RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B. Sc (General) Degree in Information and Communication Technology
First Year - Semester I Examination – June/July 2018

ICT 1303 – BASIC ELECTRONICS AND DIGITAL LOGIC DESIGN

Time: Three (03) hours

Instructions to Candidates:

1. This paper contains **six (06)** questions in **three (03)** pages.
2. Answer any **five (05)** questions.

1.

a) Why do intrinsic semiconductors need to be doped before they are used in a diode?

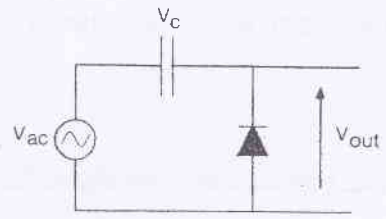
(05 Marks)

b) Discuss the rectification function of semiconductor diodes using suitable circuit diagrams.

(05 Marks)

c) The following circuit shows a voltage doubler. Explain its operation using appropriate graphs of V_{ac} and V_{out}.

(10 Marks)



2.

a) Explain the internal structure of a bipolar junction transistor and the purpose of doping different sections at different levels.

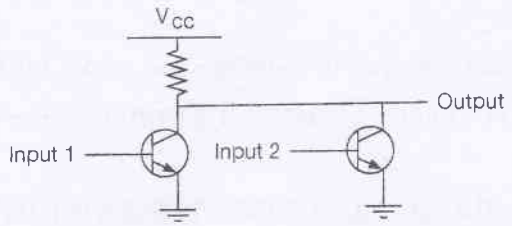
(10 Marks)

b) "Common collector amplifiers have desirable properties for input and output stages". Discuss this statement. **(05 Marks)**

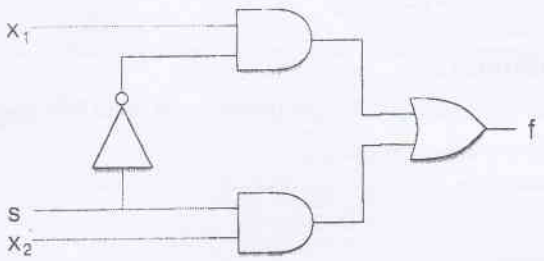
c) Compare and contrast negative feedback and positive feedback **(05 Marks)**

3.

a) Explain the operation of the following logic circuit and name it. **(05 Marks)**



b) Identify the function of the following circuit and explain its uses. **(10 Marks)**



c) Explain why it is always desirable to implement logic circuits using NAND and NOR gates. **(05 Marks)**

4.

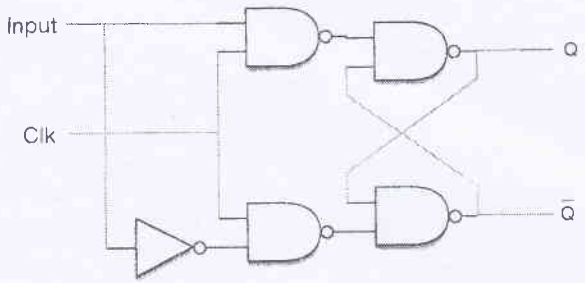
a) Design a logic circuit that would add 3 bits together. You are required to build the truth table and derive the logical function of the circuit from it. **(10 Marks)**

b) Show that the above circuit can be reduced to two half adders and an OR gate. **(10 Marks)**

5.

a) Using appropriate circuit diagrams show that a latch has two stable states. **(05 Marks)**

b) The following diagram shows the logic implementation of a flip-flop. Identify it and write down its characteristic table. ***(10 Marks)***



c) Briefly explain how master-slave flip-flops are used to achieve edge-triggering. ***(05 Marks)***

6.

a) Design a decimal up counter using JK flip-flops. ***(20 Marks)***

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