NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

B-Eng Hons Industrial and Manufacturing Engineering

Supplementary Examination

COURSE	**:**	**MANUFACTURING PROCESSES III**
CODE	**:**	**TIE 5103**
DATE	**:**	**JULY 2013**
DURATION	**:**	**3 HOURS**

INSTRUCTIONS TO CANDIDATE

1. Answer any **FIVE** questions.
2. Each question carries (20) marks
3. This paper contains seven **(7)** questions.
4. There are three **(3)** printed pages.

QUESTION 1

a. What are the three steps in the sintering cycle in Powder Metallurgy [8]

b. Describe using clearly labeled diagrams what cold isostatic pressing (CIP) is, stating the advantages of using the process. [12]

QUESTION 2

a. Show a clear illustration of the Injection Molding process. [8]

b. A cylindrical work bar with 45 mm diameter and 520 mm length is chucked in an engine lathe and supported at the opposite end using a live center. A 46.0mm portion of the length is to be turned to a diameter of 42.5 mm one pass at a speed of 450 ft/min. The metal removal rate should be 67.5 mm^3/min. Determine the
   i. required depth of cut, [4]
   ii. required feed, [4]
   iii. cutting time. [4]

QUESTION 3

a. What are the 3 basic categories of material removal processes. How different are they from each other [8]

b. Use illustrative sketches to show your understating of extrusion blow molding [12]

QUESTION 4

a. Discuss 5 considerations that make powder metallurgy an importation commercial technology [5]

b. A hole is being drilled in a block of magnesium alloy with a 15-mm drill bit at a feed of 0.5 mm/rev and with the spindle running at N = 1200 rpm. Calculate
   i. material-removal rate [7]
   ii. Torque on the drill [8]

QUESTION 5

a. Explain the following terms as used in manufacturing processe4s
   i. Circular sawing
   ii. Abrasive cut-off
   iii. Hack sawing

iv. Band sawing [8]

b. Show by illustrative sketches peripheral milling and face milling [12]

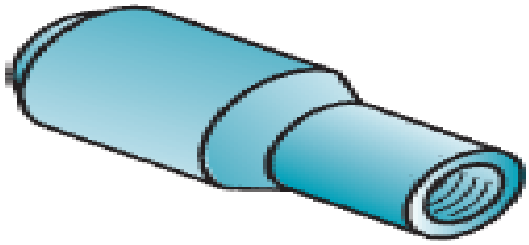
QUESTION 6

Explain in detail how the following chips are formed

i. Continuous chip [5]
ii. Continuous with built edge [5]
iii. Discontinuous chip [5]
iv. Serrated chip [5]

QUESTION 7

Use clearly labeled sketches to show how you would achieve the part show in Figure Q7



(a)

Figure Q7: Part features [20]