NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFCTURING ENGINEERING

BACHELOR OF INDUSTRIAL AND MANUFACTURING ENGINEERING HONOURS

PART V - COMPUTER AIDED MANUFACTURING - TIE 5211

SECOND SEMESTER EXAMINATION – AUGUST 2009

Time Allowed: 3 Hours
Answer 5 Questions

SECTION A

Question 1

a) Briefly outline what you understand by the term numerical controlled machines and their advantages over conventional machines. [5]

b) Write a concise part program to machine the component shown in Fig Q1. Given that the Feedrate F=0.4 mm/min and the spindle speed S = 160 rev/min using a tool T0101 for roughing to 0.2 mm of final dimensions, while Feedrate F=0.15 mm/min and the spindle speed S = 180 rev/min using a tool T0303 for finishing. Assuming that the blank is 101 mm x D60 [15]
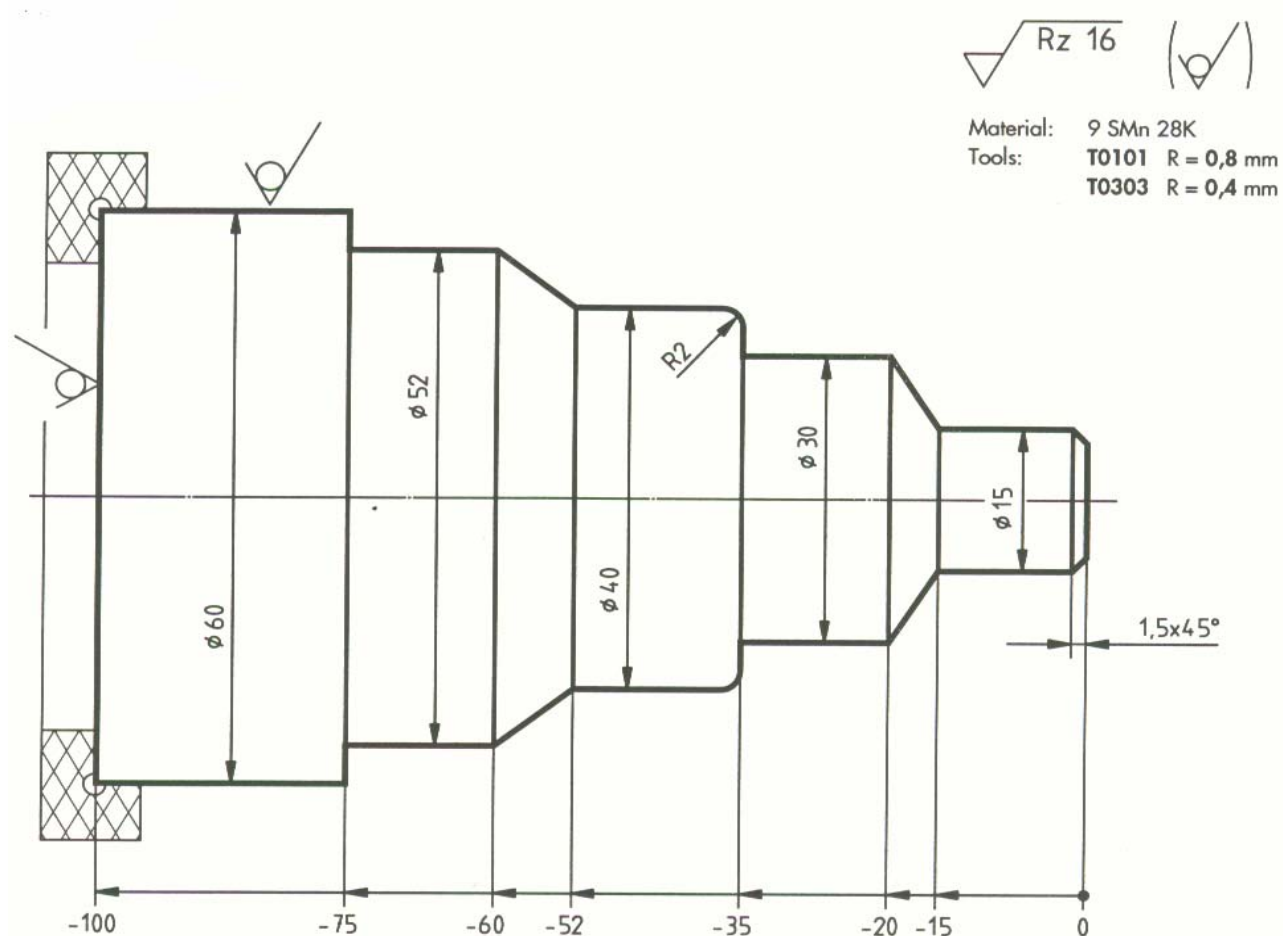

Fig Q1

Question 2

a) Briefly explain the following terms with the help of examples:

    i.   contouring machine motion   [2]

    ii. modal and non-modal commands   [2]

    iii. absolute and relative positioning commands   [2]

b) Write a concise part program to machine the component shown in Fig Q2. Given that the milling tool T3 and T4 operates with a feedrate F = 80 mm/min and the spindle speed S=1392 rev/min while the drilling tool T5 which is of diameter 8 mm operates with a feedrate F = 120 mm/min and spindle speed S = 1193 rev/min. Given also that the maximum depth of cut for the milling tools T3, and T4 is 3 mm.   [14]
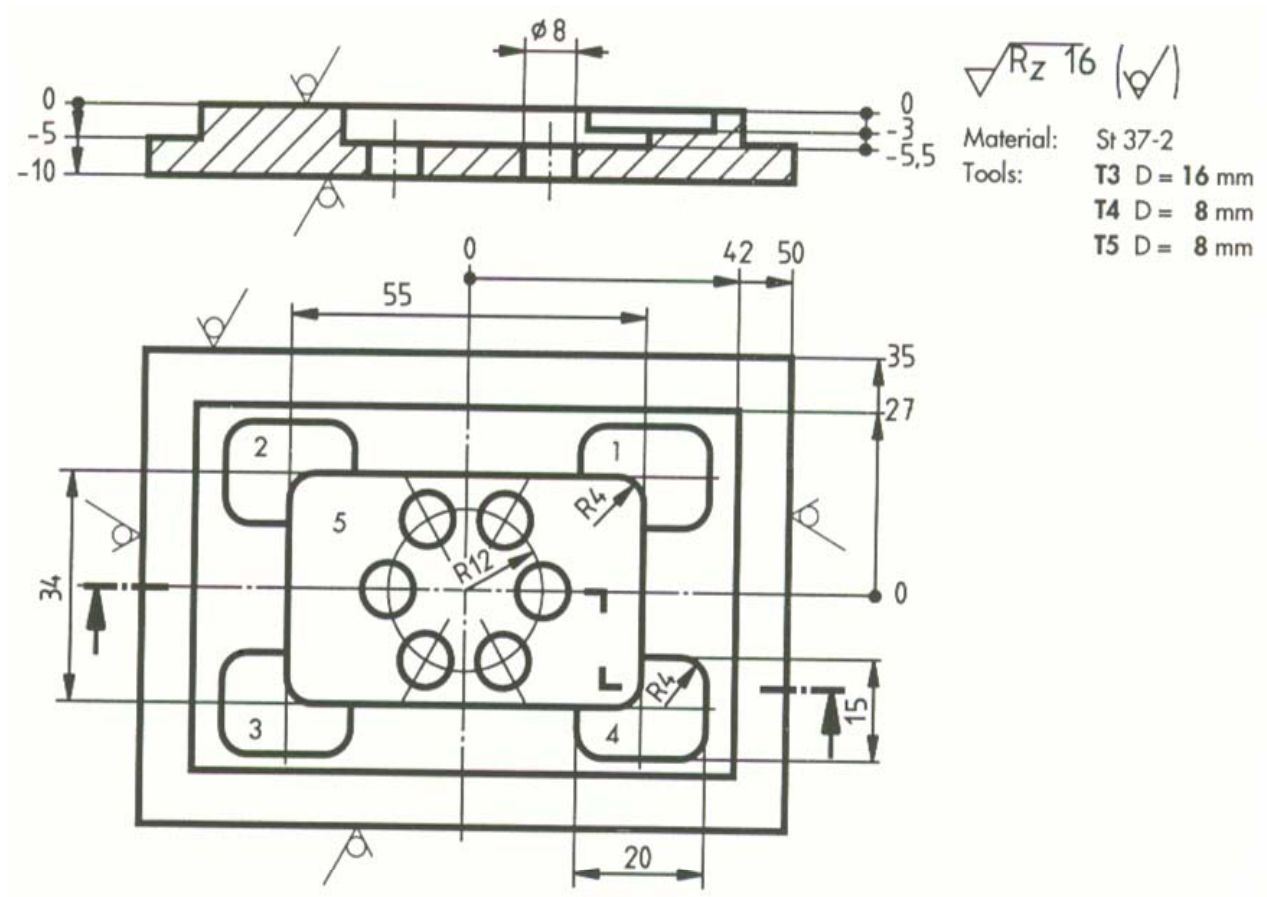

Fig Q2

Question 3

a) i) With the help of examples explain briefly what you understand by the term post-processor. [2]

ii) In a bid to convince Management to finance the purchase of CNC machines using APT instead of manual part programming explain briefly two advantages that are to be gained by such an investment. [4]

b) A full APT program is needed for machining of a part given in Fig Q3. The dimensions of the stock material are 100 x 70 x 10mm. Given a milling tool T2 with diameter D = 20 mm, feedrate F = 80 mm/min and spindle speed S = 477 rev/min. [14]
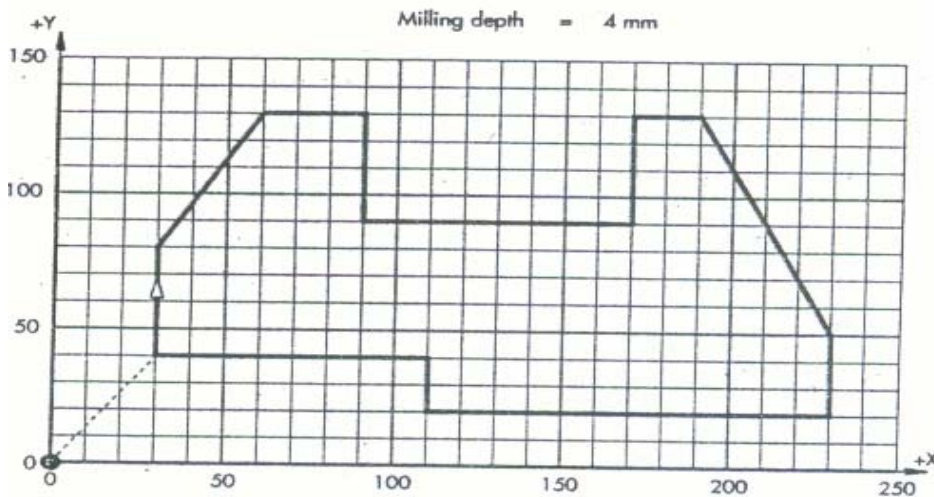

Fig Q3

Question 4

a) Explain briefly Direct Numerical Control including its disadvantages. [5]

b) Discuss Computer Numerical Control machines with aid of a block diagram [5]

c) A precise part program is needed for machining the outlined profile in Fig Q3. The dimensions of the stock material are 100 x 70 x 10mm. Given a milling tool T2 with diameter D = 10 mm, feedrate F = 80 mm/min and spindle speed S = 477 rev/min. [10]

SECTION B

Question 5

a) Briefly discuss the information flow in process plan procedure. [10]

b) Briefly explain generative approaches to computer aided process planning. [10]

Question 6

a) Briefly outline the basic functional modules for Variant CAPP. [10]

c) Name one software and its capabilities in CAPP systems. [5]

e) Discuss briefly if CAD to CAM straight link is possible and applicable in Zimbabwe. [5]

END OF EXAM