UNIVERSITI TUN HUSSEIN ONN MALAYSIA

PEPERIKSAAN AKHIR
SEMESTER I
SESI 2011/2012

NAMA KURSUS	:	MODERN MACHINING PROCESS
KOD KURSUS	:	BDD 4073
PROGRAM	:	SARJANA MUDA KEJURUTERAAN MEKANIKAL DENGAN KEPUJIAN
TARIKH PEPERIKSAAN	:	JANUARI 2011
JANGKA MASA	:	2 JAM 30 MINIT
ARAHAN	:	JAWAB **LIMA** SOALAN SAHAJA DARIPADA **ENAM** SOALAN YANG DISEDIAKAN.

KERTAS SOALAN INI MENGANDUNGI EMPAT (4) MUKA SURAT

Q1 (a) Discuss the need of advanced machining process in modern industrial sector.
(6 marks)

(b) Discuss the future of advanced machining process application.
(6 marks)

(c) A lathe is running at 1000 rpm machining a bar of steel, which is 100 mm outside diameter. The cutting force applied by the tool to the work is 700 N.

(i) Determine the cutting velocity when the tool has reduced the bar to a diameter of 50 mm with feed rate 0.15 mm/s and depth of cut 0.1 mm.

(ii) Determine the power is being used at these two diameters.

(iii) Determine the material removal rate (MRR).
(8 marks)

Q2 (a) Give the most appropriate definition of High Speed Machine.
(4 marks)

(b) When considering the use of electromachining and traditional metal removal processes, list the factors would influence the decision in deciding which techniques to apply?
(8 marks)

(c) If in a resistance-capacitance type (RC type) generator, to get an idle time of 500 μs for open circuit voltage of 100 V and amperage of 50 ampere at pulse duration of 200 μs. Determine the material removal rate of an EDM process on nikel alloy weight before and after as 29 g and 20g, while electrode graphite weighs before and after as 19 g and 12g. Also determine the percentage of wear rate.
(8 marks)

Q3 (a) Compare the following processes in term of principle of operation and application :
(i) Electrical Discharge Machine (EDM)
(ii) Electrochemical Machine (ECM)
(7 marks)

(b) Gives **FIVE** limitation when using Electrochemical machine.
(5 marks)

(c) Composition of a Nickel superalloy is as follows:

Ni = 70.0%, Cr = 20.0%, Fe = 5.0% and rest Titanium

Calculate material removal rate (rate of dissolution), if the area of the tool is 1500 mm^2 and a current of 2000 A is being passed through the cell. Assume dissolution to take place at lowest valency of the elements.

$A_{Ni} = 58.71$ $\rho_{Ni} = 8.9$ $v_{Ni} = 2$

$A_{Cr} = 51.99$ $\rho_{Cr} = 7.19$ $v_{Cr} = 2$

$A_{Fe} = 55.85$ $\rho_{Fe} = 7.86$ $v_{Fe} = 2$

$A_{Ti} = 47.9$ $\rho_{Ti} = 4.51$ $v_{Ti} = 3$

(8 marks)

Q4 (a) Gives **ONE** similarity and difference between Laser Beam Machine and Electron Beam Machine.

(3 marks)

(b) Identify the parameter of Laser Beam Machine and Electron Beam Machine.

(8 marks)

(c) Compare the following processes in term of metal removal rate, surface finish and dimensional accuracy :

(i) Laser Beam Machine
(ii) Ultrasonic machine (USM)

And for each process indicate a typical application which would justify its use, giving reasons for your choice.

(9 marks)

Q5 (a) State the working principle of USM equipment and draw schematically the USM equipment.

(6 marks)

(b) (i) Glass is being machined at a MRR of 6 mm^3/min by Al_2O_3 abrasive grits having a grit dia of 150 μm. If 100 μm grits were used, what would be the MRR?

(ii) For the above problem, from the initial setting the frequency is increased from 20 kHz to 25 kHz. Determine new MRR.

(6 marks)

(c) Schematically draw, explain the principle operation and list **FOUR** types of Plasma Arc Cutting

(8 marks)

Q6 (a) Schematically draw and describe the basic mechanism of material removal and the working principle of Abrasive Jet Machining (AJM).

(8 marks)

(b) Differentiate between water and abrasive water jet machining

(5 marks)

(c) (i) Assuming no losses, determine water jet velocity and mass flow rate , when the water pressure is 4000 bar. being issued from an orifice of diameter 0.3 mm and assuming all related coefficients to be 1.

(ii) Determine the mass flow rate of water for the given problem Estimate the material removal rate in AJM of a brittle material with flow strength of 4 GPa. The abrasive flow rate is 2 gm/min, velocity is 200 m/s and density of the abrasive is 3 gm/cc.

(7 marks)