2503/204
2509/204
ENGINEERING DRAWING
AND DESIGN II
Oct./Nov. 2022
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AUTOMOTIVE ENGINEERING
DIPLOMA IN MECHANICAL ENGINEERING
(CONSTRUCTION PLANT OPTION)

MODULE II

ENGINEERING DRAWING AND DESIGN II

3 hours

INSTRUCTIONS TO CANDIDATES

You should have for this examination:
- *Answer booklet;*
- *Drawing instruments;*
- *Drawing papers;*
- *Drawing board/table;*
- *Non-programmable calculator.*

*This paper consists of **TWO** sections **A** and **B**.*
*Answer question **ONE** in section **A (COMPULSORY)** and any other **THREE** questions from section **B**.*
Maximum marks for each question are as indicated.
All dimensions are in millimetres.
Candidates should answer the questions in English.

This paper consists of 5 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A

*Answer **ALL** questions in this section **(COMPULSORY)**.*

1. Figure 1 shows the details of a pulley drive. Assemble the parts with the handle on the right hand side and in a vertical position and hence, draw FULL SIZE in FIRST angle projection the following views:

(i) Sectional front elevation on the cutting plane X - X.

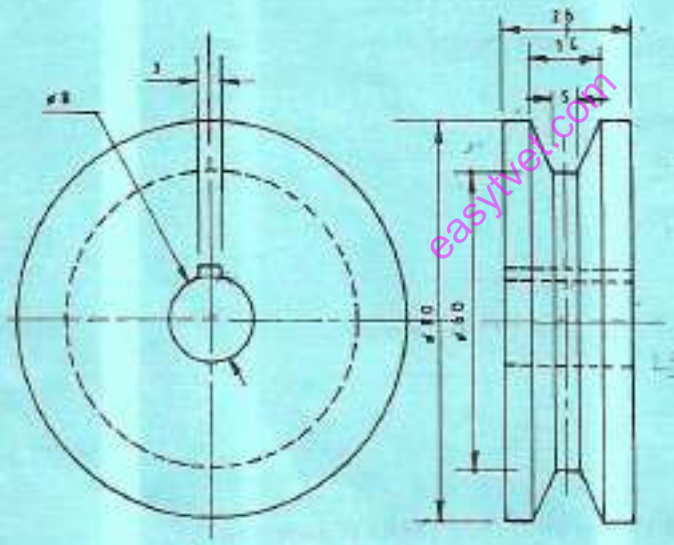
(ii) An end elevation in the direction of arrow A.

(iii) A plan.

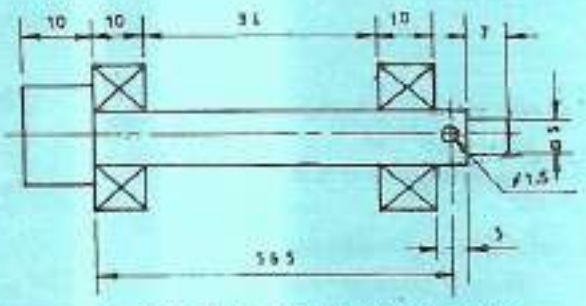
Include

- A parts lists
- six major dimensions
- hidden details
- projection symbol

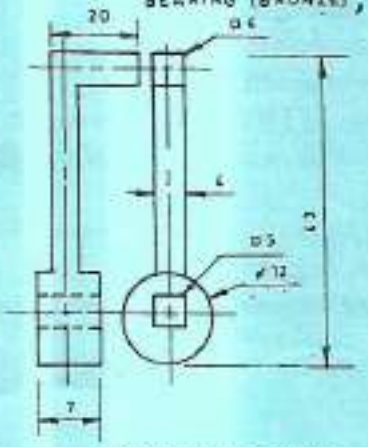
(40 marks)



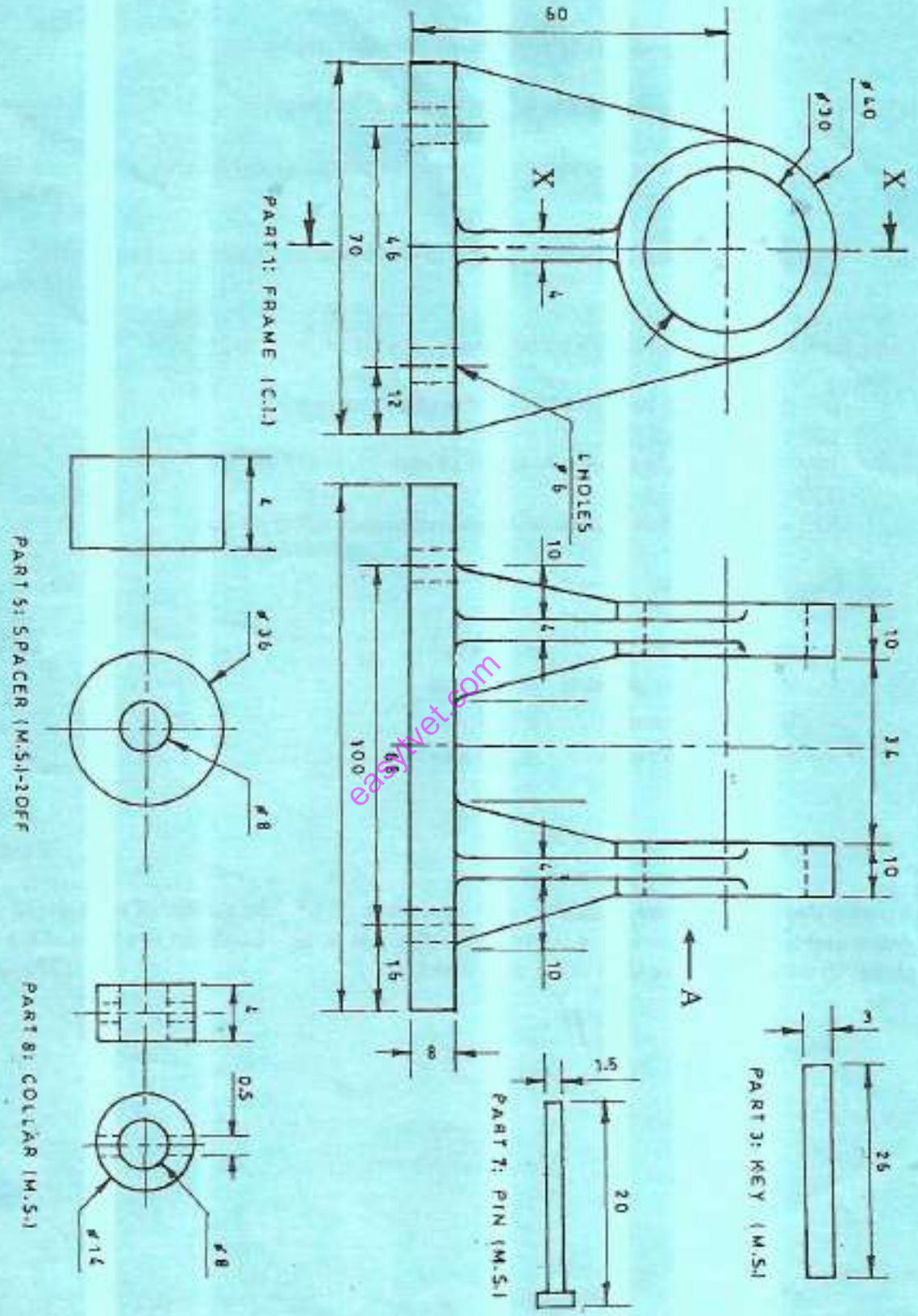
PART 2: PULLEY (C.I.)



PART 1: SHAFT AND BEARING ASSEMBLY
BEARING (BRONZE), SHAFT (M.S.)



PART 3: HANDLE (M.S.)



SECTION B

*Answer **THREE** questions from this section.*

2. (a) (i) State **three** differences between jigs and fixtures.

(ii) Explain **three** considerations when designing jigs and fixtures.

(9 marks)

(b) Design a jig that can be used to drill holes on the surface of tubular components.

(11 marks)

3. Using the following data; design a radial cam;

0 – 100° - simple harmonic motion rise of 60 mm
100 – 150° - dwell
150 – 220° - uniform velocity fall of 20 mm
220 – 270° - dwell
270 – 360° - uniform acceleration and retardation fall of 40 mm

Cam specifications

- shaft diameter = 14 mm
- roller follower diameter = 14 mm
- base circle diameter = 40 mm
- direction of rotation = clockwise

(20 marks)

4. A pinion and gear wheel are in mesh to give a gear ratio of 1:1. The number of teeth on the gear wheel is 25 with a module of 10 and a line of action at 20°. Construct **two** teeth of the pinion in mesh with **three** teeth of the gear wheel.

(20 marks)

5. (a) (i) State **four** properties required for a bearing.

(ii) Illustrate the following bearings:

(I) journal bearing;

(II) thrust bearing.

(10 marks)

(b) (i) State the importance of tolerances in the workshop;

(ii) Illustrate the different types of fits and indicate the maximum and minimum allowances in each.

(10 marks)

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