

2021
COMPUTER SCIENCE
[HONOURS]
Paper : I

Full Marks : 50

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **two** questions: 1×2=2
- a) What is the use of Instruction Register?
 - b) What is the full form of ASCII?
 - c) Convert $(7CA0)_{16}$ into corresponding octal number.
 - d) Why NAND gate is called universal gate?
2. Answer any **five** questions: 2×5=10
- a) If $ab=0$ then prove that $a \oplus b = a + b$.
 - b) What is the significance of don't care terms in K-map?
 - c) In what different modes can a p-n-p transistor work?

- d) Define signal-to-noise ratio of an amplifier.
- e) Distinguish between primary memory and secondary memory.
- f) Show how XOR gate can be used as an inverter.
- g) Why address bus is always unidirectional?

3. Answer any **three** questions: 6×3=18
- a) Simplify the Boolean expression $F(A, B, C, D) = \Sigma(0, 1, 2, 5, 8, 9, 10)$ to obtain the simplified Product-of-sums (POS) form. Draw the corresponding logic circuit. 6
 - b) Explain the working principle of Zener diode with suitable diagram. 6
 - c) Make a comparative study among Super, Mainframe, Mini and Personal computers. 6
 - d) Draw and flowchart to find the factorial of a given integer. 6
 - e) Derive the-circuits for a 3-bit parity generator and 4-bit parity checker using odd parity bit. 6

4. Answer any **two** questions: $10 \times 2 = 20$

- a) i) Explain the formation of the barrier field across the junction of a P-type and N-type semiconductor.
- ii) Briefly explain the working principle of Zener diodes. $5+5$
- b) i) Draw a feedback circuit of an RC oscillator. What type of feedback is this? Justify your answer.
- ii) Explain how OP-AMP can be used as integrator with suitable diagram. $(4+2)+4$
- c) i) Draw a block diagram of a CPU and describe its components.
- ii) What are the different types of system buses? Discuss their role. $6+4$
- d) i) Obtain the 9's complement of the decimal number 123456789. Perform the subtraction with the following unsigned decimal numbers by taking 10's complement of the subtrahend: $1753 - 8640$.
- ii) Show that exclusive-OR function $x = A \oplus B \oplus C \oplus D$ is an odd function. (A logic function is called odd if its value

is binary 1 only when odd number of input variables is equal to 1.).

$(2+3)+5$
