KYPJ
KOLEJ YAYASAN PELAJARAN JOHOR

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FINAL EXAMINATION

COURSE NAME	:	**DIGITAL ELECTRONICS**
COURSE CODE	:	**DKE 1083**
EXAMINATION	:	**OCTOBER 2019**
DURATION	:	**2 HOURS 30 MINUTES**

INSTRUCTION TO CANDIDATES /
ARAHAN KEPADA CALON

1. This examination paper consists of **FIVE (5)** Questions. Answer **ALL** Questions. /
*Kertas soalan ini mengandungi **LIMA (5)** Soalan. Jawab **SEMUA** Soalan.*

2. Candidates are not allowed to bring any material to examination room except with the permission from the invigilator. /
Calon tidak dibenarkan untuk membawa sebarang bahan/nota ke bilk peperiksaan tanpa arahan/kebenaran daripada pengawas.

3. Please check to make sure that this examination pack consist of: /
Pastikan kertas soalan peperiksaan ini mengandungi:

   i. Question paper /
   Kertas soalan

   ii. Answer booklet /
   Buku jawapan

   iii. Attachment 1 /
   Lampiran 1

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO /
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

This examination paper consists of 9 printed pages including front page
Kertas soalan ini mengandungi 9 muka surat termasuk kulit hadapan

This paper contains of **FIVE(5)** questions. Answer **ALL** questions.
Answer the questions in Answer Booklet.
*Kertas soalan ini mengandungi **LIMA (5)** soalan. Jawab **SEMUA** soalan.*
Sila jawab dalam buku jawapan.

QUESTION 1 / *SOALAN 1*

a. Give **two (2)** advantages of using digital system than analog system.

*Berikan **dua (2)** kebaikan menggunakan sistem digital berbanding sistem analog.*

(2 marks/ *markah*)

b. Without using scientific calculator, convert all the numbers given below to the numbering system required

Tanpa menggunakan mesin kira saintifik, tukarkan nombor-nombor yang diberikan di bawah kepada sistem pernomboran yang dikehendaki.

i. 482_{10} = _____ 16
ii. $2F5B_{16}$ = _____ 8
iii. 110010.111_2 = _____ 10
iv. 25_{10} = _____ Gray
v. 011001010_2 = _____ 8
vi. 34_{10} = _____ xs3

(18 marks/ *markah*)

QUESTION 2 / *SOALAN 2*

a. Summarize the following expression using deMorgan theorem and Boolean Algebra.

Ringkaskan persamaan-persamaan berikut menggunakan teorem deMorgan dan Aljabar Boolean.

i. Y = [AB'(C+BD)+A'B']C
ii. V = XY'+X(Y+Z)'+Y(Y+Z)'
iii. W = OP + O(OPQ')' + Q

(9 marks/ *markah*)

b. Based on the truth table in **Table Q2 (b)** :
   i. Summarize the simplest SOP expression using Karnough Map.
   ii. Illustrate the logic diagram from simplified expression in question Q2 (b) (i).

*Berdasarkan kepada jadual kebenaran di **Jadual Q2 (b)**:*
   i. Ringkaskan persamaan teringkas SOP dengan menggunakan Peta Karnough.
   ii. Ilustrasikan litar logik bagi persamaan teringkas di soalan Q2 (b) (i).

A	B	C	D	X
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

Table Q2 (b) / *Jadual Q2 (b)*

(11 marks/ *markah*)

QUESTION 3 / *SOALAN 3*

a. A full-adder is a combinational circuit that forms the arithmetic sum of three bits. Is has three inputs and two outputs. The block diagram for the adder is shown in **Figure Q3 (a) (i).**

i. Give the truth table for the full adder and Boolean expression for the outputs, Σ and Co.

ii. Illustrate how a 74LS151 multiplexer (8-1) IC as shown in **Figure Q3 (a) (ii)** can be used to generate the logic function of full adder circuit.

Penambah penuh mempunyai litar gabungan yang berfungsi mencampurkan 3-bit. Ia mempunyai tiga masukan dan dua keluaran. Rajah blok penambah ditunjukkan dalam ***Rajah Q3(a) (i).***

i. Berikan jadual kebenaran untuk penambah penuh dan penyataan Boolean untuk keluaran Σ dan Co.

ii. Ilustrasikan bagaimana pemultipleks 74LS151 (8-1) dalam ***Rajah Q3 (a) (ii)*** *boleh menghasilkan fungsi litar penambah penuh.*

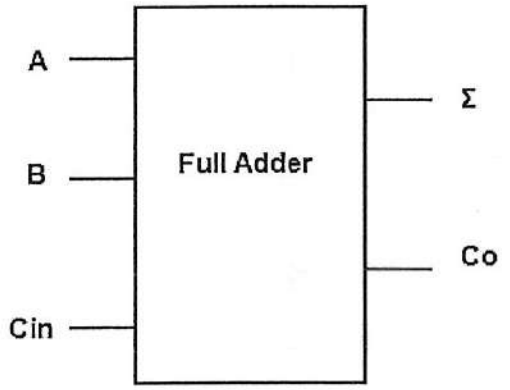


Figure Q3 (a) (i) / *Rajah 3 (a) (i)*

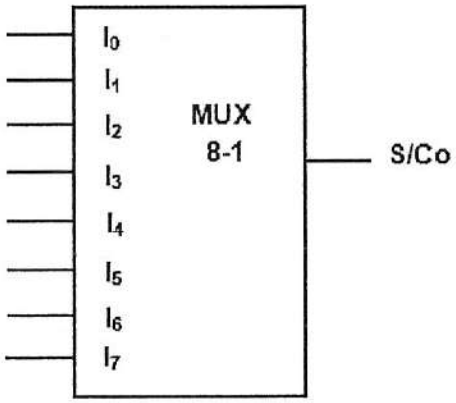


Figure Q3 (a) (ii) / *Rajah Q3 (a) (ii)*

(11 marks/ *markah*)

b. Convert each decimal number using 8 bit sign-magnitude, 1'st complement and 2'nd complement for numbers :

Tukarkan bagi setiap nombor desimal dengan menggunakan 8 bit tanda magnitud bagi pelengkap 1 dan pelengkap 2 bagi nombor berikut :

i. $-36_{10} - 15_{10}$

ii. $-28_{10} + 22_{10}$

iii. $+73_{10} - 29_{10}$

(9 marks/ *markah*)

QUESTION 4 / *SOALAN 4*

a. Sketch the timing diagram in **Attachment 1** by referring to **Figure Q4 (a)**. Assume the flip-flops are initially LOW.

*Lukiskan gambar rajah pemasaan di dalam **Lampiran 1** dengan merujuk kepada **Rajah Q4(a)**. Anggap keadaan awal bagi flip-flop adalah RENDAH.*

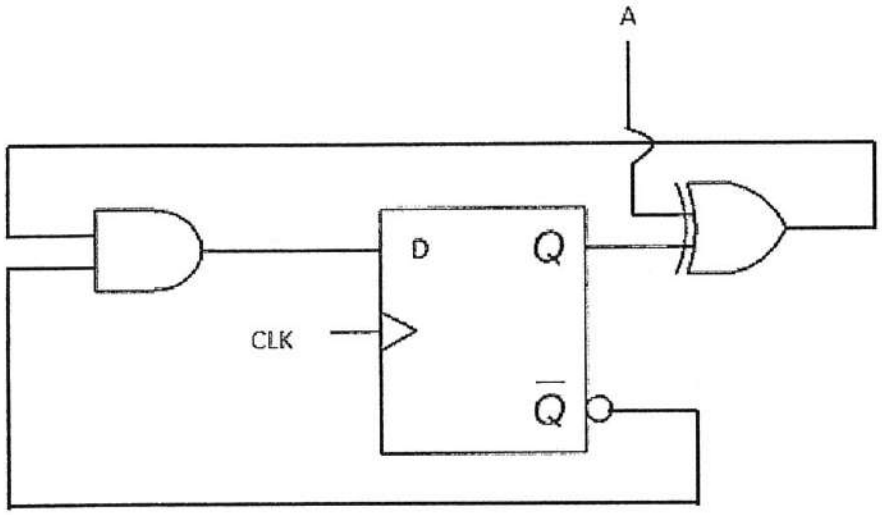


Figure Q4 (a) / *Rajah Q4 (a)*

(6 marks/ *markah*)

b. A 555 timer is configured to run as an astable multivibrator as shown in **Figure Q4 (b)**. Determine :

i. the frequency
ii. the duty cycle

*Sebuah pemasa 555 dikonfigurasikan sebagai pembilang getar tidak stabil seperti yang ditunjukkan dalam **Rajah Q4 (b)**. Tentukan :*

i. frekuensi
ii. kitar kerja

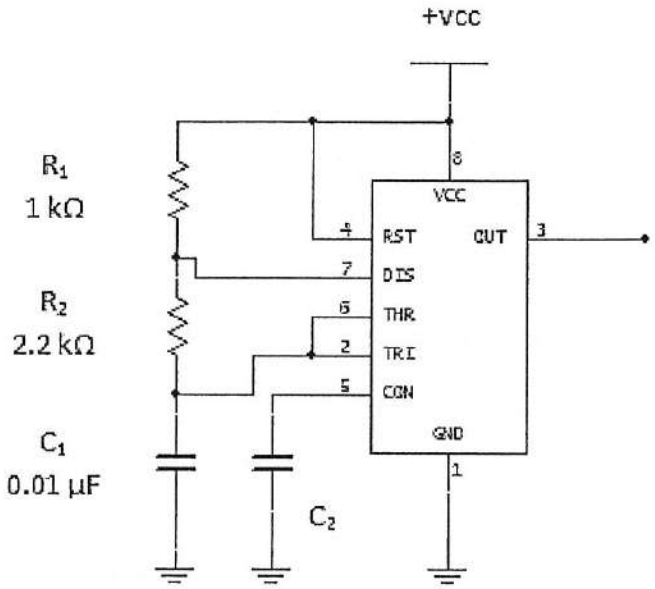


Figure Q4 (b) / *Rajah Q4 (b)*

(14 marks/ *markah*)

QUESTION 5 / *SOALAN 5*

a. Explain **three (3)** main differences between TTL and CMOS circuitry.

*Terangkan **tiga (3)** perbezaan utama di antara litar TTL dan CMOS.*

(6 marks/ *markah*)

b. Give the speed-power product of Gate A.

Berikan hasil darab halaju-kuasa bagi Get A.

Parameter	Gate A/*Get A*
V_{supply} (V)	5
t_{PLH}(ns)	10
T_{PHL}(ns)	8
$I_{CC}L$(A)	18m
I_{CCH}(A)	6m

Table Q5 (b) / *Jadual Q5 (b)*

(6 marks/ *markah*)

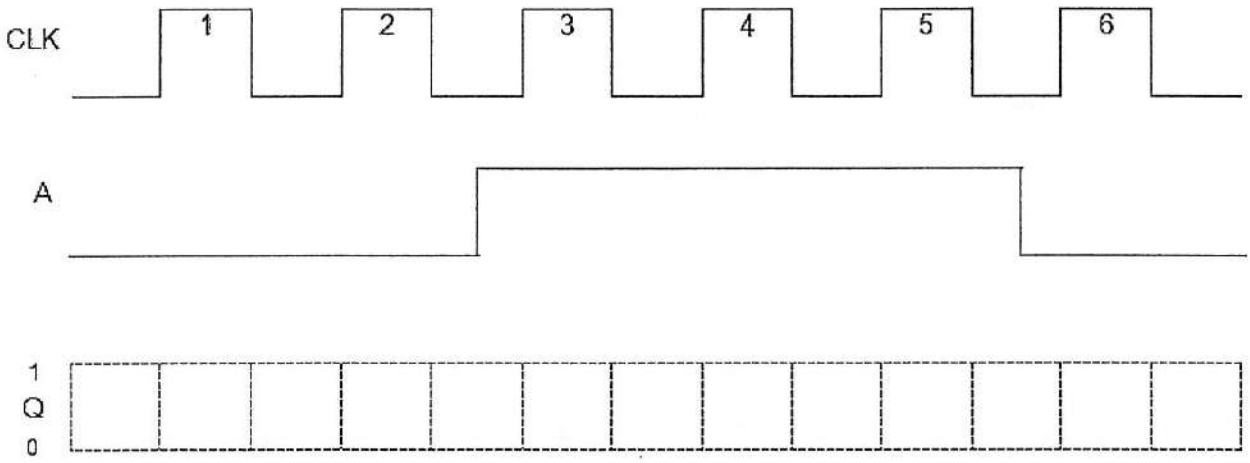
c. Explain the following term in TTL characteristics.

Terangkan istilah berikut mengikut ciri-ciri bagi TTL.

i. Fan-Out / *Rebak keluar*
ii. Fan-In / *Rebak masuk*
iii. Voltage transfer curve / *Lengkuk pemindahan voltan*
iv. Noise immunity / *Imuniti hingar*

(8 marks/ *markah*)

ATTACHMENT 1



[100 MARKS/ MARKAH]

END OF QUESTION PAPER / *KERTAS SOALAN TAMAT*