



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of Medical Engineering
UNIVERSITY EXAMINATION FOR:
BSc. Medical Engineering
EHL 4401 : Manufacturing Systems
SUPPLEMENTARY EXAMINATION
SERIES: September 2018
TIME: 2 HOURS

Instruction to Candidates:

You should have the following for this examination

- *Answer booklet*
- *Non-Programmable scientific calculator*

This paper consists of **FOUR** questions. Attempt any **THREE** questions.

Maximum marks for each part of a question are as shown.

Do not write on the question paper.

Question ONE

- What do you understand by the terminology “Numerical Control (NC)”? **(3 marks)**
- State any THREE advantages and disadvantages of implementing NC technology. **(3 marks)**
- Briefly describe the differences between the two basic types of positioning control systems used in NC. **(6 marks)**
- A turning operation is to be performed on an NC lathe. Cutting speed = 2.5 m/s, feed = 0.2 mm/rev, and depth = 4.0 mm. Workpiece diameter = 100 mm and its length = 400 mm. Determine (a) rotational speed of the workbar, (b) feed rate, (c) metal removal rate, and (d) time to travel from one end of the part to the other. **(8 marks)**

Question TWO

- Group technology (GT) and cellular manufacturing are applicable in a wide variety of manufacturing situations. Group technology offers substantial benefits to companies that have the perseverance to implement it. In this context define GT and discuss briefly the benefits. **(14 marks)**
- State and briefly discuss the TWO main approaches to process planning. **(6 marks)**

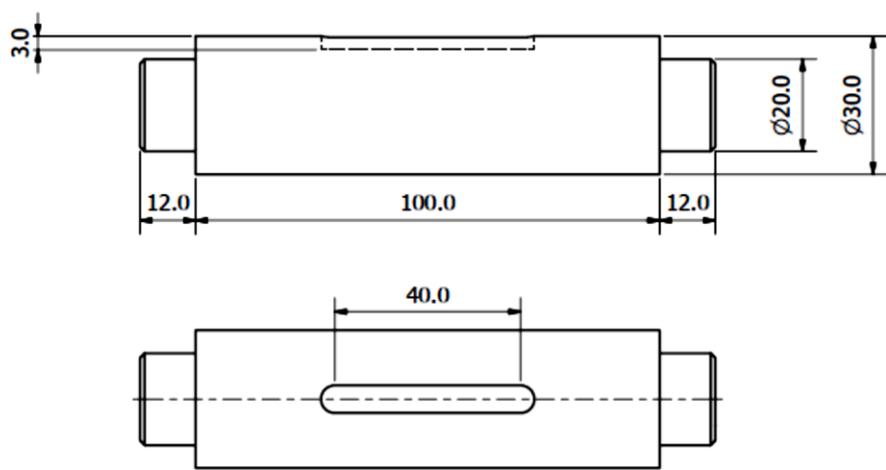
Question THREE

- Define manufacturing process planning and state its significance as used in

- manufacturing processes or assembly operations. (6 marks)
- b. Define the term part family as used in group technology. (3 marks)
- c. Discuss briefly on the approaches/methods used for grouping the parts into families. (9 marks)
- d. What is production planning? (2 marks)

Question FOUR

- a. Briefly discuss on the role of process planning in CAD/CAM integration (4 marks)
- b. Describe briefly what is material requirements planning (MRP) and state any three benefits of a well-designed MRP system (6 marks)
- c. Define manufacturing process planning and state its significance as used in manufacturing processes or assembly operations. (4 marks)
- d. Prepare a process plan for the part shown in Figure below. Assume that conventional machine tools are used. (6 marks)



Question FIVE

- a. State and briefly describe the procedures (steps) to be followed in Computer Numerical Control (CNC) programming and machining. (10 marks)
- b. Figure 5 shows a part that is to be machined from a 100 × 80 × 40mm billet. A three axis CNC is to be used for the process. Write a part program that can be used to effectively machine the part. The cutting parameters are given below: (10 marks)

Table 1: Cutting parameters

	Milling	Drilling
Cutter	Ø20mm flat end mill	Ø16mm drill bit
Spindle speed (rpm)	3000	500
Feed (mm/min)	500	240

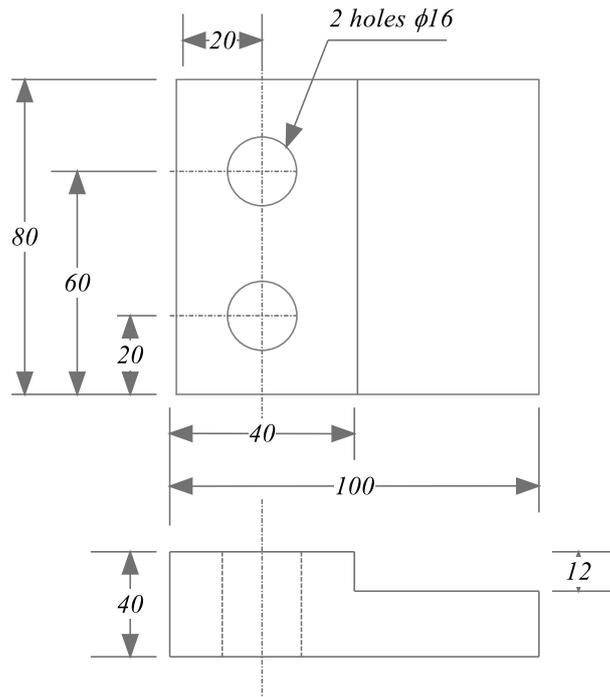


Figure 5