SECTION A : 75 MARKS
BAHAGIAN A : 75 MARKAH

INSTRUCTION:

This section consists of **THREE (3)** structured questions. Answer **ALL** questions.

ARAHAN :

*Bahagian ini mengandungi **TIGA (3)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1
SOALAN 1

CLO1
C3

(a)   Calculate the equation below in binary number system by using 2's complement method. (Show all the calculations involved thoroughly).

Kirakan persamaan di bawah dalam sistem nombor perduaan. Gunakan kaedah pelengkap 2 bagi operasi penolakan. (Tunjukkan semua pengiraan yang terlibat dengan lengkap).

$$(C7_{16} - 2A_{16}) + (96_{10} \div 3_8) =$$

[8 marks]
[*8 markah*]

CLO1
C3

(b)   Carry out the **SIX (6)** rules to convert decimal 0.40625 to 8 bit floating point format.

*Laksanakan **ENAM (6)** peraturan untuk menukar perpuluhan 0.40625 ke 8 bit format titik terapung.*

[8 marks]
[*8 markah*]

CLO1
C3

(c) Based on Figure A1(c) below, sketch the interconnection system bus between functional components of a digital computer.

Berdasarkan Rajah A1(c) di bawah, lakarkan hubungan sambungan sistem bas di antara komponen-komponen berfungsi yang terdapat di dalam komputer digital.
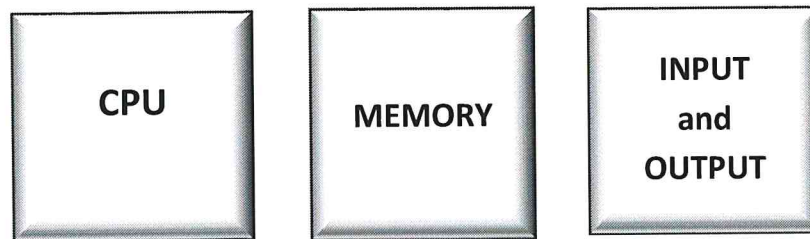
| CPU | MEMORY | INPUT and OUTPUT |

Figure A1(c) / *Rajah A1(c)*

[9 marks]
[*9 markah*]

QUESTION 2

SOALAN 2

CLO1
C3

(a)   Based on the modified parallel adder given in Figure A2(a), complete the Table A2(a) given using binary calculation.

Berdasarkan kepada penambah selari yang diubah suai dalam Rajah A2(a), lengkapkan Jadual A2(a) yang diberi menggunakan pengiraan binari.
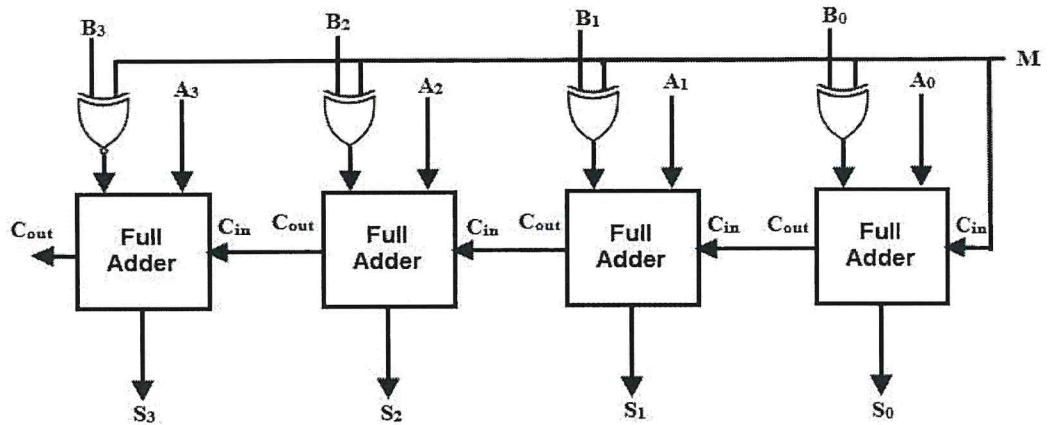

Figure A2(a) / *Rajah A2(a)*

Table A2(a)/Jadual A2(a)

Operation	4-bit input A				4-bit input B				1's complement					4-bit output with carry				
$A - B$	A_4	A_3	A_2	A_1	B_4	B_3	B_2	B_1	B_4	B_3	B_2	B_1	M	C_5	S_4	S_3	S_2	S_1
$10 - 6$																		
$15 - 9$																		
$5 - 2$																		

[6 marks]

[*6 markah*]

CLO1
C3

(b) Figure A2(b) shows the Boolean equation, demonstrate the logic circuit diagram of an 8-to-1 multiplexer by using 8 AND gates, 1 OR gate and 7 NOT gates related with truth table.

Rajah A2(b) menunjukkan persamaan Boolean, tunjukkan gambarajah litar logik bagi pemultipleks 8-ke-1 dengan menggunakan get 8 AND, get 1 OR dan get 7 NOT yang dikaitkan dengan jadual kebenaran.

$$Y = \overline{S0}\ \overline{S1}\ \overline{S2}\ D0 + \overline{S0}\ \overline{S1}\ S2\ D1 + \overline{S0}\ S1\ \overline{S2}\ D2 + \overline{S0}\ S1\ S2\ D3 + S0\ \overline{S1}\ \overline{S2}\ D4$$
$$+ S0\ \overline{S1}\ S2\ D5 + S0\ S1\ \overline{S2}\ D6 + S0\ S1\ S2\ D7$$

Figure A2(b) / *Rajah A2(b)*

[6 marks]
[*6 markah*]

CLO1
C5

(c) Figure A2(c) is a block diagram of 1-bit ALU which output will be the addition, subtraction, bitwise AND or bitwise OR of the inputs depending on the value of control lines. Set up the block diagram to obtain an 8 bit ALU.

Rajah A2(c) ialah gambarajah blok ALU 1-bit yang mana keluaran akan menjadi penambahan, penolakan, bitwise DAN atau bitwise ATAU masukan bergantung kepada nilai garis kawalan. Sediakan gambarajah blok untuk memperolehi ALU 8-bit.
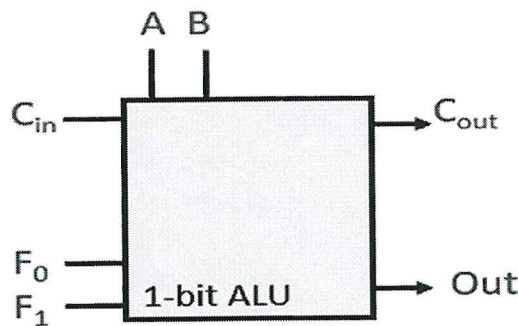

Figure A2(c) / *Rajah A2(c)*

[13 marks]
[*13 markah*]

QUESTION 3
SOALAN 3

CLO1
C3

(a) Carry out the process of source initiated strobe and destination which are applied in strobe control method of asynchronous data transfer.

Laksanakan proses sumber awal strob dan destinasi yang digunakan dalam kaedah kawalan strob pemindahan data tak segerak.

[8 marks]

[8 markah]

CLO1
C3

(b) Based on Figure A3(b) below, write timing relationship of the exchange of signals between data valid and data accepted.

Berdasarkan Rajah A3(b) di bawah, tuliskan hubungan masa pertukaran isyarat antara data yang sah dan data yang diterima.
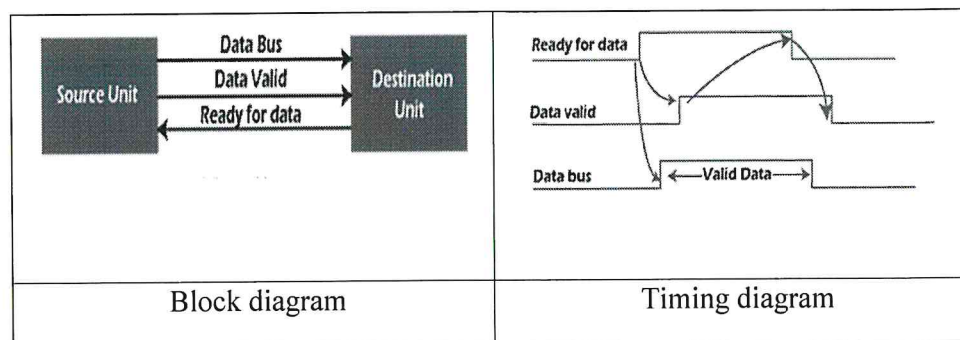

| Block diagram | Timing diagram |

Figure A3(b) / *Rajah A3(b)*

[8 marks]

[8 markah]

CLO1
C3

(c) Direct memory access (DMA) is a method that allows an input/output (I/O) device to send or receive data directly to or from the main memory, bypassing the CPU to speed up memory operations. Carry out the process of DMA to communicate data between the peripheral device and the system memory.

Akses ingatan langsung (DMA) ialah kaedah yang membenarkan masukan/keluaran (I/O) peranti untuk menghantar atau menerima data terus ke atau dari memori utama, memintas CPU untuk mempercepatkan operasi memori. Laksanakan proses DMA untuk komunikasi data antara peranti persisian dan memori sistem.

[9 marks]

[*9 markah*]

SECTION B : 25 MARKS
BAHAGIAN B :25 MARKAH

INSTRUCTION:
This section consists of **ONE (1)** essay question. Answer the question.

ARAHAN:
Bahagian ini mengandungi SATU (1) soalan esei. Jawab soalan tersebut.

QUESTION 1
SOALAN 1

CLO1
C5

Let's assume a microprocessor with 10 address lines (1KB memory). We wish to implement only 512 bytes of memory and use 128-byte memory chips. Physical memory must be placed on the upper half of the memory map. Set up two basic address decoding strategies if only a portion of the addressable space is going to be implemented.

Mari kita anggap mikropemproses dengan 10 baris alamat (memori 1KB). Kami ingin melaksanakan hanya 512 bait memori dan menggunakan cip memori 128 bait. Memori fizikal mesti diletakkan pada bahagian atas peta ingatan. Sediakan dua strategi penyahkodan alamat asas jika hanya sebahagian daripada ruang alamat akan dilaksanakan.

[25 marks]
[25 markah]

SOALAN TAMAT