



**UNIVERSITI TUN HUSSEIN ONN
MALAYSIA**

**FINAL EXAMINATION
SEMESTER II
SESSION 2009/2010**

SUBJECT NAME : PRODUCTION TECHNOLOGY
SUBJECT CODE : BPB 2073
COURSE : 2 BPA / 2 BPB
EXAMINATION DATE : APRIL / MAY 2010
DURATION : 3 HOURS
INSTRUCTION : ANSWER **FOUR (4)** QUESTIONS
ONLY OUT OF SIX (6)
QUESTIONS

THIS QUESTION PAPER CONSISTS OF 7 PAGES

- Q1 (a) Describe the significance of structures and machine components made of two materials with different coefficients of thermal expansion. (5 marks)
- (b) Describe the engineering significance of the existence of a eutectic point in phase diagrams. (5 marks)
- (c) Explain the difference between hardness and hardenability. (5 marks)
- (d) Describe the characteristics of ;
(i) an alloy
(ii) pearlite
(iii) austenite
(iv) martensite
(v) cementite. (10 marks)
- Q2 (a) Explain the importance of controlling an ingot's structure. (5 marks)
- (b) Discuss why the cost of mill products of metals increases as thickness and section size decrease. (10 marks)
- (c) Discuss how trace elements affect the ductility of steels. (10 marks)
- Q3 (a) Describe the stages involved in the contraction of metals during casting. (5 marks)
- (b) Explain the effects of mould materials on fluid flow and heat transfer in casting operations. (10 marks)
- (c) A cylinder with a diameter of 1.5 in. and height of 3 in. solidifies in 3 minutes in a sand casting operation.
(i) Determine the solidification time if the cylinder height is doubled.
(ii) Determine the time if the diameter is doubled. (10 marks)

- Q4 (a) Explain why are risers not as useful in die casting as they are in sand casting.
(5 marks)
- (b) In shell-mould casting, the curing process is critical to the quality of the finished mould. In this stage of the process, the shell-mould assembly and cores are placed in an oven for a short period of time to complete the curing of the resin binder.

Explain the process.
(5 marks)
- (c) The blank for the spool shown in Appendix I is to be sand cast out of A-319, an aluminium casting alloy.

Illustrate the wooden pattern for this part, and include all necessary allowances for shrinkage and machining.
(15 marks)
- Q5 (a) Explain why some joints may have to be preheated prior to welding.
(5 marks)
- (b) Discuss the advantages of electron-beam and laser-beam welding compared with arc welding.
(10 marks)
- (c) A welding operation will take place on carbon steel. The desired welding speed is around 0.8 inches/second.

Determine the current needed if the weld width is 0.2 inches if an arc welding power supply is used with a voltage of 12 V,
(10 marks)

- Q6 (a) It is a common practice to tin-plate electrical terminals to facilitate soldering.
Explain why tin is used. (5 marks)
- (b) Refer to the simple butt and lap joints shown at the top row of Appendix II:
- (i) Assuming that the area of the butt joint is $5 \text{ mm} \times 20 \text{ mm}$ and referring to the adhesive properties given in Appendix III, estimate the minimum and maximum tensile force that this joint can withstand. (10 marks)
- (ii) Estimate these forces for the lap joint, assuming that its area is $15 \text{ mm} \times 15 \text{ mm}$. (10 marks)

END OF QUESTION PAPER

PEPERIKSAAN AKHIR

SEMESTER/SESI : SEMESTER II 09/10
MATA PELAJARAN : TEKNOLOGI PENGELUARAN

KURSUS : 2 BPA & 2 BPB
KOD MATA PELAJARAN: BPB2073

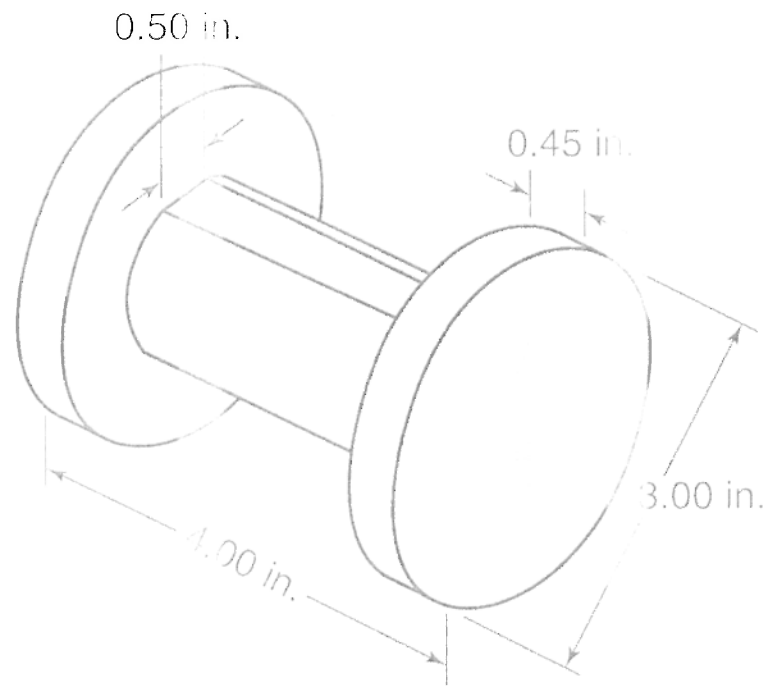


Figure 1 : The blank for the spool

PEPERIKSAAN AKHIR

SEMESTER/SESI : SEMESTER II 09/10
 MATA PELAJARAN : TEKNOLOGI PENGELUARAN

KURSUS: 2 BPA & 2 BPB
 KOD MATA PELAJARAN: BPB2073

Table 1

Typical Filler Metals for Brazing Various Metals and Alloys

Base metal	Filler metal	Brazing temperature (°C)
Aluminum and its alloys	Aluminum-silicon	570-620
Magnesium alloys	Magnesium-aluminum	580-625
Copper and its alloys	Copper-phosphorus	700-925
Ferrous and nonferrous (except aluminum and magnesium)	Silver and copper alloys, copper-phosphorus	620-1150
Iron, nickel, and cobalt-based alloys	Gold	900-1100
Stainless steels, nickel- and cobalt-based alloys	Nickel-silver	925-1200

PEPERIKSAAN AKHIR

SEMESTER/SESI : SEMESTER II 09/10
 MATA PELAJARAN : TEKNOLOGI PENGELUARAN

KURSUS : 2 BPA & 2 BPB
 KOD MATA PELAJARAN: BPB2073

Table 2

Typical Properties and Characteristics of Chemically Reactive Structural Adhesives

	Epoxy	Polyurethane	Modified acrylic	Cyanoacrylate	Anaerobic
Impact resistance	Poor	Excellent	Good	Poor	Fair
Tensile shear strength, MPa (10 ³ psi)	15-22 (2.2-3.2)	12-20 (1.7-2.9)	20-30 (2.9-4.3)	18.9 (2.7)	17.5 (2.5)
Peel strength, N/m (lb/in)	<32 (3)	1430 (9-89)	5250 (30)	>325 (3)	1750 (10)
Substrates bonded	Most	Most smooth, nonporous	Most smooth, nonporous	Most non-porous metals or plastics	Metals, glass, thermosets
Service temperature range, °C (°F)	-55 to 120 (-70 to 250)	-40 to 90 (-250 to 175)	-70 to 120 (-100 to 250)	-55 to 80 (-70 to 175)	-55 to 150 (-70 to 300)
Heat cure or mixing required	Yes	Yes	No	No	No
Solvent resistance	Excellent	Good	Good	Good	Excellent
Moisture resistance	Good-Excellent	Fair	Good	Poor	Good
Gap limitation, mm (in.)	None	None	0.5 (0.02)	0.25 (0.01)	0.60 (0.025)
Odor	Mild	Mild	Strong	Moderate	Mild
Toxicity	Moderate	Moderate	Moderate	Low	Low
Flammability	Low	Low	High	Low	Low

* Peel strength varies widely depending on surface preparation and quality.