

Printed Pages - 4

Roll No. : 20330821006

C022535(022)

B. Tech. (Fifth Semester) Examination Nov.-Dec. 2023  
(New Scheme)

(Electronics and Telecommunication Engg. Branch)  
ADVANCED DATA STRUCTURES and  
ALGORITHMS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) from each question is compulsory & carries 4 marks. Answers any two of the remaining (b), (c) and (d) and carries 8 marks.

Unit-1

1. (a) Define Stack. Give some applications of stack.

(b) Write an algorithm to insert nodes at end into a double linked list.

C022535(022)

PTO

- (c) Explain the concept of Circular Linked List.
- (d) Illustrate the steps involved in creation of ADT doubly linked list.

**Unit-II**

- 2. (a) Define the Binary Search Tree.
- (b) Explain Insertion, deletion and display procedure of AVL tree.
- (c) Explain how do you compute the height of B Tree?
- (d) Define B-Tree Generate a B-Tree of order 3, for the following key values 10, 20, 30, 40, 50, 60, 70, 80 and 90.

**Unit-III**

- 3. (a) Write the steps of Prim's spanning tree
- (b) Explain the steps involved in Depth first Traversal Technique
- (c) Illustrate the two classic algorithms for the minimum spanning tree problem

C022535(022)

- (d) Write the difference between dynamic programming with divide and conquer method

**Unit-IV**

- 4. (a) Briefly define the Greedy Algorithms.
- (b) Find upper bound of running time of a linear function  $f(m) = 6m + 3$ .
- (c) Explain the Knapsack problem.
- (d) Illustrate the Marshall's Algorithm for finding transitive closure.

**Unit-V**

- 5. (a) Briefly describe branch and bound algorithm.
- (b) Illustrate backtracking Algorithm for N queen problem.
- (c) Describe the Travelling salesman problem with a suitable example.
- (d) Illustrate the following types of complexity classes :
  - (i) P class

C022535(022)

PTO

- (ii) NP class
- (iii) NP hard
- (iv) NP complete

**C028513(028)**

**B. Tech. (Fifth Semester) Examination,**

**Nov.-Dec. 2023**

**(New Scheme)**

**(Electronics & Telecommunication Engg. Branch)**

**MICRO CONTROLLER & EMBEDDED SYSTEM**

*Time Allowed : Three hours*

*Maximum Marks : 100*

*Minimum Pass Marks : 35*

*Note : Attempt all questions. Part (a) of each question is compulsory and carries 4 marks each. Attempt any two parts from (b), (c) and (d) of each questions & carrying 8 marks each.*

**Unit-I**

**1. (a)** Explain the structure of Internal RAM of 8051 microcontroller.

4

C028513(028)

PTO

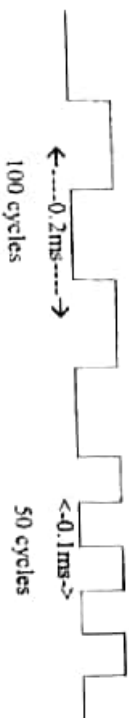
- (b) Draw the architecture of microcontroller 8051 and explain the function of each block. 8
- (c) Assume that register A has packed BCD. Write a program to convert packed BCD to two ASCII numbers and place them into R2 and R6. 8
- (d) Write a program to move the bytes from Internal RAM address from 30H into External RAM Address from 4000 H. (Number of data bytes : 10) 8

**Unit-II**

- 2. (a) Discuss the various timer modes supported by 8051. What is special about the auto reload mode? 4
- (b) Write a program to do the following: 8
  - (i) Receive data serially and send it to P0
  - (ii) Have port P1 read and transmit serially and copy given to P2
  - (iii) Make Timer 0 to generate Square Wave of frequency 15 kHz on P0.1. Use 8051 microcontroller and baud rate 4800. (XTAL = 11.0592 MHz)

C028513(028)

- (c) Write an assembly language program to count 1000 pulses externally connected to P3.4 of 8051 and after receiving all 1000 pulses, display 'OK' message on display connected to the port P2. 8
- (d) Write an assembly language program to generate given square wave using timer programming on pin P1.1 of 8051 controller. XTAL = 12 MHz. 8



**Unit-III**

- 3. (a) Explain the function of SCON and SBUF Registers. 4
- (b) Design an interfacing circuit to Interface 8051 microcontroller with serial port of PC using MAX-232. State the advantages of MAX-232 and MAX-233. 8
- (c) Explain the following standards: 8
  - RS 422, GPIB, RS 232
- (d) Write a program to send the message serially 'CSVТУ' with Baud Rate 9600 (XTAL 12 MHz). 8

C028513(028)

PTO

## Unit-IV

4. (a) Interface 4x4 Matrix Keyboard with 8051 microcontroller. 4
- (b) A robotic arm consist of two stepper motors M1 and M2 at two joints. Each motor has step angle has 2 degree. Write an ALP to rotate M1 by 64 degree clockwise and M2 by 24 degree anticlockwise. Use 4 step sequence. Connect motor M1 with port P1 and M2 with port P2. 8
- (c) Interface ADC 0804 with microcontroller and write Assembly Language Program to read 100 data bytes from ADC and store into External RAM (3000 H onwards). 8
- (d) Interface the following memory chips with 8031 microcontroller : 8
- Program ROM 32 K × 8, Data RAM 16 K × 8, Data ROM 16 K × 8

## Unit-V

5. (a) Give the application of embedded system in consumer electronics with suitable diagram. 4

- (b) What do you mean embedded system? Draw the block diagram of embedded system and explain hardware and software requirement for designing of embedded system. 8
- (c) Explain designing parameters of an embedded systems and its significances. 8
- (d) Explain characteristics of Real Time Embedded System 8

**C028512(028)**

**B. Tech. (Fifth Semester) Examination,**

**Nov.-Dec. 2023**

**(New Scheme)**

**(Elex. & Tele. Engg. Branch)**

**DESIGN OF ELECTRONICS CIRCUIT**

**Time Allowed : Three hours**

**Maximum Marks : 100**

**Minimum Pass Marks : 35**

*Note : Attempt all questions. Part (a) of each question is compulsory and carries 4 marks. Attempt any two parts from (b), (c) and (d) which carry 8 marks each.*

**Unit-1**

1. (a) Define Input Offset Voltage and Input Offset Current. 4

**C028512(028)**

**PTO**

- (b) Derive the expression for voltage gain of BIT differential amplifier using 'r' parameter analysis. 8
- (c) For voltage-series feedback amplifier, derive expression for Input Resistance and Output Resistance with feedback. 8
- (d) Draw and explain block-diagram of operational amplifier. 8

### Unit-II

2. (a) Explain voltage follower using OP-AMP. 4
- (b) Explain the operation of Schmitt trigger circuit with diagram and waveforms. 8
- (c) Explain the operation of integrator circuit using op-amp, and also give its frequency response. 8
- (d) Design the op-amp circuit which can give output as

$$V_0 = 2V_1 - 3V_2 + 4V_3 - 5V_4$$

### Unit-III

C028512(028)

3. (a) What is the order of Butterworth low-pass filter. 4
- (b) What do you mean by RC-CR transformation. 8
- (c) Derive the transfer function of sallen-key circuits. 8
- (d) Explain four op-amp Biquad circuit. 8

### Unit-IV

4. (a) Define lock range and capture range w.r.t. PLL. 4
- (b) Explain the internal structure of IC 723. 8
- (c) Write any two applications of 555 Timer IC. 8
- (d) Explain the operation of PLL with proper block diagram. 8

### Unit-V

5. (a) Define the terms resolution and linearity of D/A converter. 4
- (b) Explain the operation of Dual slope A/D converter and derive an expression for digital output. 8

C028512(028)

PTO



- (c) Explain the working of R-2R ladder D/A converter:  
Also determine the analog output of a 3-bit R-2R  
ladder D/A converter for all possible inputs. 8
- (d) Explain the principle of working of N-bit  
successive approximation type A/D converter and  
compare it with flash A/D converter. 8

**C028514(028)**

**B. Tech. (Fifth Semester) Examination**

Nov.-Dec. 23

(New Scheme)

(ET & T Engg. Branch)

(BT 3028)

**CONTROL SYSTEM**

*Time Allowed : Three hours*

*Maximum Marks : 100*

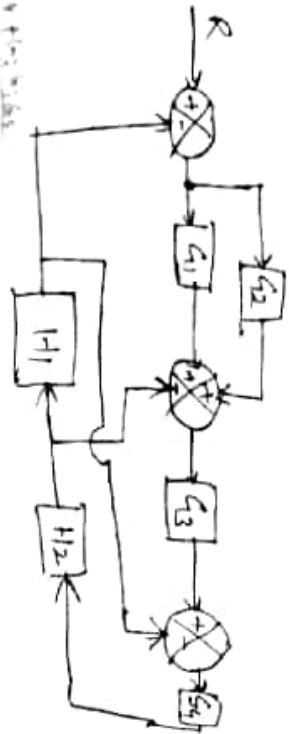
*Minimum Pass Marks : 35*

*Note : Attempt all questions. Part (a) of each question is compulsory and carries 4 marks each. Attempt any two parts from (b), (c) and (d) of each questions & carrying 8 marks each.*

1. (a) What is SFG? Give rules for Drawing SFG.
- (b) Obtain the overall transfer function for a system represented by the block diagram given below :

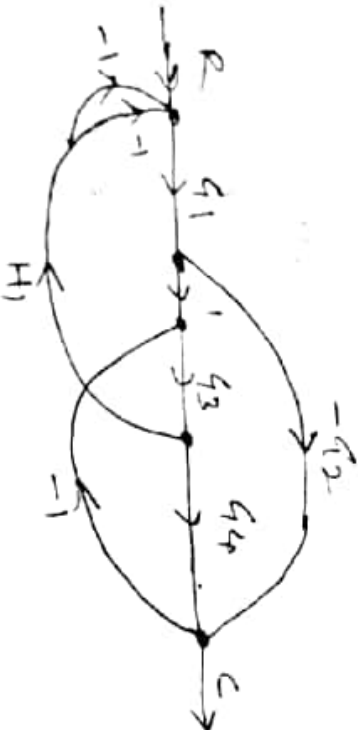
C028514(028)

PTO



For long time response, the system is dominated by the poles of the denominator.

(c) Determine the overall transfer function from the given SFG



(d) What is control system, explain? Different between open loop and closed loop control system with suitable example

2. (a) Define the following terms w.r to time response :
  - (i) Settling time ( $t_s$ )

- (ii) Rise time ( $t_r$ )
  - (iii) Maximum overshoot ( $M_p$ )
  - (iv) Steady state error ( $e_{ss}$ )
- (b) A unity feedback control system has forward path transfer function given by

$$G(s) = \frac{s+2}{s(s+1)}$$

Determine :

- (i) The expression for unit step response
- (ii) The rise time and
- (iii) The maximum overshoot

(c) Derive an expression for :

- (i) rise time ( $t_r$ ) &
- (ii) maximum overshoot ( $M_p$ ) for second order control system

(d) Determine  $e_{ss}$  for type-0, type -1 and type-2 systems

3. (a) Define the following terms w.r to stability :

- (i) Stable systems
- (ii) Unstable systems

- (iii) Limitedly stable systems
- (iv) Relatively stable systems

(b) Determine the stability of a closed loop control system whose characteristic equation is :

$$S^4 + S^3 + 2S^2 + 11S + 10 = 0$$

(c) Explain root locus plot and its significance with its Rules of plotting.

(d) A unity feedback control system has an open loop transfer function :

$$G(S) = \frac{K}{S(S+4)}$$

Draw the root locus and determine the value of  $K$ , if the damping ratio  $\zeta$  is to be 0.707.

4. (a) Explain the correlation between transient response and frequency response.

(b) Explain how GM & PM can be obtained from polar plots with suitable polar plot diagram.

(c) The open loop transfer function of a system is given by

$$G(S)H(S) = \frac{30}{S(1+0.5S)(1+0.08S)}$$

Determine :

- (i) GM,
- (ii) PM and
- (iii) Closed-loop stability using bode plots.

(d) Explain in brief minimum phase, nonminimum phase and all pass transfer function.

5. (a) What is Nyquist plot. Explain? Also explain application of Nyquist criterion to determine stability of a closed loop control system.

(b) Examine the closed loop stability of a control system whose open-loop transfer function is given below, using Nyquist criterion :

$$G(S)H(S) = \frac{K}{S(ST+1)}$$

(c) Explain the following terms w.r. to state space analysis

- (i) state variables
- (ii) state

(iii) state vector

(iv) state space

Also brief about significance of state-space approach.

(d) Explain :

(i) Controllability

(ii) Observability

w.r.to. state of a system in details.

**C028511(028)**

**B. Tech. (Fifth Semester) Examination,**

**Nov-Dec. 2023**

**(New Scheme)**

**(Electronics & Telecommunication Engineering Branch)**

**DIGITAL COMMUNICATION**

*Time Allowed : Three hours*

*Maximum Marks : 100*

*Minimum Pass Marks : 35*

*Note : Attempt all question. Part (a) carries 4 marks and is compulsory. Attempt two parts from part (b), (c) and (d) carrying 8 marks each.*

**Unit-I**

- 1. (a)** What are the advantages of digital communication over analog communication? 4

**C028511(028)**

**PTO**

12) Explain digital communication system with the help of block diagram 8

13) Describe sampling, sampling rate and Nyquist rate. 8

14) Describe the Flat-top sampling with diagram. 8

**Unit-II**

15) (a) Describe Quantization in Digital communication. 4

(b) Explain DPCM transmitter and receiver. 8

(c) Explain Delta modulation with block diagram. 8

(d) Describe the working of an ADM transmitter with neat block diagram. 8

**Unit-III**

16) (a) What is Line coding and its properties? 4

(b) Describe unipolar, polar and Bipolar signalling in line coding. 8

(c) Explain Inter-Symbol Interference and how ISI analyse with help of eye diagram. 8

(d) Encode binary sequence 1100110 using unipolar-

17) RZ, polar-NRZ, AMI and Manchester line coding techniques. 8

**Unit-IV**

18) (a) What is BASK? 4

(b) Explain Generation and detection of BFSK. 8

(c) Explain Generation of BPSK. 8

(d) Explain the working principle of a QPSK transmitter. 8

**Unit-V**

19) (a) What is Pseudo Noise Sequence? 4

(b) Explain with the help of block diagram, spread spectrum modulation system. 8

(c) Explain the FH techniques with the frequency spectrum. 8

(d) Compare DS-SS and FH-SS spread spectrum. 8