4E4160

Roll No. _____ Total No. of Pages : 3

4E4160

B. Tech. IV Sem. (Main) Exam; April-May 2017

Computer Science & Engineering

4CS1A Microprocessors & Interfaces Common with IT

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 Write short notes on :
(1) Multiplexer,
(2) De-multiplexer
(3) Encoder
(4) Decoder

4×4=16

OR

1 Explain following :
(1) Microprocessor
(2) Microcontroller
(3) Address bus
(4) Data bus

4×4=16

UNIT - II

2 (a) Draw pin diagram of 8085 and explain each pin. **8**

(b) Classify the instructions set of 8085 and explain them. **8**

OR

2 (a) Explain the instruction format of 8085. Draw the timing diagram of instruction MOV A, M and explain it. **10**

(b) Explain addressing modes of 8085. **6**

UNIT - III

3 Explain :

(a) Interrupts of 8085.

(b) RST instructions of 8085.

(c) Maskable and non-maskable interrupts and related data instruction to mask or unmask interrupt.

(d) Use of stack during interrupt processing. **4×4=16**

OR

3 (a) Explain, with suitable functional diagram, 8259 interrupt controller and its working. **10**

(b) Explain, how subroutines are implemented and executed. Explain call by value and call by reference. **6**

UNIT - IV

4 Explain 8255, programmable peripheral interface (controller). Explain all modes of 8255 with example.

16

OR

4 Explain, 8254, programmable interval timer, explain all the modes of 8254 with example.

16

UNIT - V

5 (a) Write difference between serial communication and parallel communication.

4

(b) Explain serial communication controller USART 8251. Explain its all modes with example.

12

OR

5 (a) Explain RS232 interface protocol.

4

(b) Explain interfacing of 4*4 key pad with 8085 using 8255.

12

6+

4E4161

Roll No. _____ Total No. of Pages : 6

4E4161

B. Tech. IV Sem. (Main/Back) Exam; April-May 2017

Computer Science

4CS2A Discrete Mathematical Structure

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (i) Define power set. If S be a finite set of order n then prove that power set $P(S)$ is a finite set of order 2^n.

2+6=8

(ii) Define the following :

(a) Cross partition of a set.

(b) Duality

(c) Floor function or greatest integer function.

(d) Bijection.

2×4=8

OR

2 (a) Show that the set of odd positive integers is a countable set.

4

(b) A survey is taken on method of commuter travel. Each respondent is asked to check BUS, TRAIN or AUTOMOBILE as a major method of travelling to work. More than one answer is permitted. The results reported were as follows :

(i) 30 people checked BUS;

(ii) 35 people checked TRAIN;

(iii) 100 people checked AUTOMOBILE;

(iv) 15 people checked BUS and TRAIN;

(v) 15 people checked BUS and AUTOMOBILE;

(vi) 20 people checked TRAIN and AUTOMOBILE;

(vii) 5 people checked all three methods.

How many respondents completed their surveys ?

4

(c) State and prove the generalized pigeonhole principle.

2+6=8

UNIT - II

2 (i) Define :

(a) Boolean matrix

(b) Product of Boolean matrices

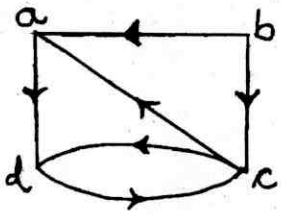
(c) Join and meet of Boolean matrices.

Also compute the join and meet of matrices :

$$A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \\ 1 & 1 & 0 \end{bmatrix}$$

1×4+4=8

(ii) Let R be the relation with digraph shown below. Find the transitive closure of R using Warshall's algorithm.



8

OR

2 (i) Define congruency relation in Modulo system. If $A = Z$ (the set of integers), Relation R defined in A set by aRb as "a is congruent to b mod 2", then prove that R is an equivalence relation.

2+6

(ii) If the set of integers $I = \{\ldots\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\ldots\}$ be partitioned by the equivalence relation aRb as $a \equiv b \pmod 3$. Obtain the set I/R.

4

(iii) If $A = \{1, 2, 3, 4, 12\}$, the partial order of divisibility on A is $a \leq b$ (i.e. if a divides b). Then draw the digraph and Hasse diagram of the poset $(A, \leq)$.

4

UNIT - III

3 (i) Prove by mathematical Induction that $3^n > n^3$ for all integers $n \geq 4$.

8

(ii) Prove the implication "If n is an integer not divisible by 3, then $n^2 \equiv 1 \pmod 3$".

8

OR

3 (i) Write short notes on :

(a) Vacuous proof

(b) Trivial proof

(c) Constructive proof

(d) Non-constructive proof

1.5×4=6

(ii) Prove that the linear search algorithm works correctly for every $n \geq 0$.

4

(iii) Sort the list $X = [64, 25, 12, 22, 11]$ using selection sort algorithm.

6

UNIT - IV

4 (i) Sketch the complete graphs k_n, $1 \leq n \leq 6$.

1×6=6

(ii) Show that the complete digraph with n-nodes has the maximum number of edges i.e. $n(n-1)$ edges, assuming there are no loops.

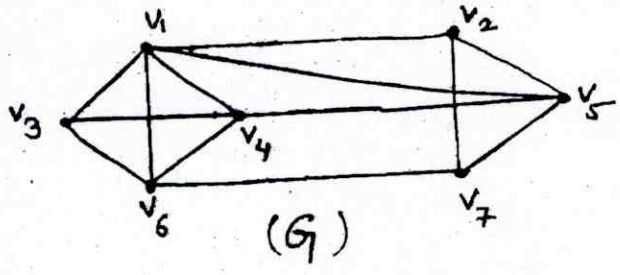
6

(iii) Draw graph which is Eulerian as well as Hamiltonian.

4

OR

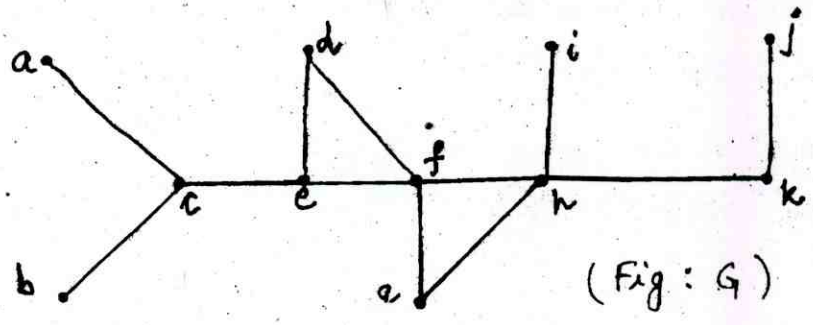
4 (i) Use Welch-Powell algorithm to paint the following graph with minimum number of colors.



4

(ii) Prove that the chromatic number of a graph will not exceed by more than one, the maximum degree of the vertices in a graph. 6

(iii) Use Depth-first search to find a spanning tree for the following graph G.



(Fig : G) 6

UNIT - V

5 (i) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology. 4

(ii) Find PCNF of a statement S whose *PDNF* is $(p \wedge q \wedge r) \vee (p \wedge q \wedge \sim r) \vee (\sim p \wedge \sim q \wedge r)$. 6

(iii) Is the following argument valid ?
Dhruv, a student in this class, knows how to write programs in JAVA. Everyone who knows how to write programs in JAVA can get a high - paying job. Therefore, someone in this class can get a high paying job. 6

OR

72

5 (i) Define Tautology, contradiction and contingency. Determine the contrapositive of each statement :

(a) If John is a poet, then he is poor.

(b) Only if Mary studies will she pass the test.

2×4=8

(ii) Determine the validity of the argument :

All men are fallible

All kings are Men.

Therefore, all kings are fallible.

8

4E4162

Roll No. _____ Total No. of Pages : 7

4E4162

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017

Computer Sci. & Engg.

4CS3A Statistics & Probability Theory

CS, IT

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. Normal distribution - Table 2. NIL

UNIT - I

1 (a) The probability that a teacher will give an unannounced test during any class meeting is 1/5. If a student is absent twice, what is the probability that he will miss at least one test ?

8

(b) The first four moments of a distribution about the value 5 of the variate are 2, 20, 40 and 50. Also find mean and variance of the distribution.

8

OR

1 (a) Two random variables X and Y have the following joint probability density function :

$$f(x,y)=\begin{cases}2-x-y, & 0\le x\le 1, 0\le y\le 1\\ 0 & \text{, otherwise}\end{cases}$$

Find

(i) Marginal probability density functions of x and y

(ii) Conditional density functions

(iii) Var (X) and Var (Y)

8

(b) If the life time of a component has probability density function $\lambda e^{-\lambda t}$, $t>0$.

Compute its time to failure and variance.

Also define the mean time to failure in terms of the reliability function.

8

UNIT - II

2 (a) Determine the mean and variance of binomial distribution. Also define moment generating function of binomial distribution.

8

(b) A driver has two taxies, which he hires out day by day. The number of demands for a taxi on each day is distributed as a Poisson variate with mean 1.5. Calculate the proportion of days on which

(i) neither of the cars is used

(ii) some demand is refused (Given $e^{-1.5} = 0.2231$).

8

OR

2 (a) As a result of tests on 20,000 electric bulbs manufactured by a company it was found that the life time of the bulb was normally distributed with an average life of 2040 hours and standard deviation of 60 hours. On the basis of the information estimate the number of the bulbs that is expected to burn for (i) more than 2150 hours (ii) less than 1960 hours.

8

(b) Define exponential distribution . Show that for the exponential distribution given by $dp = ae^{-\frac{x}{c}}$, $0 \le x < \infty$, $c > 0$ a being a constant, the mean and the standard deviation are each equal to C.

8

UNIT - III

3 (a) Calculate the coefficient of correlation between x and y using the following data :

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15

8

(b) Calculate rank correlation coefficient for the following data :

x	81	78	73	73	69	68	62	58
y	10	12	18	18	18	22	20	24

8

OR

3 (a) Write a short note on linear regression and obtain the regression line of y on x.

4+4=8

(b) Fit a second degree parabola to the following data :

x	0	1	2	3	4
y	1	5	10	22	38

8

77

UNIT - IV

4 (a) On a telephone booth, arrivals of customers follow the Poisson process with an average time of 10 minutes between one arrival and next arrival. The length of a phone call is assumed to be distributed exponentially with mean 3 minutes.

(i) Find the average number of persons waiting in the system.

(ii) What is probability that a customer spends more than 10 minutes in the booth ?

(iii) Find the fraction of a day when the phone will be used.

8

(b) Assume that the trucks with goods are coming in a market yard at the rate of 30 trucks per day and suppose that the inter-arrival times follow an exponential distribution. The time to unload the trucks is assumed to be exponential with an average of 42 minutes. If the market yard can admit 10 trucks at a time, calculate P (the yard is empty) and find the average length of queue.

8

OR

4 (a) Patients arrive at a clinic according to Poisson distribution at a rate of 30 patients per hour. The waiting room cannot accommodate more than 14 patients. Examination time per patient is exponential with mean rate of 20 per hour.

(i) Find the effective arrival rate at the clinic.

(ii) What is the probability that an arrival patient will not wait ?

(iii) What is the expected waiting time until a patient is discharged from the clinic ?

8

(b) A super market has two girls serving at the counters. The customers arrive in a Poisson fashion at the rate of 12 per hour. The service time for each customer is exponential with mean 6 minutes. Find :

(i) the probability that an arriving customer has to wait for service.

(ii) the average number of customers in the system.

(iii) the average time spent by a customer in the super market.

8

UNIT - V

5 (a) Write a short note on discrete parameter Markov chain.

8

(b) Two brands A and B of a product have probabilities 30% and 70% respectively at time t = 0, if their transition matrix P be $\begin{bmatrix} 0.7 & 0.3 \\ 0.2 & 0.8 \end{bmatrix}$, find their probabilities

(i) after time t = 1,

(ii) after time t = 2

(iii) their steady state probabilities.

8

OR

5 (a) Automata car wash facility operates with only one bay. Cars arrive according to Poisson distribution, with a mean of 4 cars per hour and may wait in the facilities parking lot if the bay is busy. Find the time spent by a car in the system and in the waiting if

(i) the time for washing and cleaning a car is exponential with a mean of 10 minutes

(ii) the time of washing and cleaning a car is constant and is equal to 10 minutes. Which facility is better ?

8

(b) Write a short note on M/G/1 queuing model.

8

4E4163

Roll No. _____ Total No. of Pages : 3

4E4163

B. Tech. IV Sem. (Main/Back) Exam; April-May 2017

Computer Sc.

4CS4A Software Engineering

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL **2.** NIL

UNIT - I

1 (a) Define system and its types along with various characteristics. **6**

(b) What is requirement specification in Software Engineering ? Describe in detail along with its importance in software development. **10**

OR

1 (a) Explain Computer System Engineering and System Analysis. **8**

(b) Explain SDLC in detail. **8**

UNIT - II

2 Explain waterfall model in detail along with its various phases; also describe its advantages and disadvantages.

16

OR

2 (a) Discuss merits and demerits of various models of software development.

8

(b) Explain specialized process model.

8

UNIT - III

3 Describe the structural analysis for the system and differentiate the DFD and CFD in detail with example.

16

OR

3 Write short notes on :

(a) FSM (Finite State Machine)

(b) Data Dictionary

(c) Control and Process Specification

(d) Behavioural modelling.

4×4

82

UNIT - IV

4 What is design documentation in Software Engineering ? Explain along with its importance in detail.

16

OR

4 (a) Describe the top down and bottom up approach in effective modular design with example.

10

(b) Explain Cohesion and Coupling.

6

UNIT - V

5 Explain unified modelling language diagrams with the help of appropriate example.

16

OR

5 Write short notes on :

(a) ODD concepts and methods

(b) Object oriented analysis modelling.

8×2

83

4E4164

Roll No. _____ Total No. of Pages : 4

4E4164

B. Tech. IV Sem. (Main) Exam., April-May 2017

Computer Science & Engineering

4CS5A Fundamental of Communication

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Explain the amplitude modulation. 6

(b) An amplitude modulated signal is given by

$$P_{AM}(t) = 10\cos\left(2\pi\cdot 10^6 t\right) + 5\cos\left(2\pi\cdot 10^6 t\right)\cos\left(2\pi\cdot 10^3 t\right) +$$

$$2\cos\left(2\pi\cdot 10^6 t\right)\cos\left(4\pi\cdot 10^3 t\right) \text{ Volts}$$

Find the various frequency components present and the corresponding modulation index. Draw the Line Spectrum and find bandwidth. 6

(c) Explain the difference between narrow band FM and wide band FM. **4**

OR

1 (a) Define the following terms for FM waves :

(i) Carrier swing

(ii) Frequency deviation

(iii) Percent modulation. **6**

(b) Explain Frequency Division Multiplexing (FDM). **6**

(c) Explain any generation method of frequency modulation. **4**

UNIT - II

2 (a) State and prove sampling theorem in time domain. What is aliasing effect and how it is reduced ? **8**

(b) Draw the circuit diagram of generation of PPM signal. Write the advantage of PPM. **8**

OR

2 (a) Find Nyquist rate and the Nyquist interval for the signal.

$$x|t| = \frac{1}{2\pi} \cos\left(4000\ \pi\ t\right) \cos\left(1000\ \pi t\right).$$

8

(b) Explain the Time division multiplexing with block diagram. **8**

85

UNIT - III

3 (a) Describe the working of a Delta Modulation System. Compare the uniform and non-uniform quantization method. **8**

(b) Explain the quantization error and derive an expression for minimum signal to noise ratio in PCM system that uses linear quantization. **8**

OR

3 (a) Explain Adaptive Delta Modulation in detail with suitable diagram. Also, explain the advantage of adaptive delta modulation over delta modulation. **8**

(b) Explain the slope overload distortion and granular noise in delta modulation and how it is removed in ADM. **8**

UNIT - IV

4 (a) Represent the data 10110100 using the following digital data formats with the help of neat figures :
(i) RZ
(ii) NRZ. **6**

(b) What is the Nyquist Criterion of zero |S| ? Explain. **4**

(c) Explain the generation method of PSK. **6**

OR

4 (a) Explain the difference between different modulation techniques. **8**

(b) Draw the block diagram of QPSK system and explain its working. **8**

UNIT - V

5 (a) Draw a block diagram to generate a PN signal. **8**

(b) What are the modulation techniques used in FHSS systems ? **8**

OR

5 (a) What are the important applications of Spread Spectrum (SS) system ? **6**

(b) What is meant by spreading a signal ? **4**

(c) What are the modulation techniques used in DSSS systems ? **6**

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4E2923

Roll No. _____ Total No. of Pages : 3

4E2923

B. Tech. IV-Sem. (Back) Exam; April-May 2017

Computer Science & Engineering

4CS6.3(O) Logic & Functional Programming

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 Explain in detail content of proposition logic's.
(a) Evaluation of constant propositions.
(b) Evaluation of proposition in a state.

2×8=16

OR

1 (a) Explain quantifiers in brief with the help of a suitable example. **8**

(b) Explain tautology with example and show that following propositions are tautology using truth table

$(p \wedge q \wedge r) \Rightarrow (r \Rightarrow p)$.

4+4=8

UNIT - II

2 (a) Differentiate between disjunction and conjunction. **8**

(b) Explain the concept of search strategy. Explain DFS search strategy. **8**

OR

2 Explain the following terms using in PROLOG :
(a) Constant
(b) Goals and Clauses
(c) Facts
(d) Rules. **4×4=16**

UNIT - III

3 (a) Discuss recursion in prolog and also define the basic rules of operation. **4+4=8**

(b) Explain sorting in prolog with example. **8**

OR

3 Write short notes on :
(a) Operators and their precedence
(b) Parsing in prolog. **4×2=8**

UNIT - IV

4 (a) What do you mean by functional programming ? Also explain the characteristics of functional languages. **2+6=8**

(b) Explain Lazy and Eager Evaluation. **8**

OR

4 Write short notes on the following :

(a) Computability and correctness

(b) Lambda calculus in terms of syntax and semantics.

8×2=16

UNIT - V

5 (a) Explain Haskell Programming in brief. How we create lists, type classes and arrays in Haskell ?

4+4=8

(b) Explain the Monad's law.

8

OR

5 (a) Write a program in Haskell using I/O.

8

(b) Explain user defined data type in Haskell.

8

4E4165

Roll No. _____ Total No. of Pages : 3

4E4165

B. Tech. IV Sem. (Main) Exam; April-May 2017

Computer Science and Engineering

4CS6A Principles of Programming Languages

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) What do you mean by environment of programming languages ? What are the effects of environment on languages. **8**

(b) Explain the history of programming languages. **8**

OR

1 (a) Differentiate between syntax and semantics giving proper examples. **8**

(b) Distinguish between static binding and dynamic binding. **8**

UNIT - II

2 (a) What is type equivalence ? Also explain structural and name equivalence using example. **8**

(b) Distinguish between static type checking and dynamic type checking. **8**

OR

2 (a) Describe the implementation and specification of sequential files and direct access files ? **8**

(b) Discuss the structured data type of variant records. **8**

UNIT - III

3 (a) What do you mean by structured sequence control ? Also discuss the problems in structured sequence control. **8**

(b) Explain the associativity and precedence of operation with suitable examples. **8**

OR

3 (a) What are activation records ? How are they useful in subprogram calls ? **10**

(b) Write a short note on Lazy Evaluation Rule. **6**

UNIT - IV

4 (a) Explain local data and referencing environments. **6**

(b) Explain the implementation of various parameter passing methods. **10**

OR

4 (a) Explain formal and actual parameters. **6**

(b) What is scope, lifetime and visibility of a variable ? Compare local, non-local and global referencing environment. **10**

UNIT - V

5 (a) Define abstract data types. Explain ADT in C++ and Java. **10**

(b) What do you understand by encapsulation ? Explain. **6**

OR

5 (a) Differentiate between static, stack and heap based storage management, with suitable example. **12**

(b) What do you understand by garbage collection ? Explain. **4**