2014

(First Semester)

MASTER OF COMPUTER APPLICATIONS

Paper No: MCA 104

(Digital Fundamentals)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer Question No 1 and **any four** from the rest

1. (a) Define:
   (i) Registers
   (ii) RAM

   (b) Design a half subtractor with truth table.

   (c) Give the comparison between BJT and FET.

   (d) Simplify the logical expression f(A,B,C) = $\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}BC + AB\bar{C}$.

   (e) What are comparators? Write down the truth table for one bit magnitude comparator.

   (f) What do you mean by doping? Explain the types of semiconductors. **(6X2=12)**

2. (a) What is a decoder? Draw the logic diagram, truth table and expression for a 3-to-8 line decoder **(1+5=6)**

(b) Draw and explain the functional block diagram of 555 Timer. **(6)**

3. (a) Explain in detail J-K flip-flop. **(4)**

(b) Give the relation between current gains 'α' and 'ß' for both common base and common emitter BJT. **(4)**

(c) Explain the free-running Multivibrator. **(4)**

4. (a) Implement $F=\sum m\ (0,1,2,3,4,10,11,14,15)$ using 8x1 MUX. **(6)**

(b) Explain in detail the 4-bit binary ripple counter. **(6)**

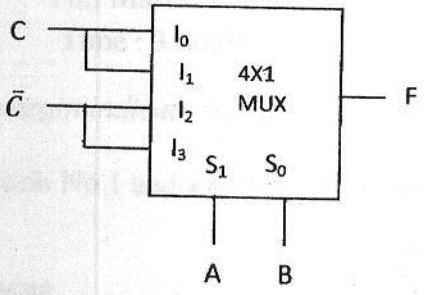
5. (a) Explain the Enhancement mode MOSFET in detail. **(6)**

(b) Implement carry look ahead adder with logic diagram and logical expression. **(6)**

6. (a) What are combinational circuits and sequential circuits? **(2)**

(b) Explain the forward and reverse bias of a pn junction diode with circuit diagram. **(6)**

(c) Find the output F of the 4x1 MUX **(4)**



7. Differentiate between:

(a) Monostable Multivibrator and Astable Multivibrator. **(6)**

(b) Synchronous Counter and Asynchronous Counter. **(6)**

8. (a) Explain in detail the Master-Slave J-K flip-flop. **(6)**

(b) Calculate the upper threshold voltage (V_{UT}) and lower threshold voltage (V_{LT}) in a Schmitt Trigger circuit if $V_{sat} = 13$ V, $R_1 = 100k\Omega$ and $R_2 = 100\Omega$. **(4)**

(c) Draw the circuit diagram of a 3-bit parallel comparator A/D converter. **(2)**