(b) Explain the working of Pipelined multiplier in basic computer in detail. 8

UNIT–IV

7. (a) Draw and explain the flowchart for addition and subtraction of signed magnitude numbers. 8

(b) Explain the Booth algorithm for multiplication of signed 2's complement numbers. 8

8. (a) Explain Floating-point Arithmetic operations in detail. 8

(b) Explain the working of BCD subtractor in basic computer. 8

B.Tech. (II Yr.) Total Pages : 4

Roll No. .....

Course No. : CS-221

M–II/132

Second Year B.Tech. of the Four-Year Integrated Degree Course Examination, 2015-16
(Computer Science & Engineering)

SEMESTER-II

COMPUTER ORGANIZATION

Time : Three Hours

Maximum Marks : 80

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(i) Attempt **five** questions in all.

(ii) The Question Paper has **four** Units. Each unit has **two** questions.

(iii) Attempt at least **one** question from each Unit.

(iv) Answer should be to the point.

(v) All questions carry equal marks.

UNIT–I

1. (a) Construct the common bus system using multiplexers for 4-registers to transfer data from one register to another where each register has size of 4-bits. 8

   (b) What are arithmetic Micro-operations? Explain the working of 4-bit adder-subtractor with suitable circuit diagram. 8

2. (a) Explain various types of shift Micro-operations with suitable examples. 8

   (b) An 8-bit register contains the binary value 10011100. What is the register value after an arithmetic shift right? Starting from the initial number 10011100, determine the register value after an arithmetic shift left and state whether there is an overflow. 8

UNIT–II

3. (a) Explain the difference between a Direct and an Indirect address instructions. How many references to memory are needed for each type of instructions to bring an operand into a processor register? 8

   (b) Explain Instruction cycle and its various phases with its flowchart. 8

4. (a) A computer uses a memory unit with 256 k words of 32-bits each. A binary instruction code is stored in one word of memory. The instruction has four parts : an indirect bit, an operation code, a register code part to specify one of the 64 registers and an address part.

   (i) How many bits are there in the operation code, the register code part, and the address part?

   (ii) Draw the instruction word format and indicate the number of bits in each part.

   (iii) How many bits are there in the data and address inputs of the memory? 8

   (b) Explain the timing and control of the basic computer. 8

UNIT–III

5. Explain the basic design of the following :

   (a) Combinational ALU.

   (b) Sequential ALU. 8+8=16

6. (a) Specify a pipeline configuration to carry out the task to perform the arithmetic operation (Ai + Bi) (Ci + Di) with a stream of numbers. List the content of all registers in the pipeline for i = 1 through 6. 8

B.Tech. (II Yr.) Total Pages : 3

Roll No. .....

Course No. : CS-222

M–II/133

Second Year B.Tech. of the Four-Year Integrated Degree Course Examination, 2015-16
(Computer Science & Engineering)

SEMESTER-II

DATA STRUCTURE

Time : Three Hours

Maximum Marks : 50

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UNIT–I

1. (a) Explain the different types of linked list with diagram. 4

   (b) Write the node structure for linked representation of polynomial. Explain the algorithm to add two polynomials represented using linked lists. 6

2. (a) What is the advantage of doubly linked list over singly linked list? Illustrate with an example. 5

   (b) Write a function to inset a node at front and rear end in a circular linked list. Write down sequence of steps to be followed. 5

UNIT–II

3. (a) Define Stack. List the operations on Stack. 4

   (b) How multiple stacks implemented using one dimensional array? Explain with a suitable example. 6

4. (a) Explain infix to postfix expression algorithm and trace it for an expression "a*(b + c)*d". 5

   (b) Give the disadvantage of ordinary queue and how it is solved in circular queue. Explain the same. Explain with suitable example, how you would implement circular queue using dynamically allotted arrays. 5

UNIT–III

5. (a) Define a binary tree and with example show array representation and linked list representation of binary tree. 4

   (b) Write an expression tree for an expression A/B + C*D + E. Give the algorithm for inorder, postorder, preorder traversals and apply that traversal method to the expression tree and give the result of traversals. 5

6. (a) What is a binary search tree? Draw the binary search tree for the following inputs : 5

   14, 5, 6, 2, 18, 20, 16, 18, 21.

   (b) What is an AVL tree? Write the algorithm to insert an item in to AVL tree. 5

UNIT–IV

7. (a) Define graph. Explain the properties of a graph. 4

   (b) Write and explain the breadth first search depth first search in a graph with suitable example. 6

8. (a) What is a single source shortest path problem? Explain Dijikstra's single source shortest path algorithm with an example. 4

   (b) What is Hashing? Explain, how it improves searching. 6

B.Tech. (II Yr.) Total Pages : 5

Roll No. .....

Course No. : BS-222 (CS & IT)

M–II/62

Second Year B.Tech. of the Four-Year Integrated Degree Course Examination, 2015-16

SEMESTER-II

DISCRETE MATHEMATICS STRUCTURE

Time : Three Hours

Maximum Marks : 50

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(iv) Answer should be to the point.

(v) All questions carry equal marks.

(vi) Assume suitable data, if necessary and indicate the same clearly.

(vii) Parts of question must be attempted together.

UNIT–I

1. (a) Determine whether the following are equivalents, using by conditional statement.

(i) $(p \leftrightarrow q) \equiv (P \wedge q) \vee (\square p \wedge \square q)$

(ii) $(p \rightarrow q) \rightarrow t \equiv (p \wedge \square q) \rightarrow t$.

(b) (i) In a box, there are 6 balls of which 3 are black and 3 are white. They are drawn successively. (i) Without replacement (ii) With replacement. What is the chance that colour are alternates?

(ii) Solve the recurrence relation :

$a_{n+2} - 2a_{n+1} + a_n = 2^n$

By the method of generating functions with initial conditions $a_0 = 2$, $a_1 = 1$.

2. (a) Using the principle of Mathematical induction prove the following results :

(i) $1^3 + 2^3 + 3^3 + \ldots\ldots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$.

(ii) $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \ldots\ldots + \frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1}$.

(b) Prove that :

(i) Intersection of sets is distributive w.r.t. union of sets i.e.

$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

(ii) Union of a set is distributive w.r.t. intersection of sets i.e.

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

UNIT–II

3. (a) Define the equivalence relation. A relation R on the set of complex numbers is defined by $z_1 \; R \; z_2 \underset{\text{eff}}{\Leftrightarrow} \frac{z_1 - z_2}{z_1 + z_2}$ is real. Show that R is an equivalence relation.

(b) Let f be a mapping from A to B, $f : A \rightarrow B$, Similarly $g : B \rightarrow C$, $h : C \rightarrow D$. Show that $h \circ (g \circ f) = (h \circ g) \circ f$.

4. (a) Let A = {2, 3, 6, 12, 24, 36} and R be the relation on A which is defined as if and only if a divides b. Show that R is a partial ordering relation in A. Draw the Hasse diagram of the POS (A, R).

(b) Let A = {a, b, c, d}. Let R = {(a, b), (a, c), (b, a), (b, c), (c, d), (d, a). Find the Transitive closure of R.

UNIT–III

5. (a) Two operations of a Boolean algebra B are associative i.e. :

(i) $a + (b + c) = (a + b) + c \quad \forall a, b, c \in B$

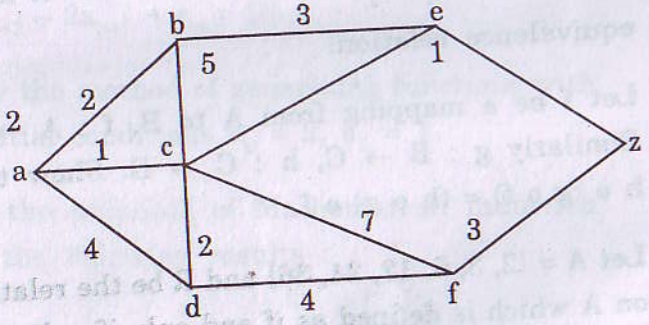
(ii) $a . (b . c) = (a . b) . c$.

(b) Prove that a connected graph G = (V, E) can have a closed circuit passing through every edge of G exactly once if and only if all its veritices be of even degree.

6. (a) Let a, b, c be elements in a lattice $(L, \leq)$. Show that if $a \leq b$, then $a \vee (b \wedge c) \leq b \wedge (a \vee c)$.

(b) Find the shortest path between a and z in the graph shown below :

2.



UNIT–IV

7. (a) Consider an algebraic system (G, *), where G is the set of all non-zero real numbers and * is a binary operation defined by $a * b = \frac{ab}{4}$.

Show that (G, *) is as abelian group.

(b) If a, b are any elements of a group G, then :

(i) $(a^{-1})^{-1} a$ (ii) $(ab)^{-1} = b^{-1} a^{-1}$.

8. (a) A semi-group G is a group if for all elements a, $b \in G$, the equations ax = b and ya = b have unique solution in G.

(b) If order of an element a of a group is n, then $a^m = e$, iff m is a multiple of n.

B.Tech. (II) Yr. Total Pages : 3

Roll No. .....

Course No. : CS-224

M–II/64

Second Year B.Tech. of the four year Integrated Degree Course Examination, 2015-16

(Computer Science & Engineering)

SEMESTER-II

MICROPROCESSORS

Time : Three Hours

Maximum Marks : 50

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(iii) Attempt at least **one** question from each Unit.

(iv) Answer should be to the point.

(v) All questions carry equal marks.

UNIT–I

1. Explain the following with example for 8085 Microprocessor :

   (a) Flag Register

   (b) Interrupt Signals. 5

2. (a) What is adderssing mode? Explain the various addressing modes of 8085 Microprocessor with example. 5

   (b) Write an assembly language program to add the contents of the memory location 2040 H to accumulator and subtract the contents of memory location 2041H from the first sum. Assume the accumulator has 30H, the memory location 2040H has 68 H and the location 2041H has 7FH. 5

UNIT–II

3. (a) What is static RAM? Explain the SRAM architecture and timing diagram. 5

   (b) Explain the various types of Memory with their hierarchy. 5

4. Explain the following :

   (a) UV-EPROM 5

   (b) Row and Column address decoder. 5

UNIT–III

5. (a) Explain the 8259 Programmable Interrupt Controller with the various priority modes and diagram. 5

   (b) Explain the functional description of Direct Memory Access (DMA) controller. 5

6. (a) Explain the 8253 Programmable Interval times with its different modes of operation. 5

   (b) Explain the 8255 Programmable Peripheral Interface with different modes of operations. 5

UNIT–IV

7. Explain the following :

   (a) Memory Mapped I/O Scheme 5

   (b) Data Transfer Schems. 5

8. (a) Explain the application of Microprocessor as frequency measurement. 5

   (b) Explain the addressing decoding in Memory Interface. 5

B.Tech. (II) Yr. Total Pages : 3

Roll No. .....

Course No. : CS-225

M–II/65

Second Year B.Tech. of the four year Integrated Degree Course Examination, 2015-16

(Computer Science & Engineering)

SEMESTER-II

SYSTEMS SOFTWARE

Time : Three Hours

Maximum Marks : 50

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(iii) Attempt at least **one** question from each Unit.

(iv) Answer should be to the point.

(v) All questions carry equal marks.

UNIT–I

1. (a) What is system software? Explain the various hardware components of a system software. 5

   (b) Explain the various building blocks of a system. 5

2. Explain the following :

   (a) Job Control 5

   (b) Resource Management. 5

UNIT–II

3. (a) What is pass of an assembler? Explain the two pass assembler. 5

   (b) What is assembler? Explain the various types of assemblers. 5

4. (a) Explain the various functions of an assembler. 5

   (b) Explain the Symbol table and Literal table with suitable examples. 5

UNIT–III

5. (a) What is macro? Explain the macro call and expansion with example. 5

   (b) Illustrate the algorithm used for designing a two pass macro processor. 5

6. Explain the following:

   (a) Recursive macro expansion. 5

   (b) Four specific task of macro instruction processor. 5

UNIT–IV

7. (a) Explain the working of absolute loader with suitable diagram and disadvantage. 5

   (b) Explain the structure of object deck and library searching with example. 5

8. (a) Explain the Compiler with their different phases and functions. 5

   (b) Explain the following :

   (i) Direct linking loader.

   (ii) Relative loader. 2.5×2=5

the following equations :

$$c_4 = d_1 \oplus d_3$$

$$c_5 = d_1 \oplus d_2 \oplus d_3$$

$$c_5 = d_1 \oplus d_2 .$$

(i) Write down the generator matrix G.

(ii) Construct the possible code words.

(iii) Suppose that the received word is 010111, decode this received words by finding the location of the error and the transmitted data bits. 4×3

(b) Explain the principle, function and operation of modem. 4

UNIT–IV

7. Explain the following terms with respect to transmission :

(i) Primary and Secondary constant

(ii) Characteristic impedance.

(iii) Standings waves ratio

(iv) Open circuit and short circuit lines. 4×4

8. (a) Describe the basic principle of light transmission. In optical fiber, illustrate the Optical Communication system. 8

(b) Differentiate between Microwave and Satellite communication. How we select the frequency band and orbit in Satellite communication? Explain in brief. 8

B.Tech. (II Yr.) Total Pages : 4

Roll No. .....

Course No. : EC-228 (CS, IT)

M–II/63

Second Year B. Tech. of the Four-Year Integrated Degree Course Examination, 2015-16
(Common for Computer Science & Engineering & Information Technology)

SEMESTER-II

COMMUNICATION SYSTEMS

Time : Three Hours

Maximum Marks : 80

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(vi) Assume suitable data, if necessary and indicate the same clearly.

(vii) Parts of question must be attempted together.

UNIT–I

1. (a) The efficiency of ordinary AM is defined as the percentage of the total power carried by the side bands, that is :

$$\eta = \frac{P_s}{P_t} \times 100\% .$$

Where P_s is the power carried by the sidebands and P_t is the total power of the AM signal.

(i) Find η for $\mu = 0.5$ (50%).

(ii) Show that for a single-tone AM, η_{max} is 33.3% at $\mu = 1$. 4+4

(b) Define and describe the Pulse modulation. 4

(c) Explain and describe Multiplexing. 4

2. Explain the following terms with respect to angle modulation :

(i) Pre-emphasis and de-emphasis. 4

(ii) Reactance modulator. 4

(iii) Indirect method for FM generation (Armstrong frequency modulation system). 8

UNIT–II

3. (a) In a binary PCM system the output signal to quantization noise ratio is held to a minimum of 40 dB. Determined the number of required levels and find the corresponding output signal to quantizing noise ratio. 4

(b) Consider a binary sequence 0100101. Draw the waveform for following signaling format :

(i) Unipolar NRZ

(ii) Bipolar RZ

(iii) AMI (Alternative mark inversion). 6

(c) Describe the advantage and disadvantages of the three signaling formats. 6

4. (a) Differentiate between DM and DPCM. Explain the working of DPCM. 8

(b) With the help of block diagram, explain the generation of QPSK with relevant waveform. 8

UNIT–III

5. (a) Consider a memory less source X with two signal x_1 and x_2. Show that H(X) is maximum when both x_1 and x_2 are equal probable. 8

(b) Show that the channel capacity of an ideal AWGN channel with infinite bandwidth is given by :

$$C_\infty = \frac{1}{\ln 2} \cdot \frac{S}{\eta} \approx 1.44 \frac{S}{\eta} \text{ b/s}$$

Where S is the average signal power and $\eta/2$ is power spectral density of White-Gaussian noise. 8

6. (a) For a(6, 3) systematic linear block code the three parity check bits C_4, C_5 and C_6 are formed from