

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2014

THIRD YEAR

COMPUTER SCIENCE (Honours)

Paper : VII

Date : 05/05/2014

Time : 11 am – 3 pm

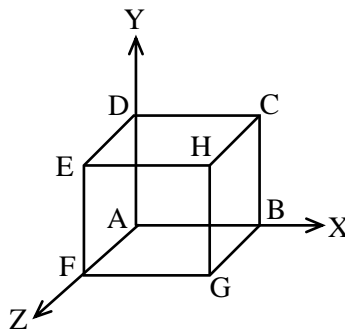
Full Marks : 100

[Use a separate Answer book for each group]

Group – A

(Answer any four questions)

1. Define any five of the following terminology : [5×2]
 - a) Shadow mask of colour CRT monitor.
 - b) Shearing in 2-D geometrical transformation.
 - c) Vanishing point in perspective projection.
 - d) Key-frame in computer animation.
 - e) Seed pixel in solid area fill algorithm.
 - f) Scan conversion in Computer graphics.
 - g) 2-D viewing transformation.
2. a) What is the benefit of representing the 2D transformations in Homogeneous coordinate systems? [5]
b) Consider a unit cube in the following Figure in standard position with its vertices at A(0,0,0), B(1,0,0), C(1,1,0), D(0,1,0), E(0,1,1), F(0,0,1), G(1,0,1) and H(1,1,1) respectively.



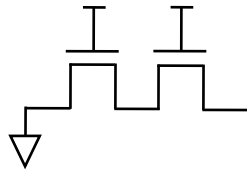
Perform a standard perspective projection of the cube when the view direction is along the negative Z-axis. [5]

3. a) Show that translation followed by rotation is not the same as rotation followed by translation. [4]
b) Explain how the concept of 4-connectivity and 8-connectivity of pixels can change the result of a filling algorithm. [6]
4. a) Show that the reflection about the $y = x$ line is equivalent to reversing the actual coordinates, i.e. $T_{\text{ref. } x=y}(x,y) = (y,x)$. [3]
b) Discuss DDA Line drawing algorithm for positive slope only. [4]
c) How does the performance of DDA depend on the slope of the line? Explains with proper illustration. [3]
5. Make comparative study on any two of the following : [2×5]
 - a) Perspective projection vs. Parallel projection
 - b) Raster scan display vs. Vector scan display
 - c) Bresenham's scan conversion vs. Midpoint scan conversion
6. Write short note on any two of the following : [2×5]
 - a) Bezier Curve
 - b) Fractals
 - c) CRT monitor
 - d) Morphing

Group – B

(Answer **any three** from the following)

7. a) Describe the P-well process of fabrication of CMOS. [8]
b) What is Stick diagram in MOS design? [2]
8. a) Explain what is meant by 'Struck-at-0' and 'Struct-at-1' fault. [4]
b) Explain the terms, 'Strong 0' and 'Strong 1'. [4]
c) What is the need of scaling of MOS devices? [2]
9. a) Deduce the expression of voltage-current relationship of MOSFET. [8]
b) Differentiate between constant voltage scaling and constant field scaling. [2]
10. a) How can we construct CMOS NAND2 gate. [3]
b) Draw the CMOS logic diagram of the function $f = \overline{A(D + E) + BC}$. [4]
c) Draw the Stick diagram for a 2-input NAND gate. [3]
11. a) What is pass transistor? [1]
b) Give an amount of system timing consideration. [3]
c) Give an expression for the output voltage for pass transistor networks. [3]

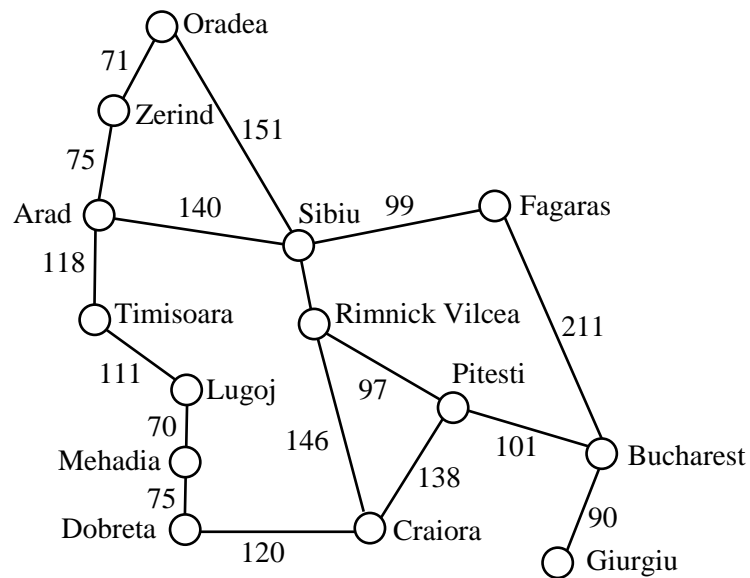


- d) Differentiate between FPGA and ASIC in terms of structure and application. [3]

Group – C

(Answer **any three** questions)

12. a) What is a skolem function? [2]
b) Write down the Modus Process inference rules. [2]
c) Consider the following sentences :
 - Marcus was a man
 - Marcus was a Pompeian
 - All Pompeian's are roman
 - Ceaser was a ruler
 - All roman are either loyal to Ceaser or hated him.
 - Everyone is loyal to someone
 - People only try to assacinate rulers they are not loyal to
 - Marcus tried to assacinate Ceaser— Using resolution theorem, prove that "Marcus hate Ceaser" . [6]
13. a) What is artificial neural network? [2]
b) Write down training procedure of a perceptron to complete 2-input AND operation. [8]
14. a) Write and explain the Min-Max algorithm in the context of game playing. [5]
b) How can the concept of Alpha-Beta pruning improve the performance of adversarial search — explain with suitable example. [5]
15. a) Does A* algorithm ensure optimality if the heuristic is not admissible? [4]
b) Consider the following Romania problem. [6]



Apply A* search algorithm to find path from Bucharest to Arad.

16. a) What is robot? Define it according to R.I.A. [2]
- b) What are the knowledge base for robotics? [2]
- c) Draw key component diagram of robotics. Describe each component briefly. [6]

