B.Sc. Semester-III (Honours) Examination, 2020-21
PHYSICS

Course Id: 32413 **Course Code: SH/PHS/303/C-7**

Course Title: Digital Systems and Applications

Time: 1 Hour 15 Minutes **Full Marks: 25**

The figures in the margin indicates full marks.

Candidates are required to give their answers in their own words as far as practicable

Section-I

1. Answer any *five* questions: 1X5=5
   i) What is 2's compliment?
   ii) Why is a parallel counter faster than a ripple counter?
   iii) What is an excitation table?
   iv) What do you mean by multiplexing?
   v) What is the use of a Karnaugh map?
   vi) What is the difference between a synchronous and an asynchronous counter?
   vii) Convert $(1001.0101)_2$ into its decimal equivalent.
   viii) What do you mean by monolithic IC?

Section-II

Answer any *two* questions: 5X2=10

2. What is a truth table? Explain how to subtract two Boolean numbers by compliment method. 1+4

3. What is a multiplexer? Draw a logic block diagram of a 4:1 multiplexer. Design a 4 to 1 multiplexer using basic gates. 1+1+3

4. Draw the circuit diagram of a mono stable multi vibrator using IC 555 timer. Explain the operation of a mono stable multi vibrator using 555 timer. 2+3

5. Define a register. Construct a 4-bit serial-in-serial-out shift register using D-type flip-flops and explain its operation. 1+1+3

Section-III

Answer any *one* question: 10X1=10

6. What is a flip-flop? Briefly discuss the action of a delayed flip-flop. Explain the principle of operation of a J-K flip-flop. What do mean by race around condition?

   1+3+5+1

7. Distinguish between series and parallel counter. What is the main advantage of a synchronous counter over a ripple counter? Draw the block diagram of an asynchronous counter and explain its operation. Show that this counter can also be used as a frequency divider. 2+1+5+2