

Enrollment No. 116UC5062

S₁ (UCS03C13) CSE

B.Tech 3rd Semester Mid Term Examination-2017

Department of Computer Science & Engineering

Digital Logic and Computer Design

UCS03C13

Full Marks: 50 Marks

Time: 2Hrs

The figures in the margin indicate full marks for the questions

Answer Q1 and any four from the rest.

Q. 1 (Compulsory)

(a) Perform the following conversions:

(i) $(1535B4)_{16} = (?)_8$

(ii) $(2213.46.3)_8 = (?)_{10}$

1

(b) Find the 10's complement of 38.675 and 9's complement of 278.77

1

(c) Subtract $(110101)_2 - (011011)_2$ using 2's complement

1

(d) Design an Ex-OR gate using minimum number of NAND gates.

2

(e) What is Fan in and Fan out in logic gates.

3

(f) Find the Minterm and Maxterm of the Boolean function $F = X + YZ$.

2

Q. 2.

(a) Find simplified expression for following where d represents don't care condition

$$F(A,B,C,D) = \sum m(0,8,11,12,15) + d(1,3,7,10,14)$$

(b) Design Half Subtractor and Full Subtractor with all its possible logic gates.

(5+5=10)

Q. 3.

(a) Design a circuit that can convert Binary Coded Decimal to Excess 3 Code Converter using truth table, K-maps, and logic circuits.

(b) Design 2 bit Comparator with suitable diagram.

(6+4=10)

Q. 4.

(a) Design a Carry Look Ahead Generator that can add two binary numbers of 4 bit each. (10)

Q. 5.

(a) What do you mean by a parity bit? Design a circuit which will generate a parity bit in the Sender side and check the correctness of the data in the Receiver side. (Consider either ODD or EVEN parity).

(b) Simplify the following Boolean expressions:

$$(i) f(x, y, z) = xy'z + x'yz + xy$$

$$(6 + (2 + 2) = 10)$$

$$(ii) f(x, y, z) = xy + x(y + z) + y(y + z)$$

Q. 6.

a) How in fixed point and floating point arithmetic machine arithmetic operations are performed? What is the limitation of fixed point arithmetic?

b) What is the concept of accuracy in this context. If a machine reserves 23 bits for storing numbers. Calculate the number of decimal digits that can be accurately expressed in the machine.

c) What is scaling? Give some examples.

c) A 32-bit machine represents its number one bit for sign, 8 bits for biased exponent and other in between mantissa. Express $-(13.50_{10})$ with all 32 bit machine format.

$$(3+2+2+3=10)$$

Enrollment No.

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Digital Circuits and Logic Design

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Full Marks: 50 Marks

Time: 2Hrs

The figures in the margin indicate full marks for the questions

Answer all the questions:

Q. 1(a) Convert $(93)_{10}$ and $(81)_{10}$ to Excess-3 code and add them, get result in binary form.

(b) State the limitations of Fixed Point arithmetic.

(c) Express the following function in a sum of minterms.

$$F(w, x, y, z) = y'z + wxy' + wxz' + w'x'z$$

(g) State De Morgan's theorem.

Σm

$$(A_1 A_2 A_3 \dots A_n)' = A_1' + A_2' + \dots + A_n'$$

$$x + yz = (x + y)(x + z)$$

(3+2+3+2=10)

Q. 2(a) Draw the logic diagram of a 2 line to 4 line decoder using NAND gates only.

(b) Design a Comparator for two binary numbers of 3 bit each with suitable diagram.

(5+5=10)

Q. 3(a) Simplify the following Boolean function in (a) sum of products and (b) product of sums using K Map

$$F = \bar{A}BC + \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + A\bar{B}C$$

(b) Is it possible to convert a full Adder Circuit into Full Subtractor? If so explain with a neat logic diagram

(5+5=10)

Q. 4 Design a 4 bit Carry Look ahead adder with suitable diagram and logical expression. (10)

Q. 5 (a) What do you mean by a parity bit? Design a circuit which will generate an odd parity generator and check the correctness with Parity checker.

(b) Simplify the following Boolean expressions to minimum number of literals:

(i) $F(A, B, C, D) = [(CD)' + A]' + A + CD + AB$

(ii) $F(A, B, C, D) = (A + C + D)(A + C + D')(A + C' + D)(A + B')$

$xy' + x'y$

Enrolment No.

S: UC503B04 B.Tech

B.Tech. 3rd Semester Mid Term Examination, 2018
Discrete Mathematical Structures
UC503B04

Time: 2 hours

Full Marks: 50

1. A relation R is defined on the ordered pair of integers as follows: $(x, y)R(u, v)$ if $x \leq u$ and $y \leq v$. Find whether the relation R is equivalence and Partial Ordered Relation. (5)

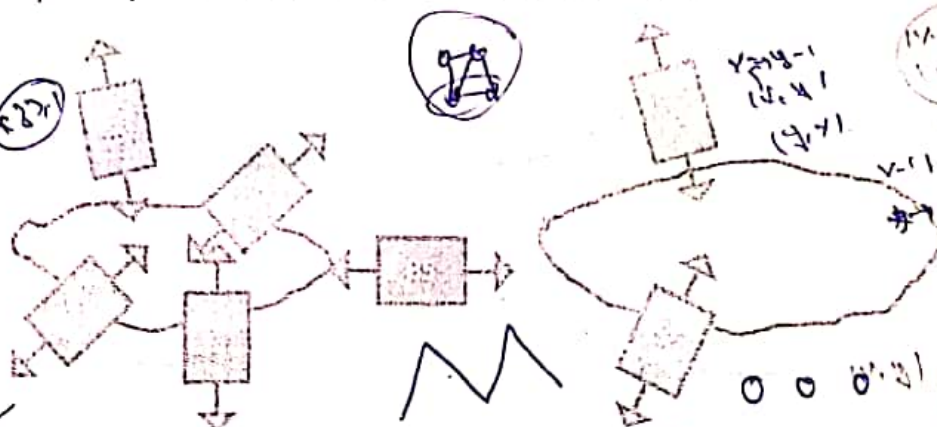
2. In a competition, a school awarded medals in different categories. 36 medals in dance, 12 in dramatics and 18 medals in music. If these medals went to a total of 45 persons and only 4 persons got medals in all the three categories, how many received medals in exactly two of these categories? (5)

3. Determine whether the binary relation S on a non empty set on set $A = \{1, 2, 3\}$ is reflexive, symmetric, transitive, antisymmetric and asymmetric. (5)

4. Determine whether the relation R on the set on all set of integers is reflexive, symmetric, antisymmetric and transitive where $(x, y) \in R$ if and only if $x \mid y$. (5)

5. x is a multiple of y if and only if $x = ky$ for some integer k . (2*5=10)

6. The city of Königsberg in Prussia (now Kaliningrad, Russia) was set on both sides of the Pregel River, and included two large islands which were connected to each other, or to the two mainland portions of the city, by seven bridges $B_1, B_2, B_3, B_4, B_5, B_6$, and B_7 as shown in the following map. Can someone cross all the bridge shown in this map exactly once and return to the exactly point? Explain. (5)



7. (a) Define planar graph and Hamiltonian graph, with example. Determine whether the following graphs are Euler, Hamiltonian and Planar. Give views to support your answer.

- (i) Wheel Graphs W_3 and W_4
- (ii) Complete Graphs K_3 and K_4
- (iii) Bipartite graph $K_{2,3}$ and $K_{1,2}$

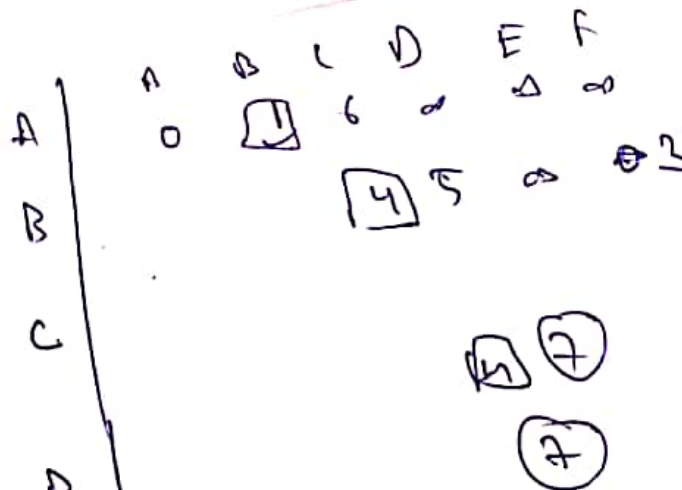
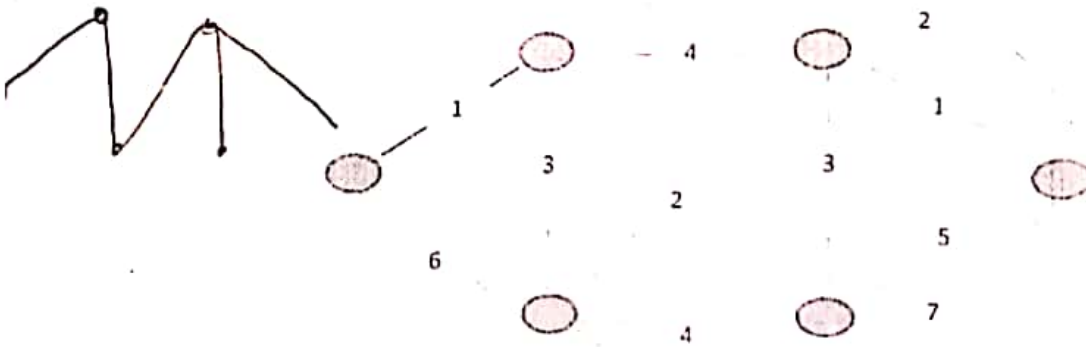
(b) Determine the chromatic number of the following graph



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7. (a) Find the minimum spanning tree using kruskal and prims algorithm for the graph given below

(5+5=10)



Enrolment No.

S₁(All Branch):ALL

B. TECH 3rd SEMESTER MID-TERM EXAMINATION - 2018
Subject Name: Engineering Mathematics - III

Subject code: UCH/CE/PE03C14/UCS/EC/EE/EI03C13/UME03C12

Time: 2 Hours

Full Marks: 50

Symbols used here have their usual meanings

Group A

Answer all the following questions

[5 × 5 = 25]

1. The chances that doctor A will diagnose a disease X correctly is 60%. The chances that a patient will die by his treatment after correct diagnosis is 40% and the chances of death by wrong diagnosis is 70%. A patient of doctor A, who has disease X, died. What is the probability that his disease was diagnosed correctly?

2. The following is the distribution function of a discrete random variable X:

x	-3	-1	0	1	2	3	5	8
F(x)	0.10	0.30	0.45	0.50	0.75	0.90	0.95	1.00

- (i) Find the probability distribution of X, (ii) Find $P(X \text{ is even})$ (iii) $P(1 \leq X \leq 8)$, (iv) Find $P(X = -3 | X < 0)$.

3. The kms X in thousands of kms which car owners get with a certain kind of tyre is a random variable having probability density function:

$$f(x) = \begin{cases} \frac{1}{20} e^{-\frac{x}{20}}, & \text{for } x > 0 \\ 0, & \text{for } x \leq 0 \end{cases}$$

Find the probabilities that one of these tyres will last (i) at most 10, 000 kms, (ii) anywhere from 16,000 to 24,000 kms (iii) at least 30, 000 kms.

4. Define moment generating-function. A random variable X is distributed at random between the values 0 and 1 so that its probability density function is: $f(x) = kx^2(1 - x^3)$, where k is a constant. Find the value of k. Using this value of k, find its mean and variance.

5. A car is parked among 10 cars in a row, not at either end. On his return the owner finds that exactly 4 of the 10 places are still occupied. What is the probability that both neighboring places are empty?

P.T.O.

8C1

2

Group BAnswer all the following questions

Marks: 25

1. Find the Fourier series of the periodic function f with period 2π , defined as follows:

$$f(x) = \begin{cases} 0, & \text{for } -\pi < x < 0 \\ x, & \text{for } 0 < x < \pi \end{cases}$$

What is the sum of the series at $x = 0, \pm\pi, 4\pi$.

[6]

2. Find the Fourier series of $f(x) = \begin{cases} x, & -1 < x < 0 \\ x+2, & 0 < x < 1 \end{cases}$ and hence evaluate the value of $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$

[5]

3. Find the half range Sine Series of $f(x) = \begin{cases} \frac{1}{4} - x, & 0 < x < 1/2 \\ x - \frac{3}{4}, & \frac{1}{2} < x < 1 \end{cases}$

[3]

4. Define linear partial differential equation with suitable example. Form a partial differential equation by the elimination of the arbitrary functions ϕ from $\phi(x+y+z, x^2+y^2-z^2) = 0$.

5. Solve: $py + qx = xyz^2(x^2 - y^2)$ $\rightarrow \phi\left(x^2 - y^2, \frac{y^2}{z} + \frac{1}{z(x^2 - y^2)}\right)$

[3]

6. Solve: $(x^2 - y^2 - yz)p + (x^2 - y^2 - zx)q = z(x - y)$.

[4]
