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328552(28)

B. E. (Fifth Semester) Examination, April-May/ Nov.-Dec. 2020

(New Scheme)

(Et & T Engg. Branch)

DATA STRUCTURE & PROGRAMMING with C++

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

***Note** : Attempt all questions. Part (a) of each question is compulsory. Attempt any **two** from (b), (c) and (d) of each question.*

Unit-I

1. (a) What are the benefits of object oriented programming language. 2

(b) Define constructor and destructor. Explain different types of constructor with sample code. 7

(c) What do you mean by friend function? Write a program to demonstrate use of friend function. 7

(d) Explain array of objects with an example. 7

Unit-II

2. (a) Differentiate between private & protected data member. 2

(b) What is Inheritance? What are the different types of inheritance? 7

(c) Explain binary operator over loading using friends function with suitable program. 7

(d) Write a program to find the area of rectangle and circle using the concept of function overloading. 7

Unit-III

3. (a) What do you mean by Polymorphism? 2

(b) What is this pointer? Explain with suitable example. 7

(c) What is Virtual Function? Why do we need virtual function? Explain with an example. 7

(d) Explain pure virtual function and its usage with example. 7

Unit-IV

4. (a) Define the term Data structure. List the various types of data structure. 2

(b) Define Sorting. Explain selection sort algorithm with the help of a suitable example. 7

(c) Explain the concept of linear search. How can we implement it using array? 7

(d) Write short notes on the following : 7

(i) Linked list

(ii) Queue

Unit-V

5. (a) What are the file stream classes? 2

(b) Explain the following functions :

seekp( ), seekg( ), tellp( ), tellg( ) 7

(c) What do you mean by Exception handling? Write a program to declare try, throw & catch keywords. 7

(d) Write short notes on the following :

(i) Template 3.5

(ii) Command line Arguments 3.5

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B. E. (Fifth Semester) Examination, April-May/ Nov.-Dec. 2020

(New Scheme)

(Et & T Branch)

DIGITAL COMMUNICATION

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) is compulsory from each question. Attempt any* **two** *parts of part (b), (c) and (d) of each question.*

Unit-I

1. (a) Define Companding. 2

(b) State and proof sampling theorem for band pass signal. 7

(c) Consider a signal having probability density

$$f(v) = \begin{cases} Ke^{-|v|} & -4 < v < 4 \\ 0 & \text{elsewhere} \end{cases}$$

(i) Find K.

(ii) Determine the step size if there are four quantization level.

(iii) Calculate the variance of quantization error when there are four quantization level. 7

(d) A Bandpass signal has center frequency f_o and extends from f_o – 5 kHz to f_o + 5 kHz. The signal is sampled at the rate f_s = 25 kHz if the center frequency f_o varies from f_o = 5 kHz to 50 kHz. Find the range of f_o for which sampling rate is adequate. 7

Unit-II

2. (a) Define PCM. 2

(b) A PCM system uses a uniform quantizer followed by a v bit encoder. Show that the rms signal to quantization noise ratio is approximately given by $(1{\cdot}8 + 6\,v)$ dB. Assume that input to the PCM is sinusoidal signal. 7

(c) What are the limitation of Delta Modulation? Also explain ADM. 7

(d) A delta modulation system is designed to operate at 4 times the nyquist rate for a signal with a 5 kHz bandwidth. The quantizing step size is 250 mV. 7

(i) Determine the maximum amplitide of a 1 kHz input sinusoidal for which delta modulation does not show slope overload.

(ii) Determine output signal to quantizing noise ratio for the signal of part (i).

Unit-III

3. (a) Define NRZ and RZ line code. 2

(b) Write short notes on : 7

(i) Eye pattern

(ii) Scrambling

(c) What is Bipolar Signalling? Draw the PSD for Bipolar signalling. 7

(d) Explain regenerative repeaters. Also explain zero forcing equalizer. 7

Unit-IV

4. (a) Define Digital Signal. 2

(b) With the aid of block diagram explain generation & detection of BPSK. 7

(c) What is DPSK? Explain DPSK with suitable block diagram. 7

(d) (i) The data $b(t)$ consist of the bit stream 001010011010. Assume that the bit rate f_b is equal to the carrier frequency f_o and sketch $V_{BASK}(t)$. 3

(ii) Differentaite Offset QPSK and non offset QPSK. 4

Unit-V

5. (a) What is Optimum Filter? 2

(b) Derive expression for probability of error for BPSK. 7

(c) Derive expression for impulse response of matched filter. 7

(d) Derive expression for probability of error for optimum filter. 7

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B. E. (Fifth Semester) Examination, April-May/ Nov.-Dec. 2020

(New Scheme)

(ET&T Engg. Branch)

ADVANCED MICROPROCESSOR and INTERFACING

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) of each unit.*

Unit-I

1. (a) Compare 8085 μP & 8086 μP. 2

(b) Explain the Pipeline Architecture of 8086 μP with its register organization. 7

(c) Explain the following Pins of 8086 μP. 7

(i) $\overline{Rq}/\overline{gt_0}$, $\overline{Rq}/\overline{gt_1}$

(ii) $\overline{S}_0$, $\overline{S}_1$, $\overline{S}_2$

(iii) QS_0 & QS_1

(d) Explain the 8087 NDP co-processor in detail. 7

Unit-II

2. (a) Define REP prefix. 2

(b) Explain the Addressing Modes with suitable example. 7

(c) Write a program to find out the largest number from an unordered array of 16-8 bit number stored sequentially in the memory location starting at offset 0500H in the segment 2000H. 7

(d) Explain Interrupts of 8086 in detail with IUT structure. 7

Unit-III

3. (a) Compare 8259 & 8259 A. 2

(b) Interface two 4 K × 8 EPROMS and two 4 K × 8 RAM chips with 8086. Select suitable maps. 7

(c) Interfrace pgrammable timer 8254 and 8086 μP at an address 0040H for counter 0 and write an ALP to generate a square wave of period of 1 ms. The 8086 and 8254 run at 6 MHz and 1·5 MHz respectively. 7

(d) Explain 8257 DMA controller in detail with suitable block diagram. 7

Unit-IV

4. (a) Define 8279 (Keyboard & Display Driver) in short. 2

(b) Interface ADC08086 with 8086 μP using 8255 ports use Port A of 8255 for transferring digital data output of ADC to the CPU and Port C for control signals. Assume that an analog input in present at the i/P_2 of the ADC and a clock input of suitable frequency is available for ADC. Draw the schematic and write required ALP. 7

(c) Design a stepper motor controller and write an ALP to rotate shaft of a 4-phase stepper motor. 7

(i) in clockwise 5 rotation.

(ii) in anti-clockwise 5 rotations.

(d) Interface LCD with 8086 μP with suitable diagram. 7

Unit-V

5. (a) Compare 80386 μP & 80486 μP. 2

(b) Explain the architecture of 80386 μP with suitable diagram. 7

(c) Explain special registers of 80386 μP in detail. 7

(d) What do you mean by Paging? Explain in detail. 7

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B. E. (Fifth Semester) Examination,
April-May/Nov.-Dec. 2020

(New Scheme)

(Et & T Branch)

AUTOMATIC CONTROL SYSTEM

Time Allowed : Three hours

Maximum Marks : 80

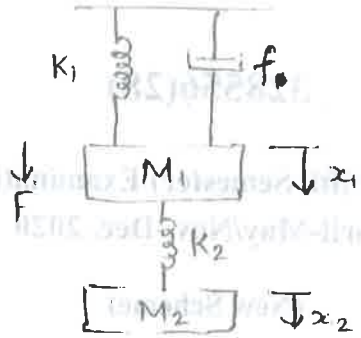
Minimum Pass Marks : 28

Note : *Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) from each question.*

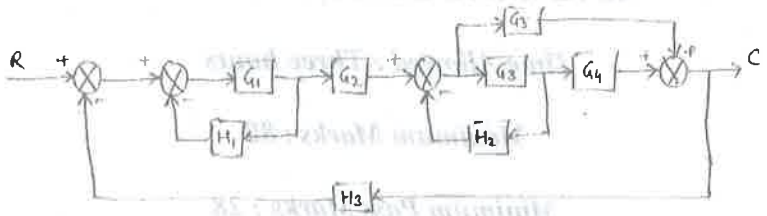
Unit-I

1. (a) Mention the difference between open loop & closed loop system. 2

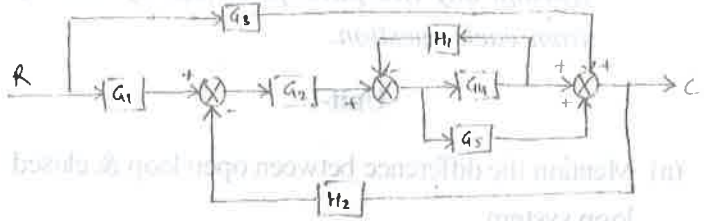
(b) Write the differential equations for the system shown below and also draw equivalent electrical network using force-voltage analogy. 7



(c) Derive the transfer function for the system shown below, using block diagram reduction technique. 7



(d) A system is shown below, determine the overall transfer function using Mason's gain formula 7



Unit-II

2. (a) Define rise time. 2

(b) Derive the expression for critical damped response of a second order control system for a unit step input. 7

(c) Explain the derivative control action in detail. Also show how it reduces max. Overshoot and effect on steady state error. 7

(d) The open loop transfer function of a unity feedback control system is $G(s) = \frac{2S}{S(S+5)}$. If the damping ratio is to be made 0·75 using tachometer feedback, Calculate the tachometer constant and max. overshoot. 7

Unit-III

3. (a) Define Stability. 2

(b) Using Routh criterion, determine the relation between K and T so that the unity feedback control system having $G(S) = \frac{K}{S\left[S(S+10)+T\right]}$ is stable.

(c) Sketch the root locus for the open loop transfer function given below. Determine the value of K to have 40% of max. overshoot for a unit step input

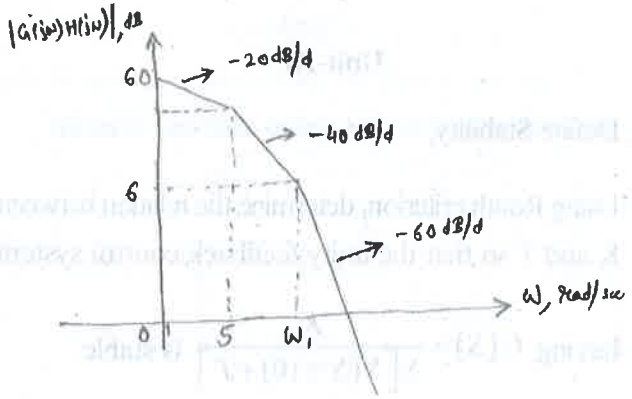
$$G(S)H(S)=\frac{K}{S(S+2)(S+4)}$$ 7

(d) Explain the procedure for plotting root locus. 7

Unit-IV

4. (a) Define gain margin & phase margin. 2

(b) Figure shows the Bode magnitude plot for the open loop transfer functions $G(S)H(S)$ of a negative feedback system. Determine the transfer function : 7



(c) A unity feedback control system has $G(S)=\frac{20}{S(S+1)(S+2)}$. Draw Nyquist plot and comment on stability. 7

(d) Sketch the polar plot for the system having $G(S)H(S)=\frac{10}{S(S+1)(S+2)}$. Calculate its gain margin in dB and comment on stability. 7

Unit-V

5. (a) Define State and state variables. 2

(b) The transfer function of a system is given by $\frac{Y(s)}{U(s)}=\frac{S^2+3S+2}{S^3+9S^2+26S+24}$. Determine the state model. Use direct decomposition method. 7

(c) A system is represented by : 7

$$\dot{X}(t)=\begin{bmatrix}-1 & 0 & 0\\ 0 & -2 & 0\\ 0 & 0 & -3\end{bmatrix}X(t)+\begin{bmatrix}1\\ 1\\ 0\end{bmatrix}u$$

Test for controllability & observability if $C = [1\ 0\ 2]$.

(d) For the electrical network shown, determine the state model. Consider i_1, i_2 and V_c state variables. The output variables are i_1 & i_2 7