

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2011/2012**

COURSE NAME : COMPUTER AIDED DESIGN
AND MANUFACTURING

COURSE CODE : BDD 4023

PROGRAMME : BACHELOR'S DEGREE OF
MECHANICAL ENGINEERING
WITH HONOUR

EXAMINATION DATE : JUNE 2012

DURATION : 3 HOURS

INSTRUCTIONS : ANSWER **FOUR (4)** QUESTIONS
ONLY FROM FIVE QUESTIONS
PROVIDED

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

- Q1**
- (a) Explain the basic parts of Graphical Kernel System (GKS). (6 marks)
 - (b) GKS offers primitive function as the routine to define the user created pictures. Describe each of the functions. (5 marks)
 - (c) Compare between Initial Graphics Exchange Specification and Standard for the Exchange of Product Model Data (8 marks)
 - (d) A Data Exchange Format (dxf) consists of six major sections to translate the drawing file. Categorize each of them. (6 marks)
- Q2**
- (a) List six devices to transfer the digital data and explain any two devices from the given list. (7 marks)
 - (b) Compare the differences between bus topology and star topology. Draw a diagram of each topology to support your answer. (6 marks)
 - (c) Discuss the categories in communication network. (8 marks)
 - (d) ISO-Open System interconnection (OSI) model has a series of seven layers in which communication processing takes place. Analyze the function two of them. (4 marks)
- Q3**
- (a) Outline the principle and advantages of group technology coding. (8 marks)
 - (b) Discuss the requirements in the construction of coding system. (6 marks)
 - (c) Part classification and coding can be divided into three main systems. Outline all of these systems. (6 marks)
 - (d) Develop a coding system based from the information given in **Table 1** and **Figure 1**. (5 marks)

- Q4**
- (a) Describe the three basic components of an NC system. (3 marks)
 - (b) Describe the right-hand rule in NC and where it is used? (5 marks)
 - (c) What is the difference between absolute positioning and incremental positioning? Sketch a drawing to support your answer. (5 marks)
 - (d) The KEY shown in **Figure 2** is to be machined on a CNC machining center. Construct a CNC program to drill a hole $\text{Ø} 8$ mm at 15 mm depth, cuts the slot at 4 mm depth and the external profile at 4 mm depth, using the cutting conditions shown in **Table 2**. (12 marks)
- Q5**
- (a) What are the differences between forward and backward process planning. (6 marks)
 - (b) Discuss the importance of process planning in product development (6 marks)
 - (c) Consider yourself as a process planner, you are assigned to fabricate the product as shown in **Figure 2**. Develop the process plan for that particular product. (13 marks)

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TABLE 1

DIGIT 1		DIGIT 2		DIGIT 3		DIGIT 4		DIGIT 5	
PART CLASS		External shape External Shape Elements		Internal Shape Internal Shape Elements		Plane Surface Machining		Auxiliary Holes and Gear Teeth	
0	Rotational Parts	L/D ≤ 0.5		0 No Hole, No Break Through		0 No Surface Machining		0 No Auxiliary Holes	
1		0.5 < L/D < 3		1 No Shape Elements		1 Surface Plane/ Curved		1 Axial, Not on Pitch Circle Dia	
2		L/D > 3		2 Thread		2 External Plane Surface, Circular Graduation		2 Axial on Pitch Circle Diameter	
3	Non rotational Parts	3 Groove		3 Groove		3 External Groove and/or Slot		3 Radial, Not on Pitch circle Dia	
4		4 No Shape Elements		4 No Shape Elements		4 External Spline (Polygon)		4 Radial, on Pitch Circle Dia	
5		5 Thread		5 Thread		5 External Plane Surface/Slot Spline		5 Axial and/ Radial and/ other Direction	
6		6 Groove		6 Groove		6 Internal Plane Surface or Slot		6 Spur Gear Teeth	
7		7 Functional Cone		7 Functional Cone		7 Internal Spline (Polygon)		7 Bevel Gear Teeth	
8		8 Operating Speed		8 Operating Speed		8 Internal or Slot/ External Polygon		8 Other Gear Teeth	
9		9 All Others		9 All Others		9 All Others		9 All Others	

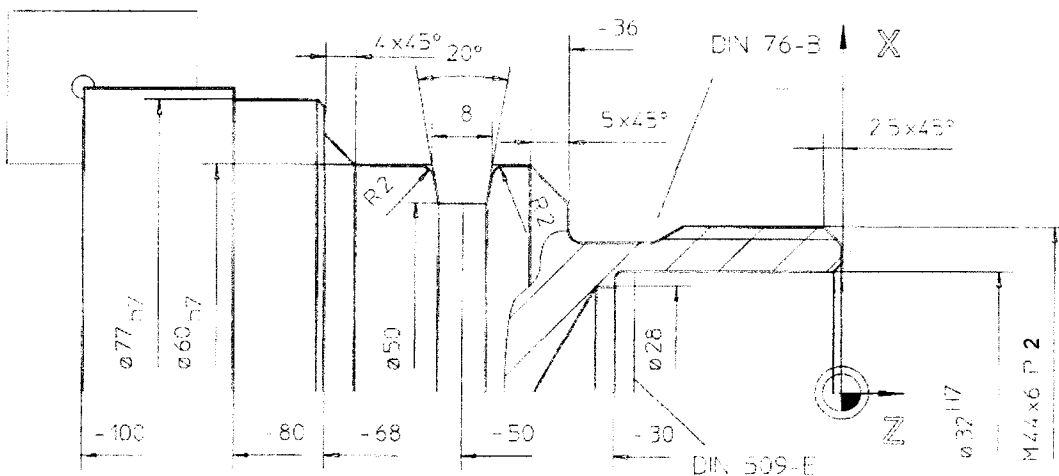


FIGURE 1

FINAL EXAMINATION

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TABLE 2

Cutter	Spindle speed (rpm)	Feed rate (mm/min)
T8 Drill \varnothing 8	1500	200
T6 Ball end mill \varnothing 8	1200	300
T10 Flat end mill \varnothing 4	1600	250

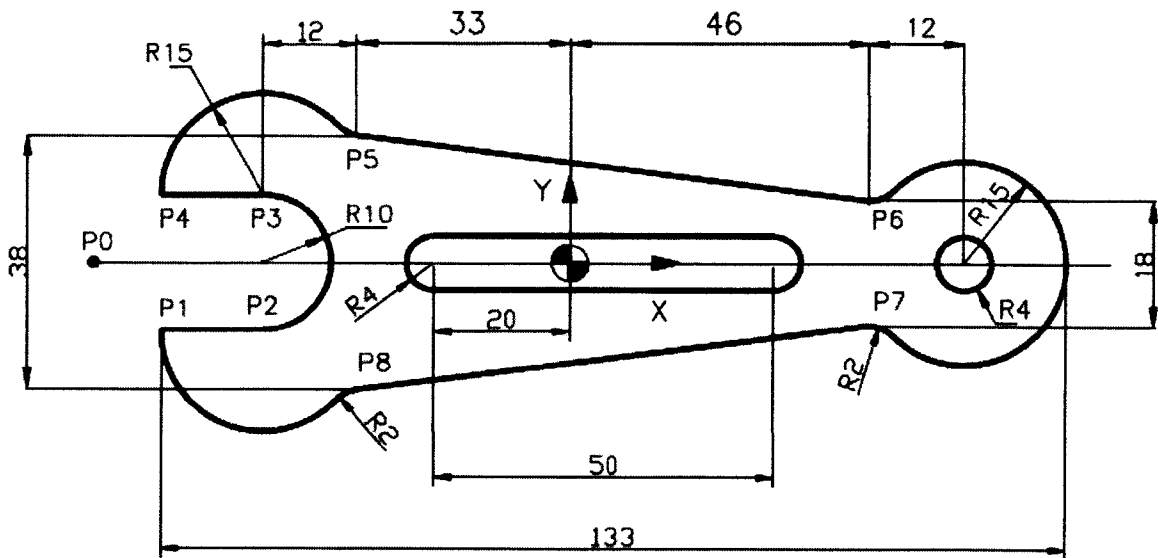


FIGURE 2

SULIT



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**PEPERIKSAAN AKHIR
SEMESTER II
SESI 2011/2012**

NAMA KURSUS : PENGUJIAN BAHAN
KOD KURSUS : BDB 4023
PROGRAM : 4 BDD
TARIKH PEPERIKSAAN : JUN 2012
JANGKA MASA : 3 JAM
ARAHAN : JAWAB EMPAT (4) SOALAN
SAHAJA DARIPADA LIMA (5)
SOALAN YANG DISEDIAKAN.

KERTAS SOALAN INI MENGANDUNGI TUJUH (7) MUKA SURAT

SULIT

- S1**
- (a) Takrifkan keplastikan. (3 markah)
- (b) Kenalpasti TIGA (3) perbezaan di antara ujian Izod dan Charpy. (6 markah)
- (c) Terangkan dengan ringkas tentang kaedah dan keputusan DUA (2) ujikaji yang disenaraikan di bawah;
- i) Ujian Lesu
 - ii) Ujian Rayapan
 - iii) Ujian Hentaman
 - iv) Ujian Kekerasan
- (12 markah)
- (d) Senaraikan EMPAT (4) jenis Ujian Kekerasan. (4 Markah)
- S2**
- (a) Terangkan kaedah dan keputusan yang boleh didapati bagi DUA (2) jenis Ujian Tanpa Musnah (NDT). (10 markah)
- (b) Huraikan dengan ringkas LIMA (5) Elemen penting dalam Ujian Tanpa Musnah (NDT). (5 markah)
- (c) Senaraikan TIGA (3) jenis Ujian Tanpa Musnah yang telah anda pelajari. (3 markah)
- (d) Nyatakan maksud bagi Ujian Tanpa Musnah. (2 markah)
- (e) Kenalpasti DUA (2) perbezaan di antara mikroskop optik dan mikroskop imbasan elektron. (5 markah)

- S3** (a) Huraikan tentang penyediaan sampel bukan logam bagi ujian Mikroskop Imbasan Elektron (SEM).
(5 markah)
- (b) Anda diberi satu logam ferus yang berbentuk silinder. Rumuskan bagaimana penyediaan sampel yang perlu dilakukan bagi melihat mikrostruktur bahan tersebut dengan menggunakan mikroskop optik.
(10 markah)
- (c) Jelaskan berserta gambarajah tentang elektron serak balik dan elektron sekunder.
(10 markah)
- S4** (a) Huraikan dengan ringkas maksud analisis terma. Berikan kepentingannya dalam kejuruteraan.
(5 markah)
- (b) Kenalpasti TIGA (3) kegunaan ujian Analisis Terma Gravimetrik (TGA).
(6 markah)
- (c) Hasilkan lakaran plot yang biasa ditemui di dalam bahan polimer hasil dari analisis terma Kalorimetri Pengimbas Pembezaan (DSC). Dengan berbantuan lakaran ini jelaskan mekanisme yang berlaku pada struktur polimer pada setiap keadaan peralihan dan perubahan kadar haba yang berlaku.
(10 markah)
- (d) Bezakan antara Kalorimetri Pengimbas Pembezaan (DSC) dan Analisis Terma Gravimetrik (TGA)
(4 markah)

S5 (a) Anda diberikan dua botol yang berisi serbuk berwarna putih, kenalpasti ujikaji yang sesuai dan rumuskan penyediaan sampel sebelum ujikaji dijalankan.

(15 markah)

(b) Bincangkan dengan ringkas tentang prinsip, fungsi serta kelebihan ujian *Fourier Transform Infrared* (FTIR).

(10 markah)

- Q1**
- (a) Define the theme of plasticity. (3 marks)
 - (b) Identify THREE (3) differences between Izod and Charpy Test. (6 marks)
 - (c) Explain briefly the method and the result of TWO (2) testing that listed below;
 - i) Fatigue Test
 - ii) Creep Test
 - iii) Impact Test
 - iv) Hardness Test(12 marks)
 - (d) List FOUR (4) types of hardness tests. (4 marks)
- Q2**
- (a) Explain the method and result that can be obtained from TWO (2) types of Non Destructive Test (NDT). (10 marks)
 - (b) Explain briefly about FIVE (5) elements in Non Destructive Test (NDT). (5 marks)
 - (c) List THREE (3) types of Non Destructive Test (NDT). (3 marks)
 - (d) Define what is Non Destructive Test (NDT). (2 marks)

- (e) Identify TWO (2) differences between optical microscope and scanning electron microscope (SEM).
(5 marks)
- Q3** (a) Explain the non metallic sample preparation for Scanning Electron Microscopy (SEM).
(5 marks)
- (b) You are given one cylinder of ferrous metal. Summarize how the sample preparation will be done to identify the microstructure of that sample using optic microscope.
(10 marks)
- (c) Describe with figure about backscattered and secondary electrons.
(10 marks)
- Q4** (a) Explain briefly what is thermal analysis. Give the important of thermal analysis in engineering.
(5 marks)
- (b) Identify THREE(3) applications of Therma Gravimetry Analysis (TGA).
(6 marks)
- (c) Construct the normal plot for thermal analysis of Differential Scanning Calorimeter (DSC) in polymer sample. Explain the mechanism of polymer structure for every different and exchanges of thermal using the plot.
(10 marks)
- (d) Differentiate between Differential Scanning Calorimeter (DSC) and Therma Gravimetry Analysis (TGA).
(4 marks)

Q5 (a) You are given white powder in two bottles, Justifies the suitable testing and summarizes the sample preparation to identify this sample.

(15 marks)

(b) Discuss briefly about principle, function and advantages of Fourier Transform Infrared (FTIR) testing.

(10 marks)