



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATIONS FOR DEGREE IN
BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMG 2421: PRODUCTION TECHNOLOGY II

SUPPLEMENTARY/SPECIAL EXAMINATIONS

SERIES: MARCH 2014

TIME: 2 HOURS

INSTRUCTIONS:

- You should have the following for this examination:
 - i) Drawing instruments
 - ii) Scientific calculator
- This paper consists of **FIVE** questions.
- Answer any **THREE** questions.

This paper consists of Two printed pages

QUESTION 1

- a) Explain how welding affects the metallurgy of the metal being joined. **(10 marks)**
- b) i) Outline the principles of resistance welding.
ii) With the aid of sketches explain seam welding. **(10 marks)**

QUESTION 2

- a) Describe the following welding processing:
i) Metal inert gas welding
ii) Plasma arch welding **(14 marks)**
- b) An electron beam welding unit operating at 120KV and rated at 1.3KW has a beam 0.5mm diameter. Each electron has mass 9.7×10^{-31} kg and a kinetic energy of 1.602×10^{-19} joule when accelerated by 1 volt. If 1 ampere current is equivalent to a flow rate of 6.28×10^{18} electrons/second determine:
i) Velocity of electrons
ii) Beam current
iii) Power density of the beam. **(7 marks)**

QUESTION 3

- a) Describe the principles of Electro-Chemical Milling (ECM). **(8 marks)**
- b) Outline the structure of an ECM machine. **(5 marks)**
- c) i) Describe Chemical Milling.
ii) State the application of chemical milling. **(7 marks)**

QUESTION 4

- a) Outline the principle of laser beam production. **(8 marks)**
- b) Briefly explain the following applications of laser:
i) Surface treatment
ii) Metal cutting
iii) Drilling **(9 marks)**
- c) List any **THREE** advantages and 3 disadvantages of lasers. **(3 marks)**

QUESTION 5

Briefly explain the following methods of metal coatings:

- a) Hot dipping
b) Galvanizing
c) Anodizing
d) Sherardising
e) Parkerizing **(20 marks)**