II / IV B.TECH. DEGREE EXAMINATIONS – NOVEMBER 2010
FIRST SEMESTER
DISCRETE STRUCTURES AND GRAPH THEORY

(CS) Max. Marks: 100

Time: 3 hrs.

Answer Question No. 1 and any five from the remaining.
Write your answers sequentially.

1. Answer the following: 10 × 2M
   a) State the converse, opposite, and contra positive to the following statement.
      If triangle ABC is a right triangle, then |AB|^2 + |BC|^2 = |AC|^2.
   b) Restate the following implication, p → q, into the equivalent form, (~p) ∨ q.
      If K-Mart does not refund the money, I will not shop there anymore.
   c) How many dominoes are there in a set which are numbered from double blank to double six?
   d) Find the coefficient of X^10 in (1 + X + X^2 + ...)^3.
   e) Consider a 1 × n chessboard. Suppose we can color each square of the chessboard either red or white. Let a_n = the number of ways of coloring the chessboard in which no 2 red squares are adjacent. Find a recurrence relation that a_n satisfies.
   f) Give an example of a nonempty set and a relation on the set that satisfies following combinations of properties; draw a digraph of the relation.
      Transitive and antisymmetric, but not reflexive
   g) Find the edge chromatic number for the following graph.

   h) Find a Hamiltonian cycle for the following graph.

   i) Is the graph K_{3,3} critical planar?
   j) State Euler’s theorem.
2. a) Translate the following sentence into symbols, first using no existential quantifier, and second using no universal quantifier.
   No dogs are intelligent.  
   b) Prove or disprove the validity of the following arguments:
   Every living thing is a plant or an animal.
   David's dog is alive and it is not a plant.
   All animals have hearts.
   Hence, David's dog has a heart.

3. a) How many integral solutions are there for \( x_1 + x_2 + x_3 + x_4 = 20 \)
   if \( 1 \leq x_1 \leq 6, 1 \leq x_2 \leq 7 \), and \( 1 \leq x_3 \leq 8 \), and \( 1 \leq x_4 \leq 9 \)?
   b) How many integers between 1 and 100 inclusive include all of the digits 1, 2, 3, and 4 alone?

4. a) Solve the following recurrence relation using generating functions.
   \[ a_n + 5a_{n-1} + 6a_{n-2} = 0 \text{ for } n \geq 2, \text{ and } a_0 = 1, a_1 = -2. \]
   b) Solve the following recurrence relation by substitution \( a_n = a_{n-1} + 2n + 1 \)
   where \( a_0 = 1 \).

5. a) Let \( R \) be a reflexive relation on a set \( A \). Show that \( R \) is an equivalence relation
   iff \( (a, b) \) and \( (a, c) \) in \( R \) imply that \( (b, c) \in R \).
   b) Explain Warshall's algorithm with an example.

6. Find a minimal spanning tree for the following graph.

7. a) Prove that \( 1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6} \) for \( n \geq 1 \), using mathematical induction.
   b) Explain Breadth-First search algorithm for a spanning tree with example.

8. a) Give the adjacency matrix of the digraph \( G = (\{a, b, c, d\}, R) \),
   where \( R = \{(a, b), (b, c), (d, c), (d, a)\} \).
   b) Find \( r \), given that \( F_r = 2F_{r+1} + F_{r+2} \).
1. Answer the following:  
   a) i) Explain self-complementing code with example.  
      ii) Find the distance between 01010 and 11001 using Hamming distance.  
   b) Convert 10.333 decimal number to base 3 and base 5.  
   c) Write De Morgan’s law and prove it for 2 variables.  
   d) State disadvantages of open drain gate. What is Tri-state gate?  
   e) Draw the circuit of JK Flip Flop and give its Truth table.  
   f) Explain Indirect addressing briefly.  
   g) Represent the following number in single precision and double precision IEEE format 0.654  
   h) Is DRAM or SRAM more expensive per bit of storage? Justify your answer.  
   i) Explain software polling.  
   j) Explain briefly Vectored Interrupts.

2. a) Minimize the following Boolean function using karnaugh map  
   \[ f(a, b, c, d) = \sum 1, 3, 5, 8, 9, 11, 15 + \sum (2, 13). \]  
   b) Minimize the following Boolean function using Quine-McCluskey’s Method.  
   Check with karnaugh map reduction method.  
   \[ f(w, x, y, z) = \sum 2, 3, 6, 7, 14, 15 \]  

3. a) Design seven segment display decoder and realize using NAND gates only.  
   b) Explain with circuit of multiplexer realization of seven segment display decoder.

4. a) Explain operation code encoding and decoding.  
   b) Explain data flow graph with diagram and explain microprogram.

5. a) Explain Booth’s method of multiplication.  
   b) Draw and explain a 4-bit serial Adder.

(Turn Over)
6. a) Explain Raster-scan display device with diagram.  
   b) Describe Interrupt controlled data transfer with daisy chaining.  

7. a) Draw and explain synchronous binary counter.  
   b) Design a synchronous modulo – 10 counter to count in the following sequence: 1, 0, 2, 3, 4, 8, 9, 7, 6, 5. Use JK flip flops for design.  

8. a) Explain Dynamic Random Access Memory with diagram and also refreshing Memory.  
   b) Illustrate 2D organization of 2M words, 16 bits/word DRAM Memory.
1. Answer the following:
   a) Evaluate the sum \( \sum_{i=1}^{n} (2i-1) \).
      2M
   b) Write a recursive algorithm to calculate \( x^n \), where \( x \) and \( n \) are +ve integers.
      2M
   c) Write a recursive algorithm to compute \( n^{th} \) Fibonacci number in linear amount of time.
      2M
   d) Write the definition of ‘Data structure’.
      1M
   e) Write the definition of ‘Abstract Data Type’.
      1M
   f) Write the applications of stacks.
      2M
   g) Write the postfix expression for the infix expression \( a+b\times c+ (d+ e+f) \times g \).
      2M
   h) Show the result of inserting 2, 1, 4, 5, 9, 3, 6, 7 into an initially empty AVL tree.
      2M
   i) There are 4 different algorithms \( A_1, A_1, A_3, A_4 \) to solve a given problem with the order \( \log(n), \log(\log(n)), n/ \log(n), n! \log(n) \) respectively. Which is the best algorithm?
      1M
   j) What is the maximum number of comparisons needed to sort 7 items using radix sort? (Assume each item is a 4 digit decimal number).
      1M
   k) A hash table has a space for 100 records. What is the probability of collision before the table is 10% full?
      2M
   l) What is the average number of comparisons performed by the ‘merge sort algorithm’ in merging two sorted lists of length 2?
      2M

2. a) Consider the polynomial
      \( a_0 x^0 + a_1 x^1 + \ldots + a_n x^n \).
      Write a linear time algorithm to find the sum of all terms in a given polynomial.
      8M
   b) Write a program to create Circular Singly Linked List and print it.
      8M

3. Write routines to implement two stacks using only one array. Your stack routines should not declare an overflow unless every slot in the array is used.
   16M

4. a) Write a program to sort given list of objects with minimum number of swappings.
      8M
   b) Explain multiway merge external sorting technique.
      8M

5. Write routines to perform insertion and deletion operations on Binary Search Trees.
   16M

(Turn Over)
6. a) Write a program to implement extendible hashing.
    b) Show the result of inserting the keys:
       10011101, 00000010, 10010111, 10111110, 01111011, 01010001, 00001011,
       11001111, 10011110, 11011011, 00101011, 01000001, 11110000, 01101111,
       10010110 an initially empty hashing data structure with M = 4.

7. a) Write a function to multiply 2 polynomials using a linked list implementation.
    b) Write a non recursive procedure to reverse a singly linked list in O(N) time.

8. a) Write a routine to perform insertion into a B-tree.
    b) Write a routine to perform deletion from a B-tree.
II/IV B.TECH DEGREE EXAMINATIONS – NOVEMBER 2010
FIRST SEMESTER
OOPS THROUGH JAVA

Answer Question No.1 and any five from the remaining.
Write your answers sequentially.

1. Answer the following: 10 x 2M
   a) What is byte code and why is it important to Java’s use for internet programming?
   b) What are the main principles of object-oriented programming?
   c) What is meant by scope and life time of a variable in Java?
   d) What is a constructor?
   e) List any four differences between a class and an object.
   f) What is an abstract class? Write its properties.
   g) What is an exception? What happens if an exception is not caught?
   h) What is use of inter thread communication?
   i) What is an applet and how it will run?
   j) What is meant by InetAddress and how it is created?

2. a) Describe Java as an Object Oriented Programming Language. 8M
   b) What are constructor and destructor functions? Explain different types of constructors. 8M

3. a) What is Multiple Inheritance? Explain how it can be implemented in Java with the help of an example. 8M
   b) Prove that all the methods in an interface are automatically public. 8M

4. a) With the help of an example, explain multithreading by extending thread class. 8M
   b) Explain how multithreading is supported in java using the thread class and the runnable interface. 8M

5. a) Explain the delegation event models. Explain the role of source and listeners with an example. 8M
   b) Describe the process of passing parameters to applets. 8M

6. a) What do you mean by URL? How to create an URL? Explain several methods provided by URL? Give appropriate examples. 8M
   b) What is the JDBC? Explain two-tier JDBC model and three-tier JDBC model. 8M

7. a) What are the types of inheritances in Java? Explain each of them in detail. 8M
   b) Write a Java program to multiply two 2-dimensional matrices. Display the result on the screen. 8M

8. a) How will you create check boxes and choice boxes? Explain the steps in detail. 8M
   b) Describe the complete life cycle of a thread with neat block diagram at each stage. 8M
1. Answer the following:
   a) Find the amount of memory required by an 8 plane frame buffer each of
      red, green and blue having 1024 \times 768 resolution.  
      2M
   b) What is refresh buffer and what is refresh rate?  
      2M
   c) Write about the various operations on segments.  
      3M
   d) What is aliasing?  
      3M
   e) Perspective Projection  
      4M
   f) What is raster – scan?  
      4M
   g) What is the difference between shearing and scaling?  
      2M

2. a) Explain Burehanis circle generating algorithm with an example.  
      12M
   b) List out the various graphic input and output devices.  
      4M

3. a) Prove that two successive reflections about any coordinates axes is equivalent 
      to a single rotation about the origin.  
      8M
   b) Write the matrix representations for the basic 2D transformations.  
      8M

4. a) Explain the different line and character attributes.  
      8M
   b) Explain Area – fill attributes.  
      8M

5. What is clipping and explain in brief about Sutherland – Hodgeman Polygon 
   clipping algorithm.  
   16M

6. a) Show that the composition of two rotations is additive by concatenating the 
      matrix representations for \( R(\theta_1) \) and \( R(\theta_2) \) to obtain \( R(\theta_1) \cdot R(\theta_2) \)  
      12M
   b) Give the transformation matrix for 3D shearing along x-axis and along y-axis.  
      4M

7. What is a structure? Explain the various structure concepts.  
   16M

8. What are Bezier curves? Explain the properties of Bezier curves.  
   16M
II/IV B.TECH. DEGREE EXAMINATIONS – JUNE 2011
FIRST SEMESTER
DISCRETE STRUCTURES AND GRAPH THEORY

Time: 3 hours
Max. Marks: 100

Answer question No.1 and any five from the remaining.

Write your answer sequentially.

1. Answer the following :

   (a) State the converse, opposite, and contra positive to the following statement
   If triangle ABC is a right triangle, then \( |AB|^2 + |BC|^2 = |AC|^2 \).

   (b) Restate the following implications, \( p \rightarrow q \), into the equivalent form, \( \neg p \lor q \).
   If lines AB and CD are parallel, then the alternate interior angles are equal.

   (c) How many dominoes are there in a set which are numbered from double blank to double nine?

   (d) Find the coefficient of \( x^{10} \) in \( \frac{1}{(1-x)^3} \).

   (e) Suppose now that each square can be colored either red, white or blue. Let \( b_n \) be the
   number of ways of coloring the \( n \) squares so that no two adjacent squares are colored red.
   Find a recurrence relation satisfied by \( b_n \).

   (f) Give an example of a nonempty set and a relation on the set that satisfies following
   combinations of properties; draw a digraph of the relation.
   Antisymmetric and reflexive, but not transitive.

   (g) Find the edge chromatic number for the graph \( K_{3,3} \).

   (h) Find a Hamiltonian cycle for the following graph.

   ![Graph Image]

   (i) Is the graph \( K_{3,3} \) critical planar?

   (j) State Euler’s theorem.

2. (a) Translate the following sentence into symbols, first using no existential quantifier,
   and second using no universal quantifier.
   Some numbers are not real.

   (b) Prove or disprove the validity of the following arguments:
   Every living thing is a plant or an animal.
   David’s dog is alive and it is not a plant.
   All animals have hearts.
   Hence, David’s dog has a heart.

(Turn Over)
3. (a) How many integral solutions are there for \(x_1 + x_2 + x_3 + x_4 = 20\) if \(2 \leq x_1 \leq 6, 3 \leq x_2 \leq 7, 5 \leq x_3 \leq 8,\) and \(2 \leq x_4 \leq 9?\)
(b) How many of the numbers between 1 and \(10^6\) inclusive consist of the digits 1, 2, 3, and 4 alone?

4. (a) Solve the following recurrence relation using generating functions
\[a_n + a_{n-1} - 16a_{n-2} + 20a_{n-3} = 0\] for \(n \geq 3\) and \(a_0 = 0, a_1 = 1, a_2 = -1.\)
(b) Solve the following recurrence relation by substitution
\[a_n = a_{n-1} + 3n^2 + 3n + 1\] where \(a_0 = 1.\)

5. (a) Let \(A\) be the set of positive integers. Define \(R\) on \(A\) by \((a, b) \in R\) iff \(a\) divides \(b\) or \(b\) divides \(a.\) Show that \(R\) is reflexive and symmetric but not transitive.
(b) Explain Warshall’s algorithm with an example.

6. Find a minimal spanning tree for the following graph

7. (a) Prove that \(1 / (1)(2) + 1 / (2)(3) + \cdots + 1 / n(n + 1) = n / (n+1),\) using mathematical induction.
(b) Explain Depth-First search algorithm for a spanning tree with example.

8. (a) Give the Boolean matrix representation of the transitive reflexive closure, \(R^+\).
(b) Find \(t,\) given that \(F_t = 5F_{317} + 3F_{316}.\)
II / IV B.TECH. DEGREE EXAMINATIONS – JUNE 2011
FIRST SEMESTER
DIGITAL LOGIC AND COMPUTER DESIGN

Time: 3 hours
Max. Marks: 100

Answer question No. 1 and any five from the remaining.
Write your answers sequentially.

1. Answer the following: 10 × 2M
   (a) (i) Explain a weighted code with example.
       (ii) Convert decimal number 94.00625 to binary.
   (b) Convert 101101.0101 binary number to their equivalent decimal and hexadecimal number.
   (c) Using the postulates of Boolean algebra prove \((x + y) \cdot (x \cdot z + z) = \overline{x}, y, z\)
   (d) What are universal gates? Explain the reasons.
   (e) What is Race around condition? How to overcome?
   (f) Describe Instruction Format with suitable example.
   (g) Write the formats of
       (i) Normalized floating point mode in excess 128 form.
       (ii) IEEE 754 format.
   (h) What is refreshing? Which type of memory needs refreshing?
   (i) Explain Bus Arbitration.
   (j) Explain I / O processor.

2. (a) Describe canonical sum and canonical product form and express the following in canonical sum and canonical product from: 8M
   (i) \(\overline{a}b + a.c + b.c\)
   (ii) \(\overline{a}b \cdot (a.b + c). (b + \overline{c}d)\)
   (b) Minimize the following boolean function using Quine – Mccluskey’s Method.
       \(f(a, b, c, d) = \sum(0,1,2,3,6,7,13,14) + \sum_d(8,9,10,12)\). 8M

3. (a) What is multiplexer? Explain in detail with Gate Circuit. Realize the following expression with multiplexer.
       \(Y = \overline{C} \cdot \overline{A} \cdot \overline{B} + \overline{C} \cdot A \cdot B + \overline{C} \cdot A \cdot B + C \cdot A \cdot B\). 8M
   (b) Draw and explain BCD to seven segment display decoder using PLA. 8M

(Turn Over)
4. (a) Explain different addressing modes.  
     (b) Explain clocks and timing in detail.

5. (a) Write and explain Floating Point addition / subtraction algorithm and trace with an example. 
     (b) Draw and explain Four stage ripple carry adder.

6. (a) Explain the read and write operations in magnetic disk memory (Hard disk). 
     (b) Explain DMA Based Data Transfer with diagram.

7. (a) Draw and explain 4 bit shift register using JK Flip - Flops. 
     (b) Design a synchronous modulo – 6 up – down counter. Use JK Flip – Flops for synthesis.

8. (a) Explain Block set – associative mapping in cache memory with diagram. 
     (b) Explain Address Translation in Virtual Memory.
II / IV B.TECH. DEGREE EXAMINATIONS – JUNE 2011
FIRST SEMESTER
DATA STRUCTURES
(EM / CS)
Max. Marks: 100

Answer question No.1 and any five from the remaining.
Write your answer sequentially.

1. Answer the following: 10 × 2M
   (a) Let \( F_i \) be the Fibonacci number, then evaluate the following sum
       \[ \sum_{i=1}^{n^2} F_i \]
       assume that \( F_1 = F_2 = 1 \).
   (b) Write Euclid’s algorithm for computing the gcd of two integers.
   (c) Solve the recurrence relation \( T(n) = T\left(\sqrt{n}\right) + n \)
       where \( n \) is integer power of 2 and \( T(2) = C_1 \).
   (d) Define a deque (Double Ended Queue). Write one application of deque.
   (e) Write the advantages of modularity.
   (f) Write recurrence, relation of quick sort in best case and solve it.
   (g) Draw any two possible AVL trees for the set of identifiers \{1, 2, 3, 4\}.
   (h) Write the definition of B – trees.
   (i) Find the maximum number of nodes and non-leaf nodes in a binary tree of
       height \( H \).
   (j) Given input \{4371, 1323, 6173, 4199, 4344, 9679, 1989\} and a hash function
       \( h_1(x) = x \mod 10 \), show the resulting open addressing hash table with second
       hash function \( h_2(x) = 7 - (x \mod 7) \).

2. (a) Given integers \( A_1, A_2, A_3, \ldots, A_n \), find the maximum value of \( \sum_{k=1}^{i} A_k \) is called
       maximum subsequence sum problem. Give an algorithm to find the maximum
       subsequence sum. 8M
   (b) Write a program to create doubly linked list and print it. 8M

3. Write a program to check for balancing symbols in the C language \{1**1, ( ), [ ], { }\}
   by using stacks. 16M

(Turn Over)
4. Write a program to sort the given list of objects by using merge sort, without using recursion.  

5. Write routines to perform insertion and deletion operations on AVL trees.  

6. Suppose we want to find the first occurrence of a sorting P1 P2 P3 ... PK in a long input string A1 A2 ... AN. We can solve this problem by hashing the pattern string, obtaining the hash value H_P, and comparing this value with the hash value formed from A1 A2 A3 ... AK, A2 A3 ... AK+1, A3 A4 ... AK+2 and so on until AN-K+1 AN-K+2 ... AN. If we have a match of hash values, we compare the strings character by character to verify the match. We return the position (in A) if the strings actually do match, and we continue in the unlikely event that the match is false. Write a program to implement it.  

7. Write a linked list implementation of self-adjusting list. A self-adjusting list is like a regular list, except that all insertions are performed at the front and when an element is accessed by a find, it is moved to the front of the list without changing the relative order of other items.  

8. (a) Write a routine that reads two alphabetized files and merges them together, forming a third alphabetized file.  
(b) Give the time complexity of the above routine and prove it.
II / IV B.TECH. DEGREE EXAMINATIONS – JUNE 2011
FIRST SEMESTER
OOPs THROUGH JAVA

Time: 3 hours
Max. Marks: 100

Answer question No.1 and any five from the remaining.
Write your answer sequentially.

1. Answer the following:
(a) Define (i) Encapsulation (ii) Inheritance.
(b) Why does java use unicode?
(c) What is garbage collection and how does it works?
(d) What are the differences between a method and a constructor?
(e) What is meant by method overriding?
(f) What is meant by multithreading?
(g) What is the use of synchronization?
(h) Briefly explain Java’s delegation event model.
(i) What is a Swing? What are its uses in Java?
(j) What is a socket? What is its use in networking?

10 × 2M

2. (a) What is a constructor? What are its special properties? How do we invoke a constructor?
(b) What is the difference between overloading and overriding a method?

8M

3. (a) Define an interface. Write a program which illustrates the way to design and implement an interface. Give an example where interface can be used to support multiple inheritance.
(b) What is a Byte Stream class? Explain various Byte Stream classes available in java.

8M

4. (a) What is the role of priorities in multithreading? What are its limitations? How do you set and get priority values for threads in Java?
(b) What is a runnable interface and what are the methods associated with it? Give an example program for creating a thread using runnable interface.

8M

(Turn Over)
5. (a) Describe Event handling model. Explain any three components in Swing.
   (b) Describe various components in Swing.

6. (a) Describe the JDBC architecture and explain the process of writing JDBC programs.
   (b) What are sockets? Explain the classes in java with regard to sockets.

7. (a) What is event source? Give examples of event sources. How events are generated?
      Are all events generated by user actions? Comment on it.
      (b) Use socket programming to design a client/server application that takes the passwords as input and checks whether it is correct. The program should print the appropriate message.

8. (a) What is the use of five keywords of Java related to exception handling i.e., try, catch, throw, throws, and finally. Write an example Java program using all the five key words mentioned above, and explain how the program works.
   (b) Write a sample program to illustrate packages.
II / IV B.TECH. DEGREE EXAMINATIONS – JUNE 2011
FIRST SEMESTER
COMPUTATIONAL MATHEMATICS

Time: 3 hours (CS / EM) Max. Marks: 100

Answer question No.1 and any five from the remaining. Write your answer sequentially.

1. Answer the following:
   (a) Write Dirichlet’s conditions for Fourier expansions.
   (b) State Parseval’s identity for Fourier transform.
   (c) Write the relation between E, Δ and V.
   (d) Find Δ(ab^2).
   (e) Write Bessel’s formula.
   (f) Write Simpson’s 1/3 rule.
   (g) Write Lagrange’s formula for unequal intervals.
   (h) Define feasible and optimal solutions in linear programming.
   (i) Define Slack and Surplus variables.
   (j) What is the difference between the transportation problem and assignment problem?

2. (a) If \( f(x) = \begin{cases} 
0, & -\pi \leq x \leq 0 \\
\sin x, & 0 \leq x \leq \pi 
\end{cases} \)
   Prove that \( f(x) = \frac{1}{\pi} + \frac{2}{\pi} \sum_{n=1}^{\infty} \frac{\cos 2nx}{4n^2 - 1} \)
   Hence show that \( \frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \cdots \rightarrow 0 = \frac{1}{4} (\pi - 2) \).

   (b) Obtain the Fourier half range sine and cosine series for \( f(x) = x \) in \( 0 < x < \pi \).

3. (a) Find the Fourier transform of \( f(x) = \begin{cases} 
1, & |x| < 1 \\
0, & |x| > 1 
\end{cases} \)
   hence evaluate \( \int_{0}^{\infty} \frac{\sin x}{x} \, dx \).

   (b) Find the Fourier sine and cosine transform of \( xe^{-ax} \).

4. (a) Apply Gauss – Seidel iteration method to solve the following equations.
   \[ \begin{align*}
   20x + y - 2z &= 17 \\
   3x + 20y - z &= -18 \\
   2x - 3y + 20z &= 25
   \end{align*} \]

   (b) Use Gauss’s forward formula to evaluate \( y_0 \), given that \( y_{31} = 18.4708 \),
   \( y_{33} = 17.8144, \ y_{39} = 17.1070, \ y_{35} = 16.3432 \) and \( y_{37} = 15.5154 \).
5. (a) Given that

<table>
<thead>
<tr>
<th>x</th>
<th>1.0</th>
<th>1.1</th>
<th>1.2</th>
<th>1.3</th>
<th>1.4</th>
<th>1.5</th>
<th>1.6</th>
</tr>
</thead>
</table>

Find \( \frac{dy}{dx} \) and \( \frac{d^2y}{dx^2} \) at \( x = 1.1 \).

(b) Use Simpson's 1/3 rule to find \( \int_0^6 e^{-x^2} \, dx \) by taking seven ordinates.

6. (a) Use M - method to

Minimize \( Z = 2x_1 + x_2 \)

Subject to \( 3x_1 + x_2 = 3 \)
\( 4x_1 + 3x_2 \geq 6 \)
\( x_1 + 2x_2 \leq 3, \quad x_1, x_2 \geq 0 \).

(b) Solve the following transportation problem:

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<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source I</td>
<td>21</td>
<td>16</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>II</td>
<td>17</td>
<td>18</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>III</td>
<td>33</td>
<td>27</td>
<td>18</td>
<td>41</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Availability</th>
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<tr>
<td>6</td>
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</table>

7. (a) Obtain the Fourier series for \( f(x) = \pi x \) in \( 0 \leq x \leq 2 \).

(b) Express the function \( f(x) = \begin{cases} 1 & \text{for } |x| < 1 \\ 0 & \text{for } |x| > 1 \end{cases} \) as a Fourier integral.

Hence evaluate \( \int_0^\infty \frac{\sin \lambda}{\lambda} \cos \lambda x \, dx \).

8. (a) Apply Bessel's formula to obtain \( j_{25} \), given \( j_{25} = 2854, \quad j_{34} = 3162 \)
\( j_{25} = 3544, \quad j_{32} = 3992 \)

(b) Using Simplex Method

Maximize \( Z = 5x_1 + 3x_2 \)

Subject to \( x_1 + x_2 \leq 2 \)
\( 5x_1 + 2x_2 \leq 10 \)
\( 3x_1 + 8x_2 \leq 12, \quad x_1, x_2 \geq 0 \).
II/IV B.TECH. DEGREE EXAMINATIONS – JUNE 2011
FIRST SEMESTER
COMPUTER GRAPHICS THROUGH C++

Time: 3 hours
Max. Marks: 100

Answer question No.1 and any five from the remaining.
Write your answers sequentially.

1. Answer the following:
   (a) What are the characteristics of a good line drawing algorithm? 3M
   (b) Define raster scan system.
   (c) What is Aliasing?
   (d) What are homogeneous coordinates?
   (e) What is a window and a viewport?
   (f) What is clipping? Explain polygon clipping.
   (g) Write about Blending functions.
   (h) Write about B – splice curves.

2. (a) Digitize a line from (10, 12) to (20, 18) on a raster screen using Bresenham’s straight line algorithm.
   (b) Distinguish between seed filling and scan line – filling algorithm.

3. (a) Write the general form of Scaling Matrix about a fixed point (x_r, y_r)
   (b) Explain character or text generation.

4. Explain Cohen – Sutherland line clipping algorithm in detail with an example.

5. What are the characteristics of Bezier curves and write about Spline’s blending function.

6. (a) Explain the taxonomy of projection and write about in detail perspective projection.
   (b) Give the basic three dimensional matrix representations.

7. (a) Write an algorithm for Bresenham’s circle generating method.
   (b) Write about inside outside tests for polygons.

8. (a) Write about polygon clipping with an example.
   (b) Explain GUI and interactive input methods.