UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan Profesional dan Pendidikan Berterusan (SPACE)

FINAL EXAMINATION / *PEPERIKSAAN AKHIR*
SEMESTER II – SESSION 2020 / 2021 / *SEMESTER II – SESI 2020 / 2021*
PROGRAM KERJASAMA

COURSE CODE *KOD KURSUS*	:	DDWD 1223
COURSE NAME *NAMA KURSUS*	:	COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE *ASAS ANIMASI DALAM MULTIMEDIA*
YEAR / PROGRAMME *TAHUN / PROGRAM*	:	1 DDWD
DURATION *TEMPOH*	:	3 HOURS (INCLUDING SUBMISSION HOUR) *3 JAM (TERMASUK MASA PENGHANTARAN)*
DATE *TARIKH*	:	APRIL / MAY 2021 *APRIL / MEI 2021*

INSTRUCTION / *ARAHAN:*

1. The question paper consists of **2 PARTS**: A and B.
   *Kertas soalan terdiri daripada **2 BAHAGIAN**: A dan B.*

2. Answer **ALL** questions and write your answers on the answer sheet.
   *Jawab **SEMUA** soalan dan tulis jawapan anda pada kertas jawapan.*

3. Write a name, matric no., identity card no., course code, course name, section and lecturer name in the upper left corner on the answer sheet.
   Tulis nama, no. matrik, no. kad pengenalan, kod kursus, nama kursus, seksyen dan nama pensyarah di penjuru atas kiri kertas jawapan.

4. Each answer sheet must have a page number written at the bottom right corner.
   Setiap helai kertas jawapan mesti ditulis nombor muka surat pada bahagian bawah penjuru kanan.

5. Answers should be handwriting, neat and clear.
   Jawapan hendaklah ditulis tangan, kemas dan jelas menggunakan huruf cerai.

WARNING / *AMARAN*

Students caught copying / cheating during the examination will be liable for disciplinary actions and the faculty may recommend the student to be expelled from sitting for exam.
Pelajar yang ditangkap meniru / menipu semasa peperiksaan akan dikenakan tindakan disiplin dan pihak fakulti boleh mengesyorkan pelajar diusir dari menduduki peperiksaan.

This examination paper consists of **13** pages including the cover.
*Kertas soalan ini mengandungi **13** muka surat termasuk kulit hadapan.*

ONLINE EXAMINATION RULES AND REGULATIONS
PERATURAN PEPERIKSAAN SECARA DALAM TALIAN

1. Student must carefully listen and follow instructions provided by invigilator.
   Pelajar mesti mendengar dan mengikuti arahan yang diberikan oleh pengawas peperiksaan dengan teliti.

2. Student is allowed to start examination only after confirmation of invigilator if all needed conditions are implemented.
   Pelajar dibenarkan memulakan peperiksaan hanya setelah pengesahan pengawas peperiksaan sekiranya semua syarat yang diperlukan telah dilaksanakan.

3. During all examination session student has to ensure, that he is alone in the room.
   Semasa semua sesi peperiksaan pelajar harus memastikan bahawa dia bersendirian di dalam bilik.

4. During all examination session student is not allowed to use any other devices, applications except other sites permitted by course lecturer.
   Sepanjang sesi peperiksaan pelajar tidak dibenarkan menggunakan peranti dan aplikasi lain kecuali yang dibenarkan oleh pensyarah kursus.

5. After completing the exam student must inform invigilator via the set communication platform (eg. WhatsApp etc.) about completion of exam and after invigilator's confirmation leave examination session.
   Selepas peperiksaan selesai, pelajar mesti memaklumkan kepada pengawas peperiksaan melalui platform komunikasi yang ditetapkan (contoh: Whatsapp dan lain-lain) mengenai peperiksaan yang telah selesai dan meninggalkan sesi peperiksaan selepas mendapat pengesahan daripada pengawas peperiksaan.

6. Any technical issues in submitting answers online have to be informed to respective lecturer within the given 30 minutes. Request for re-examination or appeal will not be entertain if complains are not made by students to their lecturers within the given 30 minutes.
   Sebarang masalah teknikal dalam menghantar jawapan secara dalam talian perlu dimaklumkan kepada pensyarah masing-masing dalam masa 30 minit yang diberikan. Permintaan untuk pemeriksaan semula atau rayuan tidak akan dilayan sekiranya aduan tidak dibuat oleh pelajar kepada pensyarah mereka dalam masa 30 minit yang diberikan.

7. During online examination, the integrity and honesty of the student is also tested. At any circumstances student is not allowed to cheat during examination session. If any kind of cheating behaviour is observed, UTM have a right to follow related terms and provisions stated in the respective Academic Regulations and apply needed measures.
   Semasa peperiksaan dalam talian, integriti dan kejujuran pelajar juga diuji. Walau apa pun keadaan pelajar tidak dibenarkan menipu semasa sesi peperiksaan. Sekiranya terdapat sebarang salah laku, UTM berhak untuk mengikuti terma yang dinyatakan dalam Peraturan Akademik.

Excerpts from online final exam guidelines
Petikan daripada panduan peperiksaan akhir dalam talian
Universiti Teknologi Malaysia

SECTION A / *BAHAGIAN A*

24 MARKS / *24 MARKAH*

MULTIPLE CHOICE QUESTIONS / *SOALAN ANEKA PILIHAN*

Choose the most appropriate answer. Write your answer in the answer sheet.

Pilih satu jawapan yang tepat. Tulis jawapan anda dalam kertas jawapan.

1. 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 berbanding 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*

2. Which of the following is the largest disk space?
Antara berikut yang manakah adalah ruang cakera yang paling besar?

   A. Terabyte
   B. Zettabyte
   C. Yottabyte
   D. Exabyte

3. Any computer must atleast consist of _____.
Mana-mana komputer mesti terdiri daripada _____.

   A. Data Bus / *Bas Data*
   B. Address Bus / *Alamat Bas*
   C. Control Bus / *Bas Kawalan*
   D. All of the above / *Semua di atas*

4. Which of the following is **NOT** a 16-bit segment register?
*Antara berikut yang manakah **BUKAN** daftar segmen 16-bit?*

   A. CS
   B. SP
   C. FS
   D. GS

5. Cache memory refers to _____.
Ingatan cache merujuk kepada _____.

A. cheap memory that can be plugged into the motherboard to expand main memory
memori murah yang boleh diapasang pada papan induk untuk memperluaskan ingatan utama
B. fast memory present on the processor chip that is used to store newly accessed data
memori pantas pada cip pemproses yang digunakan untuk menyimpan data yang baru dicapai
C. a reserved portion of main memory used to save important data
bahagian simpanan ingatan utama yang digunakan untuk menyimpan data penting
D. a special area of memory on the chip that is used to save frequently used constants
kawasan khas ingatan pada cip yang digunakan untuk menyimpan pemalar yang kerap digunakan

6. _____ is set when the result of an arithmetic or logical operation generates a negative result.
_____ *ditetapkan apabila hasil operasi aritmetik atau logik menghasilkan hasil negatif.*

A. Carry Flag / *Membawa Bendera*
B. Sign Flag / *Tanda Bendera*
C. Parity Flag / *Bendera Pariti*
D. Overflow Flag / *Bendera Limpahan*

7. Which of the following general-purpose registers will automatically be used by multiplication and division instruction?
Yang mana antara daftar kegunaan umum berikut yang akan digunakan secara automatik dengan arahan pendaraban dan pembahagian?

A. Extended Accumulator Register / *Daftar Pengumpul Diperluas*
B. Extended Base Register / *Daftar Pangkalan Lanjutan*
C. Extended Count Register / *Daftar Kiraan Lanjutan*
D. Extended Data Register / *Daftar Data Diperluas*

8. Which of the following types of memory is commonly known as main memory, is inexpensive, but must be refreshed every millisecond to avoid losing its contents?
Antara jenis memori berikut, yang mana biasa dikenali sebagai memori utma, murah, tetapi mesti diperbaharui setiap milisaat untuk mengelakkan kehilangan kandungannya?

A. EPROM
B. SRAM
C. CMOS RAM
D. DRAM

9. Which of the following is **NOT** basic types of operands?
*Antara berikut yang manakah **BUKAN** jenis operan asas?*

A. Indirect / *Tidak Langsung*
B. Immediate / *Segera*
C. Register / *Daftar*
D. Memory / *Ingatan*

10. The instruction **MOV CX, [BX] + 10** represents the following addressing mode:
*Arahan **MOV CX, [BX] + 10** mewakili mod pengalamatan berikut:*

A. Based Relative / *Relatif Berasaskan*
B. Indexed Relative / *Relatif Berindeks*
C. Based Indexed / *Berasaskan Indeks*
D. Register Indirect / *Mendaftar Tidak Langsung*

11. Choose **INVALID** instruction based on the following data definition:
*Pilih arahan yang **TIDAK SAH** berdasarkan pentakrifan data barikut:*

```
.data
arrayOne     WORD    2134h, 1230h, 3210h
arrayTwo     DWORD   12, 10, 23, 49
```

A. mov ax, arrayOne + 2
B. mov ax, arrayOne [4]
C. mov ax, arrayTwo + 4
D. mov eax, arrayTwo

12. Number of the times the instruction sequence below will loop before coming out of loop is
Bilangan kali jujukan arahan di bawah akan melakukan gelung sebelum keluar daripadanya adalah

```
        mov   al, 00h
A2:     inc   al
        jnz   A2
```

A. 00
B. 01
C. 255
D. 256

13. What is the effect of the following instruction?
Apakah kesan dari arahan berikut?

```
add bx, 120
```

A. Adds the value of 120 to the address of bx and stores 120 in that address
Menambah nilai 120 ke alamat bx dan simpan nilai pada alamat itu
B. Adds the value of 120 to the value of bx and stores it in bx
Menambah nilai 120 ke dalam bx dan simpai nilai pada bx
C. Finds the memory location 120 and adds that content to that bx
Mencari lokasi ingatan 120 dan tambahkan kandungannya kepada bx
D. None of the above
Tiada jawapan di atas.

14. The bus that connects the main processor and the hardware devices is called a _____.
Bas yang menyambungkan pemproses utama dengan peranti perkakasan dipanggil _____.

A. system bus / *bas sistem*
B. local bus / *bas tempatan*
C. PCI bus / *bas PCI*
D. expansion bus / *bas pengembangan*

15. The condition of Zero Flag is set to 1 to indicate _____.
Bendera keadaan Bendera Sifar disetkan ke 1 untuk menunjukkan _____.

A. the operation has resulted in an error / *operasi telah mengakibatkan ralat*
B. the operation requires an interrupt call / *operasi memerlukan panggilan sampukan*
C. the result of the operation is zero / *hasil operasi adalah sifar*
D. there is no empty register available / *tiada daftar yang kosong*

16. **.data** directive is used to _____.
*Direktif **.data** digunakan untuk _____.*

A. indicate the ending of the data section / *menunjukkan seksyen data berakhir*
B. indicate the beginning of the data section / *menunjukkan permulaan seksyen data*
C. indicate all the source operands / *mengisytiharkan semua operan sumber*
D. initialize the operands / *memberi nilai awalan kepada operan*

SECTION B / *BAHAGIAN B*

76 MARKS / *76 MARKAH*

SUBJECTIVE QUESTIONS / *SOALAN SUBJEKTIF*

Answer all questions and write your answer in the answer sheet.

Jawab semua soalan dan tulis jawapan anda dalam kertas jawapan.

1. What is equivalent of **-99_{10}** in 8-bit two's complement representation? Show your working?
   *Apakah yang setara dengan **-99_{10}** dalam perwakilan pelengkap dua dalam 8-bit? Tunjukkan kerja anda?* **[4 M]**

2. What is equivalent of **$43FF_{16}$** into two's complement hexadecimal? Show your working?
   *Apakah yang setara dengan **$43FF_{16}$** menjadi heksadesimal pelengkap dua? Tunjukkan kerja anda?* **[4 M]**

3. Perform the following addition and show how the bits (CF, ZF, AF, PF, OF, and SF) of the flag register is affected by the following operations.
   Lakukan penambahan berikut dan tunjukkan bagaimana bit (CF, ZF, AF, PF, OF, dan SF) dari daftar bendera dipengaruhi oleh operasi berikut. **[6 M]**

   AC1Fh + F158h

   CF = ____ PF = ____ AF = ____ ZF = ____ SF = ____ OF = ____

4. Given two decimal numbers, A and B. Suppose A = 12 and B = 210. Convert each of them into 8-bit binary numbers and then show how does a computer performs B - A operation. Show how the flags register is affected after the operation.
   Diberi dua nombor perpuluhan, A dan B. Andaikan A = 12 dan B = 210. Tukarkan masing-masing menjadi nombor perduaan 8-bit dan kemudian tunjukkan bagaimana komputer melakukan operasi B - A. Tunjukkan bagaimana daftar bendera terjejas selepas operasi. **[6 M]**

   B – A

   CF = ____ PF = ____ AF = ____ ZF = ____ SF = ____ OF = ____

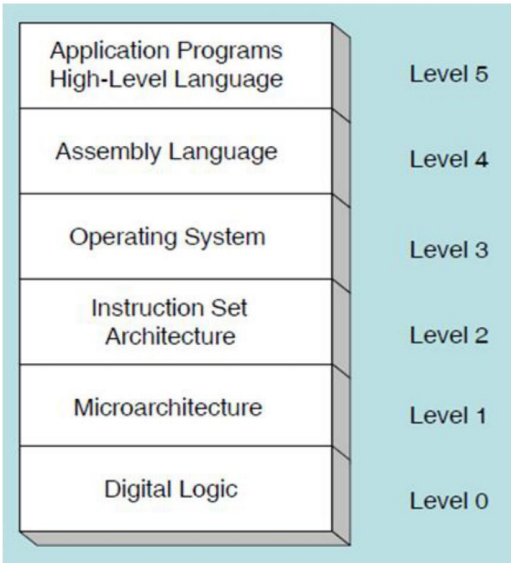


Figure 1: Virtual Machine Levels / ***Rajah 1****: Tahap Mesin Maya*

5. Explain each level of virtual machine levels in **Figure 1**?
*Terangkan setiap tahap mesin maya dalam **Rajah 1**?* **[6 M]**

6. Show the content of the individual bytes allocated in memory (in hexadecimal) for the following data declarations. Assume a computer with 32-bit address bus, and that the physical address of myArray is 00808000h. What are the addresses of bigArray, pArray, and message? What is the total number of allocated bytes?
Note: ASCII Table attached in APPENDIX A.
Tunjukkan kandungan setiap bait yang diperuntukkan dalam ingatan (dalam heksadesimal) untuk pengisytiharan data berikut. Andaikan komputer yang mempunyai 32-bit bas alamat, dan alamat fizikal W adalah 00808000h. Apakah alamat X, Y, dan Z? Berapakah jumlah bait yang diperuntukkan?
Nota: Jadual ASCII dilampirkan pada APPENDIX A. **[12 M]**

```
.data
        myArray         WORD            10h, 20h, 30h
        ALIGN 4
        bigArray        DWORD           2 DUP("Z")
        pArray          DWORD           bigArray
        message         BYTE            "I Love u"
```

Sample of Memory Layout:

LABEL	OFFSET	CONTENT	MEMORY (HEX)
myArray	00808000	10h	10

Address of **myArray** / *Alamat **myArray** :* _____

Address of **bigArray** / *Alamat **bigArray** :* _____

Address of **pArray** / *Alamat **pArray** :* _____

Address of **message** / *Alamat **message** :* _____

Total number of bytes allocated / *Jumlah bait yang diperuntukkan :* _____

7. Indicate the content of register AL and DL (in hex value) and status flag of CF after the execution of the following program fragment.
Nyatakan kandungan daftar AL dan DL (dalam nilai hex) dan bendera status CF setelah pelaksanaan fragmen program berikut. **[6 M]**

```
mov   dx, -80
sar   dl, 1
mov   al, 6Bh
shr   al, 1
shl   al, 3
```

AL = _____ BL = _____ CF = _____

8. Show the value of the flag bits after the following instructions are executed:
Tunjukkan nilai bit bendera selepas arahan berikut dilaksanakan: **[3 M]**

```
mov   eax, 51
mov   ebx, 120
cmp   eax, ebx
```

ZF = _____ CF = _____

9. Show the value of the flag bits after the following instructions are executed:
Tunjukkan nilai bit bendera selepas arahan berikut dilaksanakan: **[5 M]**

```
mov    al, 00101010b
mov    bl, 00010010b
test   al, 00001001b      ;  ZF = _____
test   bl, 00001001b      ;  ZF = _____
add    al, bl             ;  ZF = _____   PF = _____
sub    al, 100d           ;  CF = _____
```

10. Refer to the following fragments:
Rujuk keratan aturcara berikut:

```
.data
      Data1        BYTE    12d, 32d, 40d, 100d, 5d
      Data2        WORD    1D20h, 98A2h, 650h, 12h, 328Ch
      Data3        DWORD   40000h, 50000h, 30000h
      Sum          WORD    ?
.code
main PROC
      mov    esi, 2
      mov    al,  Value1[esi]          ;      ............[1]
      mov    bx,  Value2[esi * 2]      ;      ............[2]
      mov    ecx, Value3[esi * 4]      ;      ............[3]
```

Suppose the address of the data segment starts at address 0080800h. What is the effective address of the source operand for instruction labeled [1], [2], [3]? Show your calculation.
Andaikan alamat segmen data bermula pada alamat 60500h. Apakah alamat efektif bagi operan sumber bagi arahan [1], [2], dan [3]? Tunjukkan pengiraan anda. **[3 M]**

11. Refer to the following data declaration:
Rujuk kepada pengisytiharaan data berikut:

```
.data
      B1     WORD   5 DUP(4 DUP(?)), 0, 0, 0
      B2     DWORD  2, 4, 6, 8
      MSG    BYTE   "Final Exam", 0
      X1     LABEL  DWORD
      X2     LABEL  WORD
      ARR    BYTE   00h, 20h, 10h, 30h
```

What will be the content of register (in hex) if the following instruction is executed?
Apakah kandungan daftar (dalam heksa) jika arahan berikut dilaksanakan. **[6 M]**

i) mov ecx, LENGTHOF B1 ; ECX = _____

ii) mov ecx, SIZEOF MSG ; ECX = _____

iii) mov ecx, TYPE B2 ; ECX = _____

iv) mov eax, X1 ; EAX = _____

v) mov cx, X2 ; CX = _____

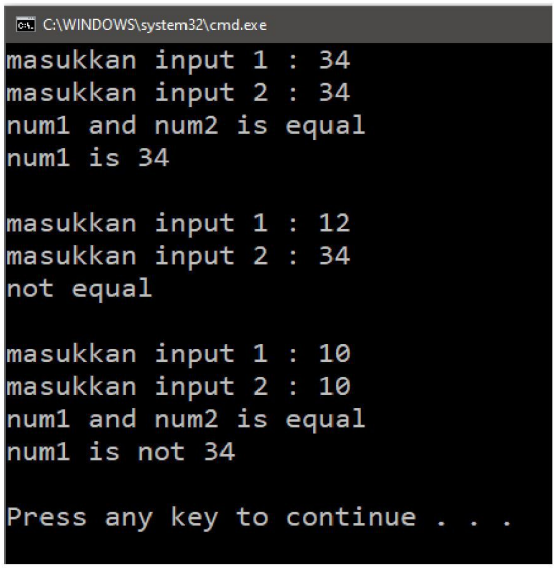
vi) mov dl, ARR ; DL = _____

12. Implement the following C++ Programming in assembly language. Your program **MUST** use **LOOP** and **JE** instructions. Your program should follow exactly as the sample output, do use new line instructions in assembly language to replace endl that have been used in the following C++ Programming.

*Laksanakan Pengaturcaraan C++ berikut dalam bahasa perhimpunan. Program anda **MESTI** menggunakan arahan **LOOP** dan **JE**. Program anda harus mengikuti betul-betul seperti contoh output, gunakan arahan baris baru dalam bahasa himpunan untuk menggantikan endl yang telah digunakan dalam Pengaturcaraan C++ berikut.* **[15 M]**

```
#include <iostream>
using namespace std;

int main(){
	int num1, num2;

	for (int i=0; i < 3; i++){

		cout << "masukkan input 1 : ";
		cin >> num1;
		cout << "masukkan input 2 : ";
		cin >> num2;

		if (num1 == num2){
			cout << "num1 and num2 is equal" << endl;

			if(num1 == 34){
				cout << "num1 is 34" << endl;
			}else{
				cout << "num1 is not 34" << endl;
			}

		}else {
			cout << "not equal" << endl;
		}
		cout << endl;
	}
}
```

Sample output should be same as below:



END OF QUESTIONS / *SOALAN TAMAT*

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	□