

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIRST SEMESTER M.TECH DEGREE EXAMINATION**  
**Electronics & Communication Engineering**  
**(VLSI and Embedded Systems)**  
**04EC6503—ADVANCED DIGITAL DESIGN**

Max. Marks : 60

Duration: 3 Hours

**PART A**

*Answer All Questions*

*Each question carries 3 marks*

1. Illustrate Shannon's expansion theorem.
2. Explain about races in asynchronous sequential circuits
3. Design a counter with parallel load
4. Explain the steps for the controller design process
5. Differentiate high level state machine and finite state machine
6. Explain the conversion of C code to high level state machine with an example.
7. Explain about component allocation with an example
8. Reduce the given equation using repeated application of the expand operation.  
$$F = ABC + ABC' + A'B'C + A'B'C$$

**PART B**

*Each question carries 6 marks*

9. Write down the HDL code for 4 bit Adder/ Subtractor.  

**OR**
10. Design a serial binary adder as a moore machine
11. Explain in detail about different types of hazards with example  

**OR**
12. Draw the ASM chart for a mod 8 counter
13. Design a 4 bit register with maintain the present value, shift right, shift left, load and clear functions.  

**OR**
14. Design a 4bit magnitude comparator
15. Design a controller for a laser surgery system. The system works by turning on the laser for a precise amount of time. Surgeon activates the laser by pressing a button, Once the button is pressed, the laser should be turned on for exactly 3 clock cycles.  

**OR**
16. With neat diagram explain microprogrammed controllers
17. Design a soda dispenser processor using RTL Design method  

**OR**
18. Illustrate the significance of critical path delay in determining the clock frequency of a circuit.
19. Discuss different state encoding techniques  

**OR**
20. Design a 4 bit sequential multiplier.