ROLL NO. _____

Code: DE108/DC108 **Subject: LOGIC DESIGN**

DipIETE – ET/CS *{NEW SCHEME}*

Time: 3 Hours **DECEMBER 2014** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: **(2×10)**

a. The ASCII code is

(A) a two bit code **(B)** a four bit code
(C) a seven bit code **(D)** an eight bit code

b. A gate in which all inputs must be low to get a high output is called _____ gate.

(A) AND **(B)** NOR
(C) NOT **(D)** NAND

c. Result of binary multiplication 10110 and 101 is

(A) 1110110 **(B)** 1011110
(C) 1110010 **(D)** 1101110

d. A half adder has

(A) one input and one output **(B)** two input and one output
(C) two input and two output **(D)** one input and two output

e. Which of the following is a combinational circuit?

(A) register **(B)** decoder
(C) flip flop **(D)** counter

f. In JK flip flop if we input K with the inverted form of what we input J, the resultant flip flop is

(A) SR flip flop **(B)** D flip flop
(C) T flip flop **(D)** JK flip flop itself

g. The number of flip flops required to reduce frequency by 32 is _____.

(A) 3 **(B)** 4
(C) 5 **(D)** 6

h. A reliable method for eliminating the decoding glitches is _____.

(A) strobing **(B)** cascading
(C) parallel loading **(D)** serial loading

i. Johnson counter is also known as

(A) up counter **(B)** down counter
(C) decade counter **(D)** twisted ring counter

j. In which of the following memory, stored data can be erased by exposing it to ultraviolet rays for a particular time period.

(A) PROM **(B)** EPROM
(C) EEPROM **(D)** RAM

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Perform the following conversions: **(8)**

(i) $(3742)_8 = (?)_{10}$

(ii) $(2A64)_{16} = (?)_2$

(iii) $(2047)_{10} = (?)_{16}$

(iv) $(1101011)_2 = (?)_{10}$

b. With the help of neat sketch explain serial and parallel transmission. **(5)**

c. Draw functional diagram of digital computer. **(3)**

Q.3 a. Draw the symbol of AND and NOR gate and explain their working using truth table **(6)**

b. Simplify the following expression using K map and implement it using logic gate. **(6)**

$Y = \overline{A}\overline{B}\overline{C} + \overline{A}BC + ABC + A\overline{B}\overline{C} + A\overline{B}C$

c. Draw the symbols and truth tables of XOR gate and XNOR gates. **(4)**

Q.4 a. Draw logic circuit of 4-bit BCD adder and explain its working. **(8)**

b. Perform the following operation: **(2+2+2+2)**

(i) $(45)_{10} - (23)_{10}$ Using 2's complement method.

(ii) $(10111)_2 - (100)_2$

(iii) $(385)_{10} + (118)_{10}$ Using BCD addition.

(iv) Represent decimal value -12 as an 8-bit signed binary value.

Q.5 a. Draw the circuit of 4 bit serial in parallel out shift register and explain its working. **(8)**

b. Draw logic circuit of 4 bit ring counter and explain its working with the help of truth table, waveforms and state diagram. **(8)**

Q.6 a. What is encoder? Explain working of octal to binary encoder. **(8)**

b. What is de-multiplexer? Draw logic diagram of 1:8 de-multiplexer and explain its working. **(8)**

Q.7 a. Draw the logic diagram NOR gate latch and its working using truth table. **(8)**

b. What is frequency division? How can flip flop be used for this application? Also list other applications of flip flop. **(2+4+2)**

Q.8 a. Explain working principle of decade counter with suitable logic diagram. **(8)**

b. What are synchronous counters? Design a Mod-6 synchronous counter using J-K Flip-Flops. **(8)**

Q.9 a. What is RAM? Distinguish between SRAM and DRAM. **(2+4)**

b. How many address bits are required to access a 32 K memory? **(2)**

c. What is ROM? Draw 16×8 ROM architecture and explain its working. **(8)**