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Total No. of Questions: [09]

B. Tech. (Electrical Engg.) (Semester – 4th)
DIGITAL ELECTRONICS
Subject Code: BELES1401
Paper ID: [18111515]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. List the basic logic gates and their symbols.
b. How are errors detected using parity bits?
c. Convert the octal number 157_8 into its decimal and hexadecimal equivalent.
d. What is the purpose of a K-map in logic design?
e. Explain the working principle of a BCD adder.
f. Elucidate the difference between one's and two's complement with the help of an example.
g. Define the term 'Ring Counter.'
h. Describe programmable logic array (PLA).
i. Differentiate between ROM and RAM.
j. Calculate the resolution of a 10-bit A/D converter with a full-scale input range of 0 to 10V.

Section – B **(5 marks each)**

Q2. Explain the working of JK flip-flop with the help of a truth table and timing diagram.
Q3. Discuss the working of multiplexers and demultiplexers, and show how a 4-to-1 multiplexer works.
Q4. Differentiate between half-adder and full-adder.
Q5. Explain the operation of a 4-bit shift register for converting data from serial to parallel and parallel to serial.
Q6. Explain how PLA and PAL are used to implement logic circuits with an example.

Section – C **(10 marks each)**

Q7. (a) Design a 4-variable K-map for the function F (A, B, C, D) =Σ (0, 1, 3, 7, 9, 11, 15) and show the minimized Boolean expression.
(b) Represent the decimal number 27 in binary form in
i) BCD code ii) Excess-3 code iii) Gray code iv) Hexadecimal code

Q8. Describe the synchronous and asynchronous (ripple) counters' designs and methods of operation. Also, design a 4-bit synchronous up/down counter and use timing diagrams to illustrate it's working.
Q9. Explain the working principle and architecture of an Analog-to-Digital Converter (ADC) using the successive approximation method. Provide a step-by-step explanation of the conversion process and solve an example to demonstrate the working.