

Data Structures & Algorithm Analysis

(3 hours)

Q. P. Code: 22955

7/12/17
[80 marks]

NOTE: Question No 1 is compulsory

Attempt any three questions from remaining. Assume suitable data if necessary.

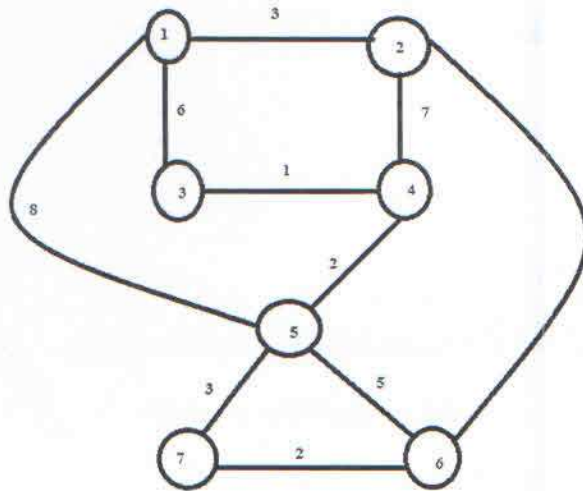
Figure indicate full marks

- Q1. A) Define Data structure and Abstract Data Type? 2
- B) What do you mean by asymptotic notations? Explain with the help of example. 3
- C) What is recursive function? Explain how it works using proper example. 3
- D) Define Stack? List the applications of Stack? 3
- E) List the properties of Red-Black Tree. 3
- F) Define Graph. What are the methods to represent graph. 3
- G) What is Linked List? State the advantages of Linked List. 3
- Q2. A) Write a program to implement Queue using array. 10
- B) Illustrate the deletion operation in a binary heap with examples. 10
- Q3. A) Write an algorithm for Quick sort and Merge sort. 10
- B) Define AVL Tree? Create an AVL tree using the following sequence
(Mention type of rotation for each case.)- 16,27,9,11,36,54,81,63,72 10
- Q4. A) Write a functions to implement insert (), delete () and traverse ()
for singly linked list. 10
- B) Write a program to implement a Stack ADT using Linked List? 10

TURN OVER

Q5. A) Find Minimum spanning tree for following graph using Prim's and Kruskal's Algorithm. Show all the steps.

10



B) From a binary max-heap and min-heap from the following sequence of data-
50,40,35,25,20,27,33

10

Q6. Write Short note (Any Four)

20

- Euclid's Algorithm
- Huffman tree
- Sparse matrix
- Breadth First Search Algorithm
- Circular Queue
- Bubble Sort

(3 Hours)

[Total Marks: 80]

- N.B.: (1) Question No. 1 is compulsory.
(2) Solve any **three** questions out of remaining **five**.
(3) Figures to **right** indicate **full** marks.
(4) Assume suitable data where **necessary**.

Q1. Solve any four

- State ideal and Practical Characteristics of an Op-amp
- Explain Multiplexer and Demultiplexer.
- Convert following decimal number to Binary, Octal, Hexadecimal and Gray code
i) $(128)_{10}$ ii) $(73)_{10}$
- Explain working of LCD.
- Covert D flip flop to S-R flip flop.

20

Q2. a) Implement following using only one 8:1 Multiplexer and few gates.

$$F(A,B,C,D) = \sum m(0,1,3,4,5,8,9,10,12,15)$$

10

b) Explain Fixed Biasing Circuit with its stability factor.

10

Q3. a) Draw and Explain Instrumentation Amplifier using Op-amp.

10

b) Draw circuit diagram and explain the operation of Monostable Multivibrator using IC555.

10

Q4. a) Minimize the following four variable logic function using K-map and design by using basic gates

10

$$f(A,B,C,D) = \sum m(0,1,2,3,4,7,8,9,11,15)$$

b) What are the different methods used to improve CMRR in Differential Amplifier.

Explain one in brief.

10

Q5. a) Design a Mod 12 asynchronous counter using J-K-flip flop

10

b) Design 4-bit binary to gray code conversion

10

Q6 Write short notes on any four

20

- Explain the working of a Non-inverting amplifier using Op-amp
- Explain working of a transistor.
- Write VHDL program for NAND gate.
- Explain working of Current Mirror Circuit.
- Explain block diagram of op-amp.

Sem-III comp f IT - Applied Math
(CBSSGS)
23/11/17

Q.P Code : 23178

[Time: Three Hours]

[Marks: 80]

Please check whether you have got the right question paper

- N.B:
1. Question.No.1 is compulsory.
 2. Attempt any three from the remaining six questions.
 3. Figures to the right indicate full marks.

- Q.1
- a) If the Laplace transform of $\sin^2 3t$
 - b) Prove that $f(z) = \log z$ is analytic
 - c) Obtain Fourier series for $f(x) = x^2 \ln(-2, 2)$
 - d) Find the Z-Transform of $\cos 2k, k \geq 0$
- 20
- Q.2
- a) Prove that $\vec{F} = 2xyz^3\hat{i} + x^2z^3\hat{j} + 3x^2yz^2\hat{k}$ is irrotational.
Find Scalar potential for \vec{F}
 - b) Find the inverse Laplace Transform using Convolution theorem
 $\frac{1}{(s^2+6s+18)^2}$
 - c) Find Fourier Series of $f(x) = \frac{\pi-x}{2} \ln(0, 2\pi)$
- 06
- Hence deduce that $\frac{1}{x} = \frac{1}{2} + \frac{1}{x} + \dots$
- 06
- Q.3
- a) Find the Analytic function $f(z) = u + iv$ if $u + v = \cos x \cosh y - \sin x \sinh y$
 - b) Find Inverse Z transform of $\frac{2z^2 - 10z + 13}{(z-3)^2(z-2)}$ $2 < |z| < 3$
 - c) Solve the Differential Equation $\frac{dy}{dx} + 2\frac{dy}{dx}y = 3te^{-1}, y(0) = 4, y'(0) = 2$ using Laplace Transform
- 06
- Q.4
- a) Find the Orthogonal Trajectory of $x^2 + y^2 - 3xy + 2y = c$
 - b) Using Green's theorem evaluate $\int_C (x^2 - y)dx + (2y^2 + x)dy, C$ is closed path formed by $y = 4, y = x^2$
- 06
- 06

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- c) Express the function $f(x) = \begin{cases} \sin x & ; 0 < x \leq \pi \\ 0 & ; x > \pi \end{cases}$ as Fourier Integral. Hence evaluate

$$\int_0^{\infty} \frac{\cos(\lambda \pi / 2)}{1 - \lambda^2} d\lambda$$

Q.5

- a) Find Inverse Laplace Transform of $\frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6}$ 06
- b) Find the Bilinear Transformation that maps the points $z = 1, -1$ into $w = 1, 0$ 06
- c) Evaluate using Stoke's theorem $\oint_C \vec{F} \cdot d\vec{r}$ where C is the boundary of the circle $x^2 + y^2 + z^2 = 1, z = 0$ and $\vec{F} = yz\vec{i} + zx\vec{j} + xy\vec{k}$ 08

Q.6

- a) Find the Directional derivative of $Q = x^2 + y^2 + z^2$ in the direction of the line $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$ at $(1, 2, 3)$ 06
- b) Find complex form of Fourier series for e^{2x} ($-\pi, \pi$) 06
- c) Find Half Range sine Series for $f(x) = x(2-x)$ $0 < x < 2$ 08
- hence deduce that $\sum_{n=1}^{\infty} \left(\frac{1}{n^2}\right) = \frac{\pi^2}{6}$

309

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Q.3 (c) Solve the differential equation $\frac{dy}{dx} + 2\frac{y}{x} = 3\frac{y^2}{x^2}$

Q.6 (c) deduce that $\sum \frac{1}{n^2} = \frac{\pi^2}{6}$

Q.3 (c) Solve the differential equation $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y = 3te^{-t}$

Q.6 (c) deduce that $\sum \frac{1}{n^6} = \frac{\pi^6}{945}$

SE-Sem III - IT (CBSEGS) 29/11/17

Q.P. Code: 25270

Principles of Analog & Digital Comm.

Time: 3 hours

Marks: 80

N.B: 1. Question No 1 is compulsory

2. Answer any four from the remaining.

1. Answer any four from the following. (20M)

- Explain any one type of wireless communication channel.
- State and prove time shifting property of Fourier transform.
- How the selectivity and sensitivity will be improved in super heterodyne receiver as compare to TRF receiver.
- Explain Inter symbol Interference and how to study ISI.
- Explain Time division multiplexing.

2. (a) Derive the expression for Friss formula. (5M)

(b) State and prove convolution property of Fourier transform. (5M)

(c) Derive the expression for AM and also draw the envelope of the AM for different modulation indexes. (10 M)

3. (a) Explain Ratio detector with neat diagram. (10 M)

(b) Explain generation and degeneration of DSBSC AM. (10 M)

4 (a) Explain Generation and degeneration of PWM. (10 M)

(b) Explain Adaptive delta modulation in detail. (10 M)

5.(a) Explain generation and degeneration of BFSK signal. (10 M)

(b) The binary data 11101101 is transmitted over a baseband channel. Draw the waveform for transmitted data using the following data formats. (10 M)

(i) Unipolar NRZ

(ii) Unipolar RZ

(iii) Bipolar RZ

(iv) Split phase Manchester

(v) Polar Quaternary NRZ for M= 4.

6. Write a short note on any four (20M)

(i) Sampling theorem

(ii) Thermal Noise and Noise Temperature

(iii) BASK generation

(iv) SSB SC AM generation method

(v) Need for modulation.

Mark 80

3 hrs

Note:

Question 1 is compulsory

Solve any three of the remaining.

Draw neat diagrams

Q1. a) Identify and list down file operations

b) Describe ACID Properties

c) Explain Total participation and partial participation with example

d) Explain aggregate Function with example

Q2. a) Explain stored procedure and functions with example

b) Explain Shadow Paging

Q3. a) Identify and list all functional dependencies satisfied by the relation

X	Y	Z
1	4	2
1	5	3
1	6	3
3	2	2

b) Explain ER Model into Relational Model Conversion with example.

Q4. a) Describe view in SQL with example

b) Explain any 2 concurrency protocols in database systems

Q5. a) List various types of constraints in database? Explain any two

b) Explain cost based query optimization

Q6. a) Explain deadlock with wait-for-graph

b) Explain conflict and view serializability with example