SEAT No._____

SARDAR PATEL UNIVERSITY

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SC

Sixth Semester B. Sc. Examination

Under CBCS

[52/A-20]

Wednesday, 4th April-2018

Time: 10:00 am To 01:00 pm

Subject: PHYSICS [**US06CPHY05**]

Digital Electronics, Electronic Communication & VLSI Technology

Total Marks 70

N.B: **(i) All the symbols have their usual meanings.**
(ii) Figures at the right side of questions indicate full marks.

Que.-1 **To answer the MCQs choose the correct option.** **[10]**

1. The binary number 1110 is equivalent to decimal number _____.
   (a) 3 (b) 13 (c) 10 (d) 14
2. ASCII code is _____ bit code.
   (a) 7 (b) 4 (c) 2 (d) 8
3. The truth table of 4-input AND gate has _____ different input combinations.
   (a) 4 (b) 8 (c) 32 (d) 16
4. A flip-flop is used to store _____ bit.
   (a) 1 (b) 4 (c) 2 (d) 8
5. When both the inputs of RS flip-flop are in 1 state leads the output in _____ condition.
   (a) No change (b) race or indeterminate (c) reset (d) set
6. One of the outputs of 4 -bit ring counter is given by_____.
   (a) 0100 (b) 0011 (c) 1110 (d) 0111
7. The simultaneous two way communication is called_____.
   (a) simplex (b) half duplex (c) full duplex (d) double communication
8. The frequency range of voice frequencies is from _____.
   (a) 300 to 3,000 Hz (b) 20 to 20,000 Hz
   (c) 3,000 to 30,000 Hz (d) 30 to 3,000 Hz
9. Mobility of an electron is about_____ that of hole mobility.
   (a) same as (b) three times (c) twice (d) half
10. The great advantage of CMOS digital circuits in IC is_____.
    (a) low power consumption (b) simple fabrication
    (c) occupies less chip area (d) high impedance

Que.-2 **Answer *briefly* any ten of the following questions.** **[20]**

(1) Show that hexadecimal number 3B is equivalent to decimal number 59.
(2) What are BCD numbers? State their uses.
(3) Implement basic gates using NOR gates.
(4) Explain in brief D flip-flop.
(5) Explain briefly working of JK master slave flip-flop.
(6) What is the output of JK flip-flop when its both inputs are tied together?
(7) Draw the block diagram of any communication system.

(8) Explain in brief simplex communication with examples.

(9) To achieve 80% modulation of a carrier of V_c= 40 V, how much modulating signal voltage is required?

(10) Explain briefly different levels of integration of IC chips.

(11) How does the Schottky diode differ from ordinary diode?

(12) State the drawbacks of junction capacitors used in IC.

Que.-3 (a) Define AND gate. Explain the working of the two inputs AND gate with suitable circuit diagram. Which gate is implemented when its output is inverted? **[06]**

(b) What is an inverter? Describe the circuit action of transistor inverter. **[04]**

OR

Que.-3 (a) What is meant by TTL? Explain the working of two inputs TTL NAND gate with suitable circuit diagram. Give the values of propagation delay time and power dissipation of standard TTL gate. **[06]**

(b) Discuss EX-OR gate with its applications. **[04]**

Que.-4 What is a register? Explain the working of 4 bit shift left register with suitable logic diagram. How it can be converted to shift right register. **[10]**

OR

Que.-4 Distinguish between asynchronous and synchronous binary counters. Describe the working of four bit synchronous counter with suitable logic diagram and clocked waveform. **[10]**

Que.-5 (a) What is amplitude modulation? Explain about mathematical representation of Amplitude Modulation. **[06]**

(b) With necessary diagram, explain the working of AM circuit with a diode. **[04]**

OR

Que.-5 (a) Differentiate between FM and PM with proper diagrams. **[06]**

(b) Explain how PM is converted to FM. **[04]**

Que.-6 (a) Describe the fabrication of n-channel JFET in monolithic IC with proper diagrams. **[06]**

(b) Explain the following configurations of a transistor used for diode operation in the monolithic IC with fabrication diagram; **[04]**

(i) collector – base with emitter floating

(ii) collector – base with emitter shorted to base.

OR

Que.-6 (a) Discuss the structure of base diffused resistor in monolithic IC fabrication with proper diagram. Also explain concept of sheet resistance. **[06]**

(b) Discuss the general classification of integrated circuits and mention their advantages over discrete components. **[04]**