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17EC52

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Digital Signal Processing

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain frequency domain sampling and reconstruction of discrete time signals. **(10 Marks)**

b. Compute circular convolution of two sequences, $x_1(n) = \{1, 2, 3, 4\}$ and $x_2(n) = \{1, -1, 3, 2\}$, using DFT-IDFT method. **(06 Marks)**

c. Compute 16-point DFT of the sequence $x(n) = 8,\ 0 \le n \le 15$. **(04 Marks)**

OR

2 a. Compute N-point DFT of the sequence $x(n) = \sin\left(\frac{2\pi K_0 \eta}{N}\right),\ 0 \le n \le N\text{-}1$. **(08 Marks)**

b. Compute DFT of the sequence $x(n) = \sin\left(\frac{3\pi n}{4}\right) + \cos\left(\frac{\pi n}{4}\right),\ 0 \le n \le 3$, using linearity property of DFT. **(06 Marks)**

c. Derive the relationship between DFT and DTFS coefficients. **(06 Marks)**

Module-2

3 a. The 4-point DFT of a length-4 sequence x(n) is given by $X(k) = \{8, -1+j, -2, -1-j\}$. Obtain y(k), the 4-point DFT of the sequence $y(n) = e^{\frac{-j\pi n}{2}}\ x((n-1))_4$. **(05 Marks)**

b. Given a sequence $x(n) = \{1, -1, 2, -2\}$, determine DFT{DFT{DFT{DFT{x(n)}}}}, using complex conjugate properties of DFT. **(07 Marks)**

c. Determine the filter output y(n), whose impulse response $h(n) = \{1, -1, 2\}$ and input $x(n) = \{1, 4, 3, 2, 1, -1, 2, 1, 5, 3, 2, 4\}$, using overlap-save method. Consider 8-point circular convolution approach. **(08 Marks)**

OR

4 a. The 4-point DFT of a sequence x(n) is given by $x(k) = \{16, -4+j4, -4, -4-j4\}$. Determine the energy of x(n) using Parseval's theorem. **(04 Marks)**

b. The IDFT {x(k)} is given by $x(n) = \{1, 2, 3, 4\}$. Determine IDFT of the following sequences: i) x(4-k) ii) j^k x(k) iii) Re{x(k)} iv) Im {x(k)} **(10 Marks)**

c. Discuss the need of FFT algorithms for computation of DFT. **(06 Marks)**

Module-3

5 a. Compute 8-point DFT of the sequence $x(n) = \{0.707, 0, -0.707, -1, -0.707, 0, 0.707, 1\}$ using DIT-FFT algorithm. **(08 Marks)**

b. Starting from the expression of Z-transform of an N-point sequence x(n), derive chirp z-transform algorithm. **(08 Marks)**

c. Mention the similarities and differences between DIT-FFT and DIF-FFT algorithm. **(04 Marks)**

OR

6 a. Develop the radix-2 DIF-FFT algorithm for N = 8 and draw the signal flow graph. **(10 Marks)**

b. Given x(n) = {1, 2, 3, -1}, obtain x(1) using Goertzel algorithm and also explain Goertzel Algorithm. **(10 Marks)**

Module-4

7 a. Obtain a parallel realization for the transfer function H(z) given below:

$$H(z)=\frac{8z^3-4z^2+11z-2}{\left(z-\frac{1}{4}\right)\left(z^2-z+\frac{1}{2}\right)}$$ **(06 Marks)**

b. Derive an expression for order and cut-off frequency of low-pass Butterworth filter. **(08 Marks)**

c. Transform the analog filter,

$$H_a(s)=\frac{s+1}{s^2+5s+6}$$

into digital filter, H(z) using impulse invariant transformation. Consider T = 0.1 sec. **(06 Marks)**

OR

8 a. Design a digital filter H(z) that when used in A/D – H(z) – D/A structure gives an equivalent analog filter with the following specifications: Passband attenuation ≤ 3.01dB, Passband edge frequency = 500Hz, Stopband attenuation ≥15dB, Stopband edge frequency = 750Hz and sampling rate = 2kHz. The filter is to be designed by performing bilinear transformation on Butterworth analog filter. **(12 Marks)**

b. A linear time-invariant digital IIR filter is specified by the transfer function,

$$H(z)=\frac{(z^2-1)(z^2-2z)}{\left(z^2+\frac{1}{16}\right)\left(z^2-z+\frac{1}{2}\right)}$$

Obtain direct form-I and direct form-II realizations of the system. **(08 Marks)**

Module-5

9 a. A filter is to be designed with the following desired frequency response:

$$H_d(w)=\begin{cases}0, & |w|<\pi/4\\ e^{-j2w}, & \pi/4<|w|<\pi\end{cases}$$

Find the frequency response of the FIR filter designed using rectangular window. **(10 Marks)**

b. Given the FIR filter with the following difference equation:
y(n) = x(n) + 3.1x(n-1) + 5.5x(n-2) + 4.2x(n-3) + 2.3x(n-4)
Sketch the lattice realization of the filter. **(10 Marks)**

OR

10 a. The frequency response of an ideal band pass filter is given by;

$$H_d(w)=\begin{cases}e^{-j3w}, & 1<|w|<2\\ 0, & |w|<1 \text{ or } 2<|w|<\pi\end{cases}$$

Design an FIR bandpass filter which approximates the above filter, using Hamming window. **(10 Marks)**

b. Realize the linear-phase FIR filter having the following impulse response:

$$h(n)=\delta(n)+\frac{1}{4}\delta(n-1)-\frac{1}{8}\delta(n-2)+\frac{1}{4}\delta(n-3)+\delta(n-4)$$ **(05 Marks)**

c. Realize an FIR filter with impulse response h(n) given by, $h(n)=\left(\frac{1}{2}\right)^n[u(n)-u(n-4)]$, using direct form-I. **(05 Marks)**

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17EC53

Fifth Semester B.E. Degree Examination, Jan./Feb.2021
Verilog HDL

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain the typical design flow for designing VLSI IC circuits with neat block diagram. **(10 Marks)**

b. Explain the Top down and Bottom up design methodology with an suitable example. **(10 Marks)**

OR

2 a. Explain the following components in a simulation (i) Design block (ii) Stimulus block. **(06 Marks)**

b. Make use of T-Flip Flop build a 4-bit Ripple carry counter and explain the design hierarchy. **(10 Marks)**

c. Explain the Trends in HDLs. **(04 Marks)**

Module-2

3 a. List all the lexical convention used is verilog and explain with examples. **(08 Marks)**

b. Explain the two methods of connecting ports to external signal with an example. **(08 Marks)**

c. Explain the compiler directives in verilog HDL. **(04 Marks)**

OR

4 a. What are the data types in verilog? Explain the following data types with suitable example:
(i) Nets (ii) Parameter (iii) Array (iv) Memory **(08 Marks)**

b. Write the Verilog code for SR Latch using gate level mode and also write stimulus code. **(06 Marks)**

c. With neat block diagram, explain the components of verilog module. **(06 Marks)**

Module-3

5 a. Explain the following gate primitives used in verilog HDL with truth table:
(i) Bufif (ii) notif **(04 Marks)**

b. Construct a 4-bit Ripple carry adder and develop the verilog code using gate level model, also write stimulus code. **(08 Marks)**

c. What should be the output of the following: $A = 4'd_{10}$, $B = 4'd_{13}$, $C = 4'b_{|OX|}$.

(i) A ^ B (ii) |B (iii) B >> 2 (iv) A >>>2 (v) $Y = \{3\{A\},2\{B\}\}$

(vi) $Y = \{A[2:0], B[3:1]\}$ (vii) A & C (viii) A || B **(08 Marks)**

OR

6 a. Construct a 4-bit carry look ahead adder and develop the verilog code using data flow description. **(08 Marks)**

b. Write the verilog code for 4 to 1 multiplexer using conditional operator. **(06 Marks)**

c. What are Rise, Fall and Turnoff delays? How they are specified in verilog? **(06 Marks)**

Module-4

7 a. Explain the blocking and non blocking assignment statements with suitable example. **(06 Marks)**

b. What are the different delay based timing controls are associated with verilog HDL and explain with relevant example. **(08 Marks)**

c. Using case statement, design an 8-function ALU that takes 4-bit inputs 'a' and b and a 3-bit input signal select 1, and gives a 5-bit output 'out'. The ALU implements the following functions based on a 3 bit input signal select. Ignore any overflow or underflow bits.

Select signal	$3'd_0$	$3'd_1$	$3'd_2$	$3'd_3$	$3'd_4$	$3'd_5$	$3'd_6$	$3'd_7$
Function (out)	a	a + b	a – b	a/b	a % b	a<<1	a>>1	a>b

(06 Marks)

OR

8 a. Explain the sequential and parallel blocks with suitable example. **(08 Marks)**

b. Write a verilog code for 4 to 2 priority encoder using casex. **(04 Marks)**

c. List the loop statements in verilog. Explain the following loops with examples:
(i) For loop (ii) Repeat **(08 Marks)**

Module-5

9 a. Compare VHDL and Verilog HDL. **(04 Marks)**

b. Explain the synthesis process with a neat block diagram. **(08 Marks)**

c. Explain the relationship between a design entity and its entity declaration and architecture body in VHDL? **(08 Marks)**

OR

10 a. Explain the following Data Objects in VHDL with examples :
(i) Constant (ii) Signals (iii) Variables. **(09 Marks)**

b. What are the data types in VHDL? Explain the Scalar data types with examples. **(07 Marks)**

c. Write the VHDL code for a 4-bit wide register ensure that the input DATA [3 : 0] is stored only when the 'CLOCK' signal is detected on its rising edge. **(04 Marks)**

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17EC54

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Information Theory and Coding

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Obtain an expression for average information content of long independent messages. **(05 Marks)**

b. A block and white TV picture consists of 256 lines of picture information. Assume that each line consists of 526 picture elements and that each can have 255 brightness levels. Picture is repeated at the rate of 30 frames/sec. Calculate the average rate of information conveyed by TV picture. **(05 Marks)**

c. For the Markov model shown in Fig.Q1(c). Find :
i) State probabilities
ii) State and source entropy
iii) G_1, G_2 and show that $G_1 > G_2 > H$.

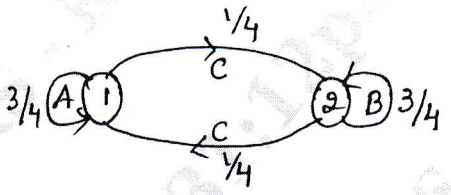

Fig.1(c) **(10 Marks)**

OR

2 a. A source emits one of four probable messages M_1, M_2, M_3 and M_4 with probabilities of 7/16, 5/16, 1/8 and 1/8 respectively. Find the entropy of the source. List all the elements of second order extension of this source. Hence show that $H(s^2) = 2H(s)$. **(06 Marks)**

b. Define the following :
i) Unit of information
ii) Entropy
iii) Self information
iv) Information rate. **(04 Marks)**

c. For the Markov model shown in Fig.Q2(c). Find :
i) State probabilities
ii) State entropy
iii) Source entropy
iv) Rate of information if r_s = 1 sym/sec.

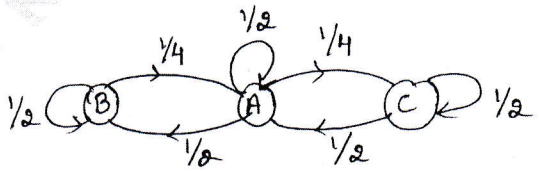

Fig.Q2(c) **(10 Marks)**

Module-2

3 a. Using Shannon's binary encoding algorithm, find all the codewords for the symbols, P = {0.55, 0.15, 0.15, 0.1, 0.05}. Also find its efficiency and redundancy. **(10 Marks)**

b. Consider the source, S = {A, B, C, D, E, F} with P = {0.1, 0.15, 0.25, 0.35, 0.08, 0.07}. Find the codewords for the source using Shannon – Fano algorithm. Also find the source efficiency and redundancy. **(05 Marks)**

c. Encode the following information using LZ algorithm : "THIS_IS_HIS_HIT". **(05 Marks)**

OR

4 a. An information source has a sequence of independent symbols with probabilities as follows :
S = {A, B, C, D, E, F, G, H}
P = {0.4, 0.25, 0.12, 0.08, 0.05, 0.05, 0.03, 0.02}.
Construct binary and ternary code using Huffman encoding procedure and find its efficiency redundancy. **(10 Marks)**

b. Explain prefix coding and Kraft – McMillan inequality with an example. Also draw the decision diagram for the prefix codes. **(05 Marks)**

c. Consider a discrete memoryless source with S = {X, Y, Z}, probabilities P = {0.5, 0.3, 0.2}. Find the code word for the message "YYZXZY" using arithmetic coding. **(05 Marks)**

Module-3

5 a. For the joint probability matrix given find :
i) H(X) ii) H(Y) iii) H(X, Y) iv) H(Y/X) v) H(X/Y) vi) I(X, Y).

$$JPM = P(X,Y) = \begin{array}{c} \\ x_1 \\ x_2 \\ x_3 \\ x_4 \end{array} \begin{array}{c} \begin{array}{cccc} y_1 & y_2 & y_3 & y_4 \end{array} \\ \begin{bmatrix} 0.05 & 0 & 0.20 & 0.05 \\ 0 & 0.10 & 0.10 & 0 \\ 0 & 0 & 0.20 & 0.10 \\ 0.05 & 0.05 & 0 & 0.10 \end{bmatrix} \end{array}.$$

(10 Marks)

b. Prove that mutual information is always positive. **(05 Marks)**

c. Find the channel capacity of the channel shown in Fig.Q5(c), by Muroga's method given $p(x_1) = 0.6$, $p(x_2) = 0.4$.

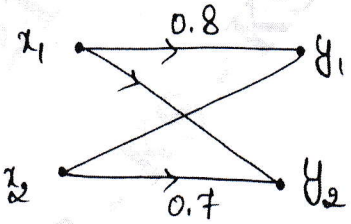

Fig.Q5(c) **(05 Marks)**

OR

6 a. Obtain an expression for the channel capacity of binary symmetric channel. **(05 Marks)**

b. For a channel matrix $p(Y/X) = \begin{bmatrix} 3/4 & 1/4 \\ 1/4 & 3/4 \end{bmatrix}$, given $p(x_1) = 2/3$, $p(x_2) = 1/3$, $r_s = 1000$ sym/sec. Find H(X), H(Y), H(X, Y), H(Y/X), H(X/Y), I(X, Y) and channel capacity, information rate. **(10 Marks)**

c. Define mutual information and prove that H(X/Y) = P·H(X) for a binary erasure channel. **(05 Marks)**

Module-4

7 a. For a systematic (7, 4) linear block code, parity matrix is given by,

$$P = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}.$$

i) Find all the possible valid code words
ii) Draw the encoding and syndrome calculation circuit.
iii) A single error has occurred in each of the following code words given, $R_A = [0\ 1\ 1\ 1\ 1\ 1\ 0]$, $R_B = [1\ 0\ 1\ 1\ 1\ 0\ 0]$. Detect and correct the errors. **(10 Marks)**

b. The generator polynomial of a (7, 4) cyclic code is $g(x) = 1 + x + x^3$, find the codewords for message vectors (1010), (1110), (1100) and (1111) using systematic and non-systematic form. **(10 Marks)**

OR

8 a. A (6, 3) linear block code has the following check bits $C_4 = d_1 + d_2$, $C_5 = d_1 + d_3$ and $C_6 = d_2 + d_3$.
i) Write the G and H matrices
ii) Draw the encoding and syndrome calculation circuits.
iii) Construct the standard array and through example illustrate decoding operation. **(10 Marks)**

b. Consider (15, 5) linear cyclic code with generator polynomial,
$g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 x^{10}$
i) Draw the encoder and syndrome circuit
ii) Find the code vector for the message polynomial $d(x) = 1 + x^2 + x^4$ by listing the states of the shift registers.
iii) Is $V(x) = 1 + x^4 + x^6 + x^8 + x^{14}$ a code polynomial? If not find the syndrome. **(10 Marks)**

Module-5

9 a. Consider a(3, 1, 2) convolution code with impulse responses $g^{(1)} = (110)$, $g^{(2)} = (101)$, $g^{(3)} = (111)$.
i) Draw the encoder diagram
ii) Find the generator matrix
iii) Find the code vector for the information sequence (11101) using time domain and transform domain approach. **(10 Marks)**

b. Write short notes on :
i) BCH code
ii) Golay codes. **(10 Marks)**

OR

10 a. Consider the convolutional encoder shown in Fig.Q10(a).
i) Draw the state table, state transition table and state diagram
ii) Using the code tree, find the encoded sequence for the message vector (10111)
iii) Verify the output sequence so obtained using transform domain approach.

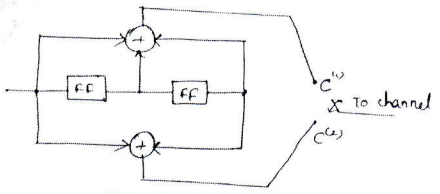

Fig.Q10(a)

b. Explain viterbi decoding algorithm with an example. **(10 Marks)**

(10 Marks)

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17EC553

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Operating System

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define Operating System. Discuss various resource allocation techniques. **(10 Marks)**
b. Explain different computational structures of Operating System with examples. **(10 Marks)**

OR

2 a. Explain different classes of Operating Systems. **(10 Marks)**
b. Discuss using timing chart :
i) When CPU bound program has higher priority.
ii) When I/O bound program has higher priority. **(10 Marks)**

Module-2

3 a. Define a Process and discuss OS view of a process. **(08 Marks)**
b. Discuss various states transition for a process. **(06 Marks)**
c. Explain the various field of a PCB. **(06 Marks)**

OR

4 a. Explain Long term. Medium and Short term scheduling. **(10 Marks)**
b. Discuss two representative approaches to implementation of threads. **(10 Marks)**

Module-3

5 a. Compare and contrast Contiguous and non Contiguous memory allocation techniques. **(08 Marks)**
b. Write short notes on : i) Paging ii) Segmentation. **(12 Marks)**

OR

6 a. Explain Demand paging preliminaries. **(10 Marks)**
b. With an example, discuss FIFO , LRU page replacement policy. **(10 Marks)**

Module-4

7 a. Explain the interface between File system and IOCS. **(10 Marks)**
b. Compare and contrast Sequential file organization and Direct file organization. **(10 Marks)**

OR

8 a. Explain Directory structures. **(10 Marks)**
b. Discuss briefly File system actions at OPEN and CLOSE. **(10 Marks)**

Module-5

9 a. Define Message passing and Explain how it could be implemented. **(10 Marks)**
b. Discuss the following with respect to main box : i) Features ii) Advantages iii) Air line reservations Server using 3 mail boxes. **(10 Marks)**

OR

10 a. Define Deadlock. Discuss Resource request and allocation graph and Wait – for – graph for a system containing resource class and processes. **(10 Marks)**
b. Explain Deadlock Detection Algorithm. **(10 Marks)**

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17EC562

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Object Oriented Programming using C++

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-1

1 a. Write the Difference between structures and unions. **(05 Marks)**

b. Write C++ program to perform the addition of even number and odd number for the range 1 to N, the N value is accepted from keyboard. **(10 Marks)**

c. Define reference variable. Write a program to illustrate the reference variable. **(05 Marks)**

OR

2 a. Write C++ program to enter four number from keyboard and perform the average of four numbers. **(05 Marks)**

b. Write the syntax for the switch and if-else control statement. Write C++ program to illustrate the while loop. **(10 Marks)**

c. Define Dynamic Memory allocation. Explain 'new' and 'delete' operator with C++ program. **(05 Marks)**

Module-2

3 a. Write C++ program to Swapping (Exchange) of two numbers by using call by reference with pointer as a argument. **(10 Marks)**

b. Write C++ program to find the square of number by using inline function. **(05 Marks)**

c. Write C++ program to find the factorial of number by using Recursion function. **(05 Marks)**

OR

4 a. Write C++ program to illustrate Arrays of Objects, the name of class is employee which contain data member such name and age. **(10 Marks)**

b. Write C++ program to perform the Addition of Data objects of two different classes by using friend function. **(10 Marks)**

Module-3

5 a. Define Constructor. Write C++ program to illustrate the copy constructor. **(06 Marks)**

b. Write the difference between constructor and destructor. **(04 Marks)**

c. Write C++ program to calculate the area of Triangle, the program contain two data members such as height and base, use constructor to initialize the data members and display the result by using display ( ) member function. **(10 Marks)**

OR

6 a. Write C++ program to illustrate the unary minus (-) operator overloading and write C++ program for binary plus (+) operator overloading. **(10 Marks)**

b. Define destructor. Write C++ program to illustrate the destructor. **(10 Marks)**

Module-4

7 a. Define Inheritance. Explain single Inheritance with public visibility mode program. **(10 Marks)**

b. Explain Multiple Inheritances. Write C++ program to illustrate multiple inheritance. **(10 Marks)**

OR

8 a. Write C++ program to illustrate this pointer, the class name is person and their respective data member such as "name" and "age". **(10 Marks)**

b. What is virtual function? Mention the rules of virtual function. Write a program to illustrate virtual function. **(10 Marks)**

Module-5

9 a. Write C++ program to illustrate the get( ) and put( ) unformatted I/O operation function. **(05 Marks)**

b. Write C++ program for Reading String by using getline( ) unformatted I/O operation function. **(05 Marks)**

c. What is C++ stream? Explain stream classes for consol I/O operations. **(10 Marks)**

OR

10 a. What are the input and output streams? Write a program to illustrate writing and reading of data from single file. **(10 Marks)**

b. Explain about EOF (End Of File). **(04 Marks)**

c. Explain the classes for file stream operations. **(06 Marks)**

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CBCS SCHEME

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17EC563

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
8051 Microcontroller

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-1

1 a. Differentiate between Microprocessor and Microcontroller with respect to their architecture and instructions. **(06 Marks)**

b. Explain the Oscillator circuit and machine cycle of 8051 Microcontroller. **(06 Marks)**

c. Explain the Internal Memory Organization in 8051. **(08 Marks)**

OR

2 a. With a neat block diagram, explain the architecture of 8051 Microcontroller. **(10 Marks)**

b. Write the circuit diagram for Part – 1. Explain the input, output operations in 8051 using Part – 1. **(10 Marks)**

Module-2

3 a. Explain the different addressing mode of 8051. Give an example for each one of them. **(10 Marks)**

b. Explain the following instructions with examples :
i) SJMP reL ii) DA A iii) CJNE destination , source , reL
iv) SWAP A v) DJNZ Rn , ReL. **(10 Marks)**

OR

4 a. Explain Data transfer instructions with examples. **(10 Marks)**

b. Explain byte and bit level logical AND Operation with example. **(05 Marks)**

c. Write an ALP to verify whether the data present in Accumulator is odd/even if odd store 00H in Ro register. Otherwise store FFH in Ro register. **(05 Marks)**

Module-3

5 a. Write an ALP to find the smallest number of an array of N – 8 bit unsigned numbers. **(08 Marks)**

b. Write an ALP to arrange the Numbers in Ascending order. **(08 Marks)**

c. Write an ALP to rotate the contents of A to the left by one position with carry. **(04 Marks)**

OR

6 a. Write a program to move block of data from Internal data memory to External data memory location. **(10 Marks)**

b. Write a program to find the factorial of a number. **(05 Marks)**

c. Write a program to count the numbers of 1's and 0's in 8 – bit data. **(05 Marks)**

Module-4

7 a. What is the difference between timer and counter? **(02 Marks)**

b. Explain the functions of each bit in the TMOD and TCON register. **(08 Marks)**

c. Write an ALP to generate square wave on Pin P1.5 of 500Hz (approximately) with using timer 0 , mode 1. Assume that crystal frequency of 8051 is 11.0592 MHz. **(10 Marks)**

OR

8 a. Explain Full duplex, Half duplex and Simplex serial data transfer. (06 Marks)
b. Write the steps required for programming 8051 to transfer data serially. (06 Marks)
c. Write an 8051 C program to transfer the message "YES" serially at 9600 baud , 8 – bit data 1 – stop bit do this continuously. (08 Marks)

Module-5

9 a. Explain the function of each bit in the (IE) Interrupt Enable register. (08 Marks)
b. Define Interrupt. List the various interrupts of the 8051. (08 Marks)
c. Bring out the difference between Interrupt and Pooling. (04 Marks)

OR

10 a. A switch is connected to Pin P2.5 and a steeper motor to Port 1. Write a program to monitor the status as of switching and
if Sw = 0 , Stepper motor rotate clockwise,
if Sw = 1 , Stepper motor rotate Anti clockwise continuously. (10 Marks)
b. Discuss interfacing of ADC 0804 with 8051 using timing diagram for ADC. (10 Marks)

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