UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 4 Examination in Engineering: February 2020

Module Number: ME4303 **Module Name: Manufacturing Engineering (N/C)**

[Three Hours]

[Answer **all questions**, each question carries twelve marks]

Q1. a) Define the single-point and multi-point cutting tools with appropriate examples.

[3.0 Marks]

b) Clearly state three grades of High Speed Steel (HSS) tools and their recommended applications.

[3.0 Marks]

c) Briefly explain the formation of Built Up Edge (BUE) chips during machining with aid of clear sketches.

[3.0 Marks]

d) Describe two mechanisms that cause wear at the tool-chip and tool-work interfaces in machining.

[3.0 Marks]

Q2. a) What are the special features of friction welding?

[3.0 Marks]

b) Explain the resistance welding process with neat sketches.

[3.0 Marks]

c) Explain the types of oxy-acetylene flames with sketches.

[3.0 Marks]

d) List any four welding defects. Explain how they are happened, and actions to be taken to avoid them.

[3.0 Marks]

Q3. a) What are the four major drawbacks of hot working?

[2.0 Marks]

b) Explain why metal components produced by forging are preferred when compared to other machining and welding process.

[4.0 Marks]

c) Compare the direct and indirect extrusion process with neat sketches.

[3.0 Marks]

d) What is wire drawing? Explain the process by giving applications.

[3.0 Marks]

Q4. a) List four principal criterions that have to be considered when selecting a cutting fluid for a machining operation.

[3.0 Marks]

b) Briefly describe each advantage and disadvantage of Electro Discharge Machining (EDM).

[3.0 Marks]

c) Explain the working principle of Plasma Arc Machining (PAM) with aid of suitable sketches.

[3.0 Marks]

d) A turning operation, the work part is 125 mm in diameter and 300 mm long. A feed of 0.225 mm/rev is used in the operation. If cutting speed is 3.0 m/s, the tool must be changed every 5 work parts; but if cutting speed is 2.0 m/s, the tool can be used to produce 25 pieces between tool changes. Determine the Taylor tool life equation for this job.

[3.0 Marks]

Q5. a) Describe the types of ingredients usually added to metallic powders during blending and/or mixing.

[3.0 Marks]

b) What are the 3 steps in sintering cycle of powder metallurgy (PM)? Explain with suitable sketches.

[3.0 Marks]

c) Why a controlled atmosphere furnace is desirable in sintering?

[3.0 Marks]

d) Explain, why PM Technology well suited to production of gears and bearings?

[3.0 Marks]