FKMP

KOLEJ UNIVERSITI TEKNOLOGI TUN HUSSIEN ONN

PEPERIKSAAN AKHIR
SEMESTER II
SESI 2004/05

NAMA MATAPELAJARAN	:	PROSES PEMBUATAN
KOD MATAPELAJARAN	:	BTM 2303
KURSUS	:	2 BTM
TARIKH PEPERIKSAAN	:	MAC 2005
JANGKAMASA	:	2 ½JAM
ARAHAN	:	1. JAWAB **SEMUA** SOALAN
		2.KERTAS SOALAN PEPERIKSAAN INI MENGANDUNGI DUA VERSI IAITU BAHASA MALAYSIA DAN BAHASA INGGERIS

KERTAS SOALAN INI MENGANDUNGI 5 MUKA SURAT

S1 (a) Terangkan secara ringkas konsep proses-proses berikut:

(i) Proses pembentukan *(deformation process)*
(ii) Proses pembuangan bahan *(material removal process)*

(4 markah)

(b) Senaraikan tiga jenis komposit *'reinforce plastics'* dengan bantuan lakaran skematik struktur binaan.

(6 markah)

(c) Senaraikan tiga langkah asas operasi proses *'powder metallurgy'*.

(6 markah)

(b) Terdapat beberapa faktor mengapa proses pembentukan plastik penting kepada sektor pembuatan. Senaraikan dua faktor tersebut.

(4 markah)

S2 (a) Satu operasi pemesinan mengisar *(slab milling)* dilakukan pada permukaan atas logam besi yang berbentuk segiempat tempat yang berukuran panjang 300 mm dan lebar 100 mm. Garispusat matalat pemotong 75 mm dan bilangan gigi 4 di mana panjang matalat pemotong adalah melebihi lebar bendakerja pada kedua-dua hujungnya. Maklumat pemesinan seperti berikut: V = 80 m/min, f = 0.2 mm/tooth, dan d = 7.0 mm.
Kirakan:

(i) Masa pemotongan yang diambil untuk pemesinan bagi keseluruhan permukaan bendakerja
(ii) Kadar pembuangan bahan

(10 markah)

(b) Di dalam satu operasi pemesinan mencanai permukaan *(surface grinding)* di mana garispusat roda matalat = 150 mm dan *infeed* = 0.07 mm, kelajuan pemotongan roda matalat (V) = 1450 m/min, kelajuan bendakerja (V_w) = 0.25 m/s, *cross-feed* = 5 mm, dan $C = 0.75$ grits/mm^2.
Kirakan:

(i) Purata panjang per cip (average length per chip)
(ii) Kadar pembuangan bahan (metal removal rate)
(iii) Bilangan cip per unit masa (number of chips formed per unit time)

(10 markah)

S3 (a) Satu operasi penuangan dilakukan di mana tinggi *sprue* = 175 mm. Luas keratan rentas bahagian paling bawah *sprue* ialah 400 mm^2. Rongga acuan mempunyai isipadu = 0.001 m^3.
Kirakan:

(i) Halaju logam cair pada bahagian paling bawah *sprue*
(ii) Kadar alir isipadu
(iii) Masa yang di ambil oleh logam cair untuk memenuhi keseluruhan rongga-rongga di dalam acuan.

(10 markah)

(b) Di dalam satu operasi tuangan pasir, logam cair boleh dituang ke dalam acuan pada kadar aliran isipadu seragam 1000 cm^3/s. Logam cair mengalir kedalam acuan melalui *downsprue*. Keratan rentas *downsprue* adalah berbentuk bulat dengan garispusat bahagian atas ialah 3.4 cm. Jika tinggi *downsprue* ialah 25 cm, kirakan garispusat yang sesuai pada bahagian paling bawah *downsprue* supaya kadar aliran isipadu seragam tersebut dapat dikekalkan.

(10 markah)

S4 Satu plat logam dengan ketebalan 40 mm perlu dikurangkan ketebalannya kepada 30 mm dengan menggunakan operasi menggelek. Kelajuan awal bendakerja = 16 m/min, jejari roda penggelek = 300 mm, dan kelajuan putaran roda penggelek = 18.5 rev/min.
Kirakan:

(a) Pekali geseran minimum yang di perlukan
(b) Kelajuan akhir bendakerja dimana anggaran lebar plat logam tersebut bertambah kepada 2 % semasa proses menggelek dilakukan.
(c) Slip kegelinciran

(20 markah)

S5 Satu operasi menempa panas dijalankan dengan menggunakan dai terbuka (open die). Saiz asal bendakerja adalah: D_o = 25 mm, and h_o = 50 mm. Bendakerja tersebut perlu ditempa kepada garispusat = 50 mm. Takat alah bendakerja adalah berlaku pada 85 MPa (n = 0). Pekali geseran di antara permukaan dai dan bendakerja = 0.40.
Kirakan:

(a) Tinggi akhir bendakerja
(b) Daya maksimum operasi menempa

(20 markah)

TERJEMAHAN

S1 (a) Explain briefly the concept of processes listed below:

(i) Deformation process
(ii) Material removal process

(4 marks)

(b) List three types of composites reinforce plastics with the aids of schematic its structure.

(6 marks)

(c) List three step of basic operation of conventional powder metallurgy.

(6 marks)

(c) There are several reasons why the shaping plastic processes are important. List two of them.

(4 marks)

S2 (a) A slab milling operation is performed on the top surface of a rectangular workpart which is 300 mm long by 100 mm wide. The milling cutter, which is 75 mm in diameter and has four teeth, overhangs the width of the part on both sides. Cutting conditions are: V = 80 m/min, f = 0.2 mm/tooth, and d = 7.0 mm. Determine:

(i) The time to make one pass across the surface
(ii) The material removal rate during the cut.

(10 marks)

(b) In a surface grinding operation the wheel diameter = 150 mm and the infeed = 0.07 mm. The wheel speed (V) = 1450 m/min, work speed (V_w) = 0.25 m/s, and the cross-feed = 5 mm. The number of active grits per area of wheel surface C = 0.75 grits/mm^2.
Determine:

(i) Average length per chip
(ii) Metal removal rate
(iii) Number of chips formed per unit time for the portion of the operation when the wheel is engaged in the work.

(10 marks)

S3 (a) The downsprue leading into the runner of a certain mold has a length = 175 mm. The cross-sectional area at the base of the sprue is 400 mm^2. The mold cavity has a volume = 0.001 m^3.
Determine:

(i) The velocity of the molten metal flowing through the base of the downsprue
(ii) The volume rate of flow
(iii) The time required to fill the mold cavity.

(10 marks)

(b) Molten metal can be poured into the pouring cup of a sand mold at a steady rate of 1000 cm^3/s. The molten metal overflows the pouring cup and flows into the downsprue. The cross-section of the sprue is round, with a diameter at the top = 3.4 cm. If the sprue is 25 cm long, determine the proper diameter at its base so as to maintain the same volume flow rate.

(10 marks)

S4 A 40 mm thick plate is to be reduced to 30 mm in one pass in a rolling operation. Entrance speed = 16 m/min. Roll radius = 300 mm, and rotational speed = 18.5 rev/min.
Determine:

(a) The minimum required coefficient of friction that would make this rolling operation possible
(b) Exit velocity under the assumption that the plate widens by 2% during the operation
(c) Forward slip

(20 marks)

S5 A hot upset forging operation is performed in an open die. The initial size of the workpart is: D_o = 25 mm, and h_o = 50 mm. The part is upset to a diameter = 50 mm. The work metal at this elevated temperature yields at 85 MPa (n = 0). Coefficient of friction at the die - work interface = 0.40.
Determine:

(a) Final height of the part
(b) Maximum force in the operation

(20 marks)