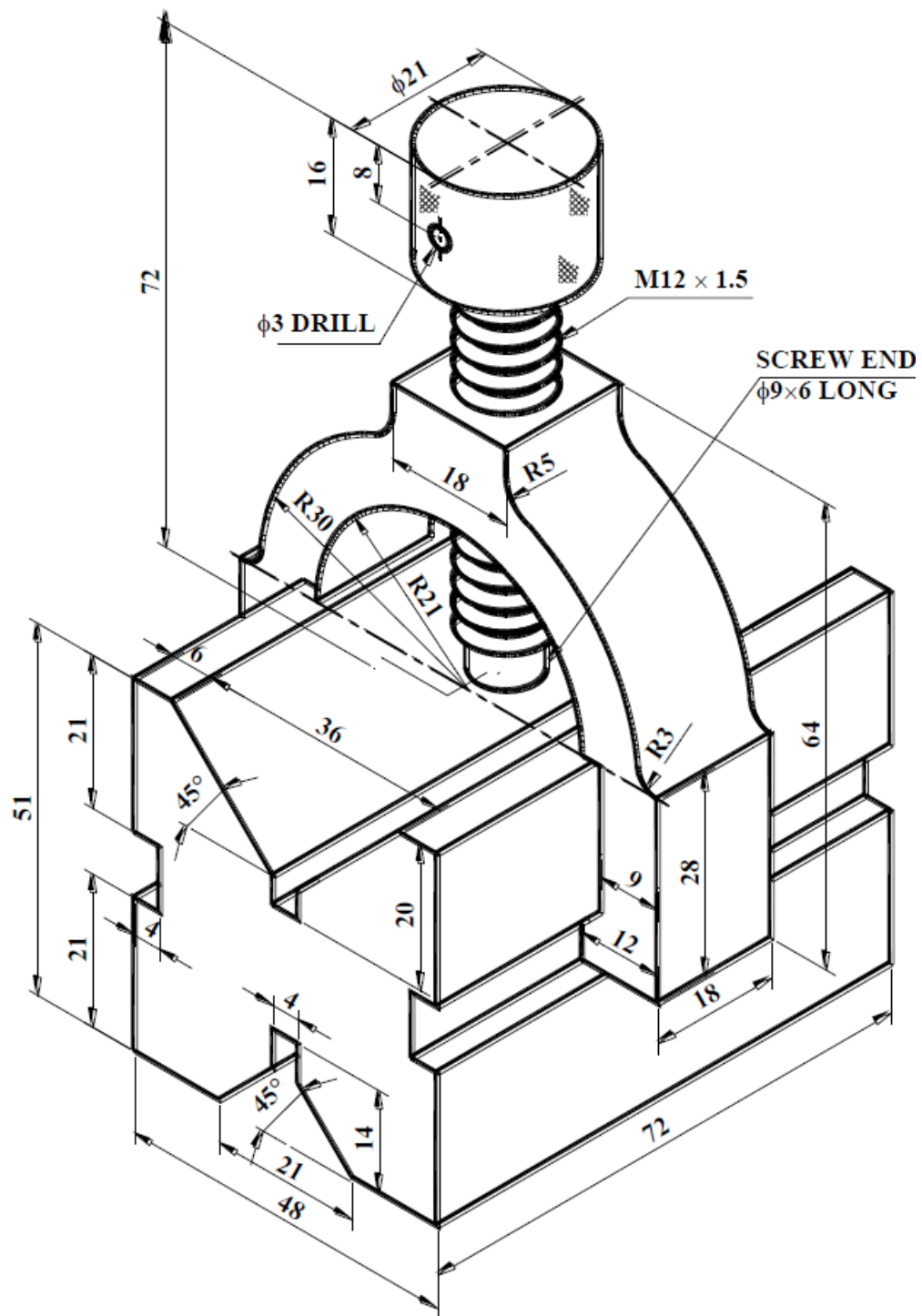


Figure Q1

