

[Time:2.30 Hrs]		[Marks:75]
Please check whether you have got the right question paper.		
N.B:	1. All question are compulsory. 2. Figures to the right indicate full marks. 3. Students answering in the regional language should refer in case of doubt to the main text of the paper in English.	

	All Questions Compulsory	
Q.1	Attempt any three of the following	15
a.	Define digital signal. With respect to digital signal explain the terms-digits and bits. Also discuss active high and active low signal.	
b.	Write the difference between analog signal and digital signal.	
c.	What are different numbering systems used? Convert following numbers to required numbering system. (11001011.01110) ₂ = (?) ₁₀ ii) (1100110.011010) ₂ = (?) ₁₆	
d.	Convert the following numbers. i) (17E.F6) ₁₆ = (?) ₂ ii) (110010100011.10100101) ₂ = (?) ₁₆	
e.	Find i) The Gray code equivalent of decimal (13) ii) Binary equivalent of Gray code 1111. iii) Hexadecimal equivalent of octal (765) iv) Octal equivalent of binary (110011110101) v) Decimal equivalent of binary (110011110101)	
f.	Write a short note on Error correction and detection code.	
Q.2	Attempt any three of the following	15
a.	State and prove De-Morgan's theorem and realize it using basic gates.	
b.	Describe the NAND and the OR gate with the symbol, the logical statement, the Boolean expression and its logical circuit diagram.	
c.	State and prove the commutative and associative law in Boolean Algebra.	
d.	Solve the SOP expressions using K maps $F(A,B,C,D) = \sum m(1,3,4,5,7,9,11,13,15)$	
e.	Prove the following: i) $A + \overline{A}B = A + B$ ii) $(\overline{A} + B)\overline{A}B\overline{C} = \overline{A} + B + \overline{C}$	
f.	Describe how NAND gate is used to build the NOT, OR and AND gates	
Q.3	Attempt any three of the following	15
a.	What is full adder? Draw logic circuit diagram and explain it.	
b.	Design and implement Binary to Gray code converter.	
c.	Describe the working of a comparator.	
d.	Write a short note on BCD to EXCESS-3 code converter.	
e.	Describe the working of a multiplier	

f.	Design the half adder using K-map. Draw the circuit diagram for the same.	
Q.4	Attempt any three of the following	15
a.	Explain S-R flip flop in detail.	
b.	Write short note on Multiplexer.	
c.	Write a note on master slave JK flip flop.	
d.	Implement the following using 8:1 multiplexer. i) $F(A,B,C,D) = \sum m(2,4,5,7,10,14)$ ii) $F(A,B,C,D) = \sum m(1,5,6,9,10)$	
e.	Draw a neat circuit diagram and explain the working of 1:4 Demultiplexer.	
f.	Explain the role of ALU as a part of computer system.	
Q.5	Attempt any three of the following	15
a.	Differentiate between Synchronous and Asynchronous counters.	
b.	What are parallel and shift registers?	
c.	Explain working of SIPO register.	
d.	Describe working of 4 bit binary counter.	
e.	Briefly describe the architecture of SISO shift register.	
f.	Write a note on ring counter.	