

[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.	

Q.1	Attempt any three of the following: a. Convert following numbers to required number system: i. $(AB.1C)_{16} = (?)_{10}$ ii. $(96.125)_{16} = (?)_8$ b. Explain the importance of digital number system. c. Perform following arithmetic operations i. $(727)_8 + (234)_8$ ii. $(DADA)_{16} + (BABA)_{16}$ d. What is hamming code? A seven bit even parity hamming code is received as 1110101. What is the correct code? e. Convert the following i. $(100101)_{\text{gray}} = (?)_2$ ii. $(968)_{10} = (?)_{\text{BCD}}$ iii. $(57)_{10} = (?)_{\text{Excess-3}}$ iv. $(1001010100110110)_{\text{BCD}} = (?)_{10}$ v. $(101010)_2 = (?)_{\text{gray}}$ f. Explain 2's complement method with suitable example.	15
Q.2	Attempt any three of the following: a. With the help of suitable symbols and truth tables write a short note on basic logic gates. b. Describe NAND gate with its symbol and truth-table. Draw EX-OR gate using NAND gates only. c. Prove the following i. $(\bar{A} + B)\bar{A}\bar{B}\bar{C} = \overline{A + B + C}$ ii. $\bar{A}BC + A\bar{B}C + AB\bar{C} + ABC = AB + BC + AC$ d. Simplify the following expression using Boolean algebra and draw log circuit diagram for the simplified expression. $W\bar{X}(W + Y) + WY(\bar{W} + \bar{X})$ e. Simplify using K-map and logic circuit for simplified expression. $F(A,B,C,D) = \pi M(4,5,8,9,11,12,13,15)$ f. Simplify using K-map and logic circuit for simplified expression. $F(A, B, C, D) = \sum m(0,1,3,4,5,7,8,9,12,13)$	15
Q.3	Attempt any three of the following: a. Design half adder using K-map. Draw the circuit diagram for the same. b. Design a 4-bit adder circuit and explain its working. c. Explain 2 bit comparator. d. Design and implement Gray to binary code converter e. Design a combinational circuit for the following description. <ul style="list-style-type: none"> The circuit has 4 inputs and 2 outputs One of the output is true if the majority of inputs are true 	15

	<ul style="list-style-type: none">• The other output is true if all the 4 inputs are the same. <p>f. With the help of k-maps and suitable diagrams explain full subtractor.</p>	
Q.4	<p>Attempt <u>any three</u> of the following:</p> <ul style="list-style-type: none">a. With the help of suitable diagram and truth-table explain the working of T-flipflop.b. How JK-flip flop is derived from SR flip flop? Explain with the help of suitable diagrams.c. With the help of suitable diagram, describe the working of 4:1 Multiplexer.d. Differentiate between encoder and decodere. Design 1:8 demultiplexer and explain its working.f. Design full adder using 1:8 demultiplexer	15
Q.5	<p>Attempt <u>any three</u> of the following:</p> <ul style="list-style-type: none">a. Write a short note on modulus of counterb. Differentiate between counters and shift registers.c. With the help of suitable diagrams explain 3-bit asynchronous up-counter.d. Write a short note on Ring Countere. Briefly describe the architecture of SISO shift registersf. Design and explain modulo 5 synchronous counter.	15