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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016**

COURSE NAME : MODERN MACHINING
TECHNOLOGY
COURSE CODE : BNM 30103
PROGRAMME : 3 BNM
EXAMINATION DATE : DECEMBER 2015/JANUARY 2016
DURATION : 3 HOURS
INSTRUCTION : ANSWER **FIVE (5)** QUESTIONS
ONLY.

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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- Q1** (a) Differentiate between transferred plasma arc and non-transferred plasma arc in terms of their components and circuit diagram. (5 marks)
- (b) Dual gas plasma torch and water injected plasma are the common plasma arc cutting system available in the market. Compare these systems and select the best system in terms of the working principle, main gases, shielded gases and recommended workpiece. (15 marks)
- Q2** (a) List and explain **THREE (3)** components of laser delivery system. (6 marks)
- (b) Differentiate between Nd:YAG laser and CO₂ laser in terms of their instruction. (6 marks)
- (c) What are the type of laser outputs available in the market? Justify which is the best type of laser output. (8 marks)
- Q3** (a) Explain the importance of spark gap in Electrical Discharge Machining process. (4 marks)
- (b) Sketch and explain the differentiation between Electro Chemical Machine and Electrical Discharge Machine processes. (6 marks)
- (c) **Figure Q3 (c)** shows examples of artificial parts knee component for surgery knee replacement. Recommend a modern manufacturing process that capable to produce them Justify your answer with possible consideration. (10 marks)
- Q4** (a) State the working principle of Chemical Machining process and draw a schematic diagram of the processing steps sequence. (4 marks)
- (b) Illustrate and describe on how to produce a contour using Chemical Machining process. (6 marks)

- (c) An aircraft component is chemically milled from a 800 mm x 500 mm alloy plate of 20 mm thickness. A ribbed pattern is made by removing 80% of the area to a depth of 18 mm.
- (i) Assuming the alloy material removal rate is 0.012 mm/min, calculate the time required to etch the pattern.
- (ii) A same pattern is etching on the larger plate with the size of 900 mm x 650 mm with 20 mm thickness. Calculate the machining time. Comment and conclude the time obtained in (i) and (ii). (10 marks)
- Q5** (a) Identify at least **FOUR (4)** parameters that effect the machining characteristics in Electron Beam Machining (EBM). (4 marks)
- (b) Sketch and describe the material removal process in the Electron Beam Machining (EBM). (6 marks)
- (c) A current density for EBM to cut alloy steel block is 25 Ampere and the voltage use is 60 Volt. If the diameter of the beam is 5 mm while the pulse energy, pulse duration and accelerating voltage is 500 W/m², 0.5 min and 40 V, calculate the power density for the EBM process. Determine the effect of power density in EBM process. (10 marks)
- Q6** (a) State the definition of High speed Machining (HSM). (2 marks)
- (b) Identify the importance of HSM compare to Electrical Discharge Machining (EDM). (4 marks)
- (c) Discuss the advantages of using granite-epoxy composites and polymer concrete for HSM machine structure? (4 marks)
- (d) As an engineering technologist in a manufacturing company you have been asked to purchase HSM by the top management. Evaluate the important criteria for the HSM design consideration. (10 marks)

-END OF QUESTIONS-

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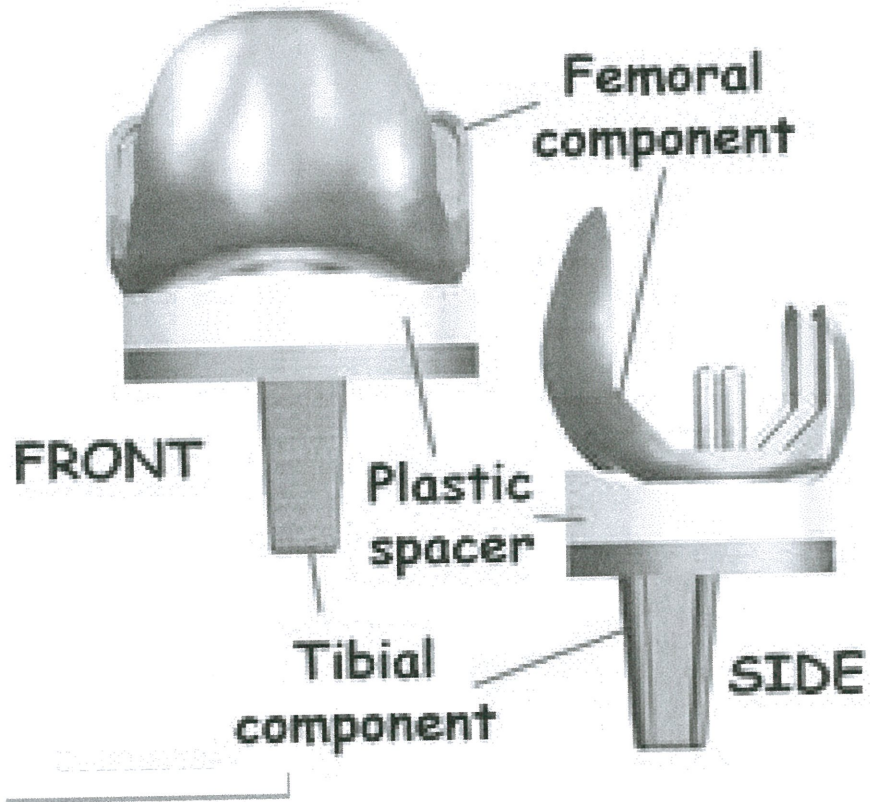


FIGURE Q3 (c)