



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan Profesional dan
Pendidikan Berterusan
(UTMSPACE)

2

**FINAL EXAMINATION / PEPERIKSAAN AKHIR
SEMESTER 1 – SESSION 2016 / 2017
PROGRAM KERJASAMA**

COURSE CODE : DDPC 1223
KOD KURSUS

COURSE NAME : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE /
NAMA KURSUS ORGANISASI KOMPUTER DAN BAHASA HIMPUNAN

YEAR / PROGRAMME : 1 / DDPC / DDPZ
TAHUN / PROGRAM

DURATION : 2 HOURS 30 MINUTES / 2 JAM 30 MINIT
TEMPOH

DATE : OCTOBER 2016
TARIKH

INSTRUCTION/ARAHAN :

1. Answer **ALL** questions in the spaces provided in this exam question paper.
Jawab SEMUA soalan diruang yang disediakan dalam kertas soalan ini.
2. Candidates are required to follow all instructions given out by the examination invigilators
(calon dikehendaki mematuhi semua arahan daripada pengawas peperiksaan)

*(You are required to write your name and your lecturer's name on your answer script)
(Pelajar dikehendaki tuliskan nama dan nama pensyarah pada skrip jawapan)*

NAME / NAMA	:	.....
I.C NO. / NO. K/PENGENALAN	:	.....
YEAR / COURSE TAHUN / KURSUS	:	.....
COLLEGE NAME NAMA KOLEJ	:	.....
LECTURER'S NAME NAMA PENSYARAH	:	.....

This examination paper consists of ... 14... pages including the cover
Kertas soalan ini mengandungi 14..... muka surat termasuk kulit hadapan

SECTION A / BAHAGIAN A
21 MARKS / 21 MARKAH

MULTIPLE CHOICE / ANEKA PILIHAN

Choose the most appropriate answer. Write your answer in the table provided on page 6.
Pilih satu jawapan yang paling tepat. Tulis jawapan anda pada jadual di mukasurat 6.

1. A CPU designed using a RISC architecture allows _____ .
CPU yang direka untuk menggunakan seni bina RISC yang membolehkan _____ .
 - A. assembly language programs to be written more easily
aturcara bahasa himpunan ditulis dengan lebih mudah
 - B. programs to be written with fewer instructions
program-program ditulis dengan kurang bilangan arahan
 - C. the processor executes at a faster clock speed.
pemproses laksana pada kelajuan lebih pantas
 - D. none of the above.
tiada jawapan di atas

2. If a system is 64 bit machine, then the length of each word will be _____ bytes.
Jika satu sistem mesin 64 bit, panjang setiap satu perkataan ialah _____ bait.
 - A. 4
 - B. 8
 - C. 16
 - D. 12

3. A CPU has 16 bit program counter (PC). This means that the CPU can address _____
Satu CPU mempunyai pembilang aturcara 16 bit (PC). Ini bermakna CPU ini boleh mengalamatkan _____ .
 - A. 16K memory locations / 16K lokasi ingatan
 - B. 32K memory locations / 32K lokasi ingatan
 - C. 64K memory locations / 64K lokasi ingatan
 - D. 256K memory locations / 256K lokasi ingatan

4. An overflow has occurred when adding two's complement numbers, if
Limpahan telah berlaku apabila menambah dua nombor pelengkap-dua, jika
- A. there is a 'carry' out of the most-significant bit (MSB).
terdapat 'bawa' keluar daripada bit paling bermakna (MSB).
 - B. there is a carry into the MSB.
ada 'bawa' ke dalam bit MSB.
 - C. the 'carry' into the MSB differs from the carry out of the MSB.
'bawa' ke dalam bit MSB berbeza daripada bit keluar dari MSB.
 - D. the 'carry' into the MSB equals the carry out of the MSB.
'bawa' ke dalam MSB sama dengan yang dibawa keluar daripada MSB.
5. Choose the **incorrect** statement that describes an instruction cycle.
*Pilih pernyataan yang **salah** yang menerangkan satu kitar arahan.*
- A. The execute cycle can happen before the fetch cycle.
Kitar laksana boleh berlaku sebelum kitar kutip.
 - B. The execute cycle can happen simultaneously with the fetch cycle in pipeline execution.
Kitar laksana boleh berlaku serentak dengan kitar kutip dalam pelaksanaan talian paip.
 - C. The content of the Program Counter (PC) or Instruction Pointer (IP) is updated before the next instruction is fetched.
Kandungan Pembilang Aturcara (PC) atau Penunjuk Arahan (IP) dikemaskini sebelum arahan dikutip.
 - D. Pre-fetch cycle occurs when the CPU needs to fetch operand from the memory.
Kitar pra-kutip berlaku apabila CPU perlu mengambil operan dari ingatan.
6. Which of the following registers can interact with the secondary storage?
Mana di antara daftar berikut yang boleh berinteraksi dengan storan sekunder?
- A. MAR
 - B. PC
 - C. IR
 - D. EAX
7. During the execution of a program which gets initialized first?
Semasa pelaksanaan aturcara apakah yang pertama sekali diberi nilai awalan?
- A. MDR
 - B. IR
 - C. PC
 - D. MAR

8. Part of the operating system is usually stored in ROM so that it can be used to boot up the computer. ROM is used rather than RAM because _____.

Sebahagian daripada sistem pengoperasian disimpan dalam ROM supaya ia boleh digunakan untuk memulakan (boot) komputer. ROM digunakan dan tidak RAM kerana _____.

- A. ROM chips are faster than RAM / *cip ROM lebih laju dari cip RAM*
- B. ROM chips are not volatile / *cip ROM tidak meruap*
- C. ROM chips are cheaper than RAM chips / *cip ROM lebih murah dari cip RAM*
- D. none of the above / *tiada jawapan di atas*

9. In DMA transfers, the required signals and addresses are given by the _____.

Dalam pemindahan DMA, isyarat dan alamat yang diperlukan diberi oleh _____.

- A. Processor / *Pemproses*
- B. Device drivers / *Pemacu peranti*
- C. DMA controllers / *Pengawal DMA*
- D. The program itself / *Aturcara itu sendiri*

10. Which is (are) the file (files) generated after the process of assembling?

Manakah fail yang akan dijana selepas proses penghimpunan?

- A. .asm and .obj
- B. .asm and .exe
- C. .obj
- D. .exe

11. Choose **illegal** instruction based on the following data definition:

*Pilih arahan yang **tidak sah** berdasarkan pentakrifan data berikut:*

```
.DATA  
arrayW WORD 1020h, 3040h, 5060h  
arrayD DWORD 1, 2, 3, 4
```

- A. mov ax, arrayW+2
- B. mov ax, arrayW [4]
- C. mov ax, arrayD+4
- D. mov eax, arrayD

SECTION B/ BAHAGIAN B

79 marks / 79 markah

ANSWER ALL QUESTIONS. ANSWER IN THE PROVIDED SPACES IN THIS EXAM PAPER.

JAWAB SEMUA SOALAN. JAWAB PADA RUANG YANG DISEDIAKAN DALAM KERTAS SOALAN INI.

Q1. a) What is equivalent of -35_{10} in 8-bit 2's complement representation? Show your working. [4 M]

Apa itu nilai setara bagi -35_{10} dalam perwakilan 8-bit pelengkap 2 8-bit? Tunjukkan jalan kerja anda.

b) Explain the concept of a stored program computer. [3 M]

Terangkan konsep komputer aturcara tersimpan.

c) Describe the main function of the Central Processing Unit (CPU). [2 M]

Terangkan fungsi utama Unit Pemprosesan Pusat.

d) Give the size of the data bus and physical memory capacity of: [4 M]

Berikan saiz bagi bas data dan kapasiti ingatan fizikal bagi:

i) Intel 8086 _____

ii) Intel 80486 _____

Q2. a) Describe the function of the following registers:

[4 M]

Terangkan fungsi daftar-daftar berikut:

i. Memory Address Register (MAR) / *Daftar Alamat Ingatan (MAR)*

ii. Instruction Register (IR) / *Daftar Arahan (IR)*

b) Describe the fetch-execute cycle when the **ADD BX, [2000H]** is fetched from the main memory and executed. Assume the processor has a **MAR, MBR, IP** and **IR**. The control unit issues **Read, Write, Wait for Memory Operation to Complete (WMTC), Memory Operation Complete (WFC)** and **Execute** control signals during the fetch-execute operation.

[10 M]

*Terangkan kitaran kutip-laksana apabila arahan **ADD BX, [2000H]** dikutip dari ingatan utama dan dilaksanakan. Andaikan pemproses mempunyai **MAR, MBR, IP** dan **IR**. Unit kawalan mengeluarkan isyarat **Read, Write, Wait for Memory Operation to Complete (WMTC), Memory Operation Complete (WFC)** dan **Execute** sewaktu operasi kutip-laksana.*

Q3. a) What is the main function of I/O interface module? [2 M]
Apakah fungsi utama modul antaramuka I/O?

b) Explain steps in an I/O transfer via DMA technique. [4 M]
Terangkan langkah-langkah dalam pemindahan I/O melalui teknik DMA.

c) Give the difference between main memory and disk storage. [2 M]
Berikan perbezaan antara ingatan utama dan cakera storan.

d) Given a magnetic disk with the following properties. [4 M]
Diberikan ciri cakera magnet seperti berikut:

- | | | |
|------------------------------|------------------------------------|------------------|
| - rotation speed | <i>/kelajuan putaran :</i> | 8200 RPM |
| - average seek time | <i>/ purata masa pendam:</i> | 6 ms |
| - sector size | <i>/ saiz sektor :</i> | 512 bytes |
| - number of sector per track | <i>/bilangan sektor per jejak:</i> | 150 |

Calculate time of one rotation and average time to access a block of 30 consecutive sectors.

Kira masa bagi satu putaran dan masa purata untuk mencapai satu blok sebesar 30 sektor yang berterusan.

Q4. a) Refer to the following data declaration:

Rujuk kepada pengisytiharaan data berikut:

```
.DATA
Array1  WORD  5 DUP(3 DUP(?))
Array2  DWORD  1,2,3,4
digitStr BYTE  "arSeNAL",0
dval    LABEL  DWORD
wval    LABEL  WORD
blist   BYTE   00h, 10h, 00h, 20h
```

What will be the content of register (in hex) if the following instruction is executed?

Apakah kandungan daftar (dalam heksa) jika arahan berikut dilaksanakan?

- | | | |
|-------------------------------|-------------|-------|
| i. mov ecx, SIZEOF digitStr | ecx = _____ | [1 M] |
| ii. mov ecx, TYPE Array2 | ecx = _____ | [1 M] |
| iii. mov ecx, LENGTHOF Array1 | ecx = _____ | [1 M] |
| iv. mov eax, dval | eax = _____ | [1 M] |
| v. mov dl, blist | dl = _____ | [1 M] |

b) Refer to the following program fragment. What will be displayed at the screen assuming that the offset of myDATA is 00005000h? [5 M]

Rujuk kepada keratan aturcara berikut. Apakah yang akan dipaparkan pada skrin andaikan offset bagi myDATA ialah 00005000h?

```
.DATA
myDATA  word  2
        DUP(0,10,1234,3CFFh)

.CODE
mov     esi, OFFSET myDATA
mov     ecx, LENGTHOF myDATA
mov     ebx, TYPE myDATA
call    DumpMem
```

Answer

Q5. a) Show the value of the flag bits after the following instructions are executed:

Tunjukkan nilai bit bendera selepas arahan berikut dilaksanakan:

```
i. mov  al, 0f5h
   add  al, 0bh
```

CF = _____ ZF = _____ [2 M]

```
ii. mov al, 3fh
   add  bh, 23h
   sub  al, bh
```

CF = _____ PF = _____ [2 M]

b) Indicate the content of register AL, DL and CF (in hex value) after the execution of the following program fragment.

Tunjukkan kandungan daftar AL, DL and CF (dalam nilai heksa) selepas pelaksanaan keratan aturcara berikut:

```
MOV    AX, 7C36h
MOV    DX, 9FA6h
SHR    AL, 3
SAR    DL, 4
```

AL = _____ [2 M]

DL = _____ [2 M]

CF = _____ [1 M]

c) Given the following assembly language code: How many times will the loop execute and what will be the final value of eax? [4 M]

Diberi kod bahasa himpunan seperti berikut: Berapa kalikah gelung akan dilaksana dan apakah nilai terakhir bagi eax?

```
mov  eax, 1
mov  ecx, 0
ulang:
dec  eax
loop ulang
```

Loop = _____

eax = _____

6. a) Translate the following IF statements into assembly language:
Terjemahkan pernyataan IF berikut kepada bahasa himpunan:

[4 M]

```
If (var1 == var2)
    x = 1;
else
    x = 2;
```

- b) Given the following data definitions:
Diberi definisi data seperti berikut:

[6 M]

ARRAY	DWORD	12, 128, -12, -45, 9, -43, -94
TOTAL	DWORD	?

Write the assembly language code to implement the following pseudocode:
Tuliskan kod bahasa himpunan untuk melaksanakan kod-pseudo berikut:

```
DI = 0
CX = 0
while (DI <= 14) or (CX < 0) do
{
    CX = ARRAY[DI] + CX
    DI = DI + 2
}
TOTAL = CX
```

- Q7. The final exam marks for DDPC 1223 students are 45, 67, 88, 98, 100, 67, 84, 56, 45 and 78 (all marks are in decimal). Write a program that will find the lowest exam mark and **display** the result on the screen. Your program should use **LOOP** and **JLE** instructions.

Use variables: **MARKS** to store all the students' exam marks and **LOWEST** for the lowest mark obtained.

[10 M]

*Markah peperiksaan akhir bagi pelajar DDPC 1223 adalah 45, 67, 88, 98, 100, 67, 84, 56, 45 dan 78 (semua markah dalam nilai perpuluhan). Tulis satu aturcara yang untuk mencari markah terendah dan paparkan hasil pada skrin. Program anda patut menggunakan arahan **LOOP** dan **JLE**.*

*Guna pembolehubah: **MARKS** untuk menyimpan semua markah dan **LOWEST** untuk markah terendah yang didapati.*

APPENDIX A
ASCII TABLE . JADUAL ASCII

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	Null	32	20	Space	64	40	@	96	60	`
1	01	Start of heading	33	21	!	65	41	A	97	61	a
2	02	Start of text	34	22	"	66	42	B	98	62	b
3	03	End of text	35	23	#	67	43	C	99	63	c
4	04	End of transmit	36	24	\$	68	44	D	100	64	d
5	05	Enquiry	37	25	%	69	45	E	101	65	e
6	06	Acknowledge	38	26	&	70	46	F	102	66	f
7	07	Audible bell	39	27	'	71	47	G	103	67	g
8	08	Backspace	40	28	(	72	48	H	104	68	h
9	09	Horizontal tab	41	29	)	73	49	I	105	69	i
10	0A	Line feed	42	2A	*	74	4A	J	106	6A	j
11	0B	Vertical tab	43	2B	+	75	4B	K	107	6B	k
12	0C	Form feed	44	2C	,	76	4C	L	108	6C	l
13	0D	Carriage return	45	2D	-	77	4D	M	109	6D	m
14	0E	Shift out	46	2E	.	78	4E	N	110	6E	n
15	0F	Shift in	47	2F	/	79	4F	O	111	6F	o
16	10	Data link escape	48	30	0	80	50	P	112	70	p
17	11	Device control 1	49	31	1	81	51	Q	113	71	q
18	12	Device control 2	50	32	2	82	52	R	114	72	r
19	13	Device control 3	51	33	3	83	53	S	115	73	s
20	14	Device control 4	52	34	4	84	54	T	116	74	t
21	15	Neg. acknowledge	53	35	5	85	55	U	117	75	u
22	16	Synchronous idle	54	36	6	86	56	V	118	76	v
23	17	End trans. block	55	37	7	87	57	W	119	77	w
24	18	Cancel	56	38	8	88	58	X	120	78	x
25	19	End of medium	57	39	9	89	59	Y	121	79	y
26	1A	Substitution	58	3A	:	90	5A	Z	122	7A	z
27	1B	Escape	59	3B	;	91	5B	[	123	7B	{
28	1C	File separator	60	3C	<	92	5C	\	124	7C	|
29	1D	Group separator	61	3D	=	93	5D	]	125	7D	}
30	1E	Record separator	62	3E	>	94	5E	^	126	7E	~
31	1F	Unit separator	63	3F	?	95	5F	_	127	7F	□

END OF QUESTIONS / SOALAN TAMAT