Universiti Teknikal Malaysia Melaka
Peperiksaan Akhir semester I
Sesi 2009/2010

Fakulti Kejuruteraan Pembuatan

<table>
<thead>
<tr>
<th>KOD MATAPELAJARAN</th>
<th>BMFS3323/ BMFS4353</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATA PELAJARAN</td>
<td>PROSES PEMBUATAN TERMAJU (ADVANCED MANUFACTURING PROCESSES)</td>
</tr>
<tr>
<td>PENYELARAS</td>
<td>Ir. SIVARAO SUBRAMONIAN</td>
</tr>
<tr>
<td>KURSUS</td>
<td>BMFB, BMFP, BMFR</td>
</tr>
<tr>
<td>MASA</td>
<td>2.15 PETANG – 5.15 PETANG (3 JAM)</td>
</tr>
<tr>
<td>TARIKH</td>
<td>2 NOVEMBER 2009</td>
</tr>
<tr>
<td>TEMPAT</td>
<td>BILIK KULIAH 4 PBPI</td>
</tr>
</tbody>
</table>

Arahan Kepada Calon:
1. Kertas soalan ini mengandungi LIMA (5) soalan.
2. Sila jawab SEMUA soalan.
3. Gunakan muka surat baru untuk setiap soalan yang dijawab.

Kertas soalan ini terdiri daripada enam (6) muka surat sahaja
(termasuk muka surat hadapan)
QUESTION 1

a) Compare chemical machining, electro chemical machining and photo chemical machining processes based on their fundamental working principles. [3 marks]

b) Explain electro chemical machining process with a neat schematic sketch. [7 marks]

c) Being an engineer of a precision production plant, you feel that the use of traditional machine tools should be replaced for the total betterment. What would be your FIVE (5) main points to attain the advantages and the improvement in process capabilities of non-traditional machines? [5 marks]

d) List any FIVE (5) design considerations in Photo Chemical Blanking. [5 marks]
QUESTION 2

a) Name FOUR (4) types of Electrical Discharge Machine (EDM) which are commonly used in precision manufacturing industries.

[4 marks]

b) In your opinion, can plain tap water be used as a dielectric fluid in EDM process? Please explain.

[4 marks]

c) A 10 mm-thick stainless steel plate is being machined using EDM die sinking. Before the machining, the workpiece and electrode was 23.48g and 10.71g respectively. After 15 minutes, the weight for the workpiece and electrode has been reduced to 19.28g and 6.58g. Estimate the Material Removal Rate (MRR) and Electrode Wear Rate (EWR).

[7 marks]

d) If an EDM is to be considered by your industry, what are the FOUR (4) advantages that you would recommend about EDM to your superiors?

[5 marks]
QUESTION 3

a) A manufacturing industry is interested in producing a steering wheel as shown in Figure 1. As a manufacturing engineer, briefly suggest the most suitable advanced processing machine and its processing steps in order to fabricate the 5mm low carbon steel part. State your assumptions (if any) to support your answer.

[10 marks]

Figure 1: Steering Wheel

b) List any FIVE (5) advantages of the above selected process to provide your recommendations to the industry.

[5 marks]

c) Calculate the average power density in the focused circular area of Electron Beam Welding (EBW) in watt/mm² if the operation voltage is 60 kV and the beam current is 23 mA. The electron beam diameter is 0.32mm and heat transfer factor is 0.87.

[5 marks]
QUESTION 4

a) Plasma Arc Machining (PAM) possesses advantages and disadvantages in catering the need of precision manufacturing. List THREE (3) each.

[6 marks]

b) Explain the working principle of plasma arc machining with a neat schematic sketch.

[8 marks]

c) Consider a manufacturing industry using electrochemical machining to produce a 100mm deep hole with 20mm diameter. Estimate maximum current and the time required to produce this if, maximum current density = 8 A/mm² and maximum material removal rate = 12 mm/min.

[6 marks]
QUESTION 5

a) Explain the ultrasonic machining working process with the aid of a neat schematic sketch. [10 marks]

b) What is the role of abrasive slurry in ultrasonic machining process? [2 marks]

c) Name three common types of grains used as abrasive slurry in Ultrasonic Machining (USM) and mention their common grain sizes for roughing and finishing. [3 marks]

d) List any FIVE (5) advantages of ultrasonic machining process. [5 marks]