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B.Tech. (Electronics & Communication Engineering) (Sem.–4)

SIGNALS AND SYSTEMS

Subject Code : BTEC/403/18

M.Code : 77568

Date of Examination : 17-05-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

(a) Define even and odd signals with the help of suitable example.

(b) Differentiate between continuous and discrete amplitude signals.

(c) What do you mean by differential and difference equations?

(d) Check the system $y(t) = t\,x(t)$ for linearity.

(e) Write down the equations for Fourier Series and Fourier Transform pairs.

(f) Explain the integration property of Fourier Transform.

(g) What is difference between Discrete Fourier Transform (DFT) and Discrete Time Fourier Transform [DTFT]?

(h) Write down any two properties of ROC.

(i) Define mean, median and standard deviation.

(j) Explain system stability with an example.

SECTION-B

2. Determine the fundamental time period of the following signal if periodic

$$x(t) = 4 \sin (o.8\pi t + \frac{\pi}{4} + 3\cos (0.6\pi t + \frac{\pi}{6})$$

3. Classify different types of systems and explain causal/non-causal system in brief.

4. Find the Fourier transform of the following signal

$$x(t) = e^{-a|t|}$$

5. Write a short note on poles-zeros representation of a system.

6. Calculate the convolution of the following signals by using z-transform

$$x_1[n] = \{1,2,1\} \text{ and } x_2[n] = \{1, -2,3,4\}$$

SECTION-C

7. Explain various properties of Fourier Transform in detail.

8. Explain the Unit step response and Impulse response of a system. Also, discuss the relationship between them.

9. Describe the sampling theorem and aliasing with the help of suitable diagrams.

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B.Tech. (Electronics & Communication Engineering) (Sem.–4)

MICROPROCESSORS AND MICROCONTROLLERS

Subject Code : BTEC-402-18

M.Code : 77566

Date of Examination : 13-05-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

(a) List the 16 - bit registers of 8085 microprocessor.

(b) Describe the function of IO/M signal in the 8085 microprocessors.

(c) Define opcode and operand.

(d) Draw the data memory organization in 8051.

(e) MOV R4, R7 is invalid. Why?

(f) State the function of RS1 and RS0 bits in the flag register of 8051.

(g) List the various Interrupt sources in 8051.

(h) Name any two logical instructions in 8051.

(i) What do you mean by interfacing?

(j) Differentiate between SRAM and DRAM.

SECTION-B

2. Describe various addressing modes in 8085 with the help of suitable examples.

3. What is the difference between microprocessor and microcontroller?

4. Explain the following instructions of 8051 with the help of suitable examples:

   INC, CJNE, RL, ADDC, JNC

5. Describe the ADC interfacing with 8051 microcontroller using a suitable diagram.

6. Discuss the handling of various interrupts in 8085.

SECTION-C

7. Describe the pin diagram of 8051 microcontroller in detail.

8. Explain the interfacing of LCD with Microcontroller in detail.

9. **Write a short note on the following :**

   a) Virtual memory

   b) Stack

   c) timers

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B.Tech. (Electronics & Communication Engineering) (Sem.–4)

DATA STRUCTURE AND ALGORITHMS

Subject Code : BTCS/301/18

M.Code : 77567

Date of Examination: 14-05-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a) What is a heap? How elements are inserted in a heap?

b) What do you mean by time space trade off an algorithm?

c) What is merging? Discuss with examples.

d) What is hashing? Explain.

e) Briefly explain various rotations on AVL tree.

f) Discuss tree traversals.

g) What is a stack? Write applications of a stack.

h) Differentiate between array and link list.

i) Define Graph. How it is represented in memory?

j) Compare single and doubly link list.

SECTION-B

2. Discuss representation of binary tree using arrays and linked list.

3. Write algorithm for Insertion sort. Apply the same on the following elements to arrange in decreasing order.

   13 34 23 9 44 18 15

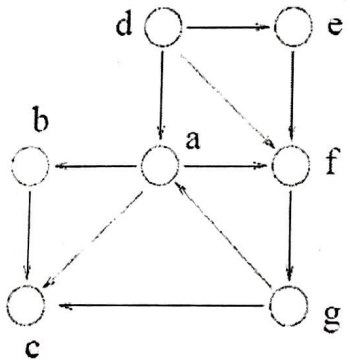
4. Describe the different notations used to describe the asymptotic running time of an algorithm.

5. Explain the binary search algorithm using a suitable example. How binary search differs from linear search?

6. What do you mean by circular queue? How insertion and deletion are performed on circular queue? Discuss with examples.

SECTION-C

7. Write DFS graph traversal algorithm and apply on the following graph.



8. Write an algorithm to insert a new node in the existing sorted single linked list. Discuss your algorithm with the help of a suitable example.

9. What are B-trees? Write their properties. Design a B-tree of order 5 from the following nodes.

   9, 15, 14, 10, 19, 12, 16, 21, 18, 13, 27, 17, 26, 32, 11, 20, 22, 28, 29, 24.

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B.Tech.(Electronics & Communication Engineering) (Sem.–4)

ANALOG CIRCUITS

Subject Code : BTEC/401/18

M.Code : 77565

Date of Examiantion: 07-05-2024

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) What are the limitation of transistors at high-frequency?

b) Compare the common collector configuration to common emitter of BJT amplifier.

c) What is positive voltage clamping?

d) Draw the output and transfer characteristics of B JT.

e) Draw the circuit diagram for the Wien bridge oscillator.

f) State and discuss the oscillation criteria in feedback amplifier.

g) Compare Class-A to Class-B power amplifier.

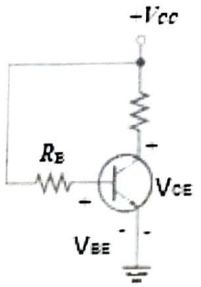
h) What is Avalanche breakdown in PN junction diode?

i) Draw the high frequency model of MOSFET.

j) Draw a push-pull amplifier and discuss working principle.

SECTION-B

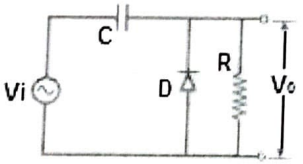
2. For the following circuit, if R_B=1 KΩ, R_c = 10 KΩ, V_{BE} = 0.7 V, Vcc = 5 V common base current gain (α) of the transistor is 0.99. Find out the collector's current.



3. a) The open loop gain (A_{OL}) of a voltage amplifier is 100: The overall gain (A_{CL}) was reduced to 50 when negative feedback was applied. Calculate the fraction of the output voltage feedback,

   b) If this fraction is maintained, calculate the value of the amplifier gain required if the overall stage gain is to be 75.

4. Determine and sketch output voltage, Vo for the network shown in the following figure:



Input voltage Vi is a square pulse varying from -20 V to +20 V. Diode D is the ideal diode. Justify your answer.

5. A phase shift oscillator uses 5 pF capacitors. Find the value of R to produce a frequency of 800 kHz.

6. What is cross-over distortion? How can that be eliminated?

SECTION-C

7. Derive the maximum efficiency of a transformer coupled Class-A power amplifiers. Compare it with the direct coupled class-A power amplifier.

8. Draw the circuit of the hybrid pi model for a transistor in CE configuration. Using approximation, reduce it to calculate short circuit current gain.

9. a) Discuss types of feedback and compare them.

   b) Explain the operation of the Wien bridge oscillator.

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