BCA Sem-VI

CG-CC-13(R/B)

April,2024

Computer Graphics

Full Marks: 60 **Time: 3 Hours**

Group-A

(Answer All) **[8x1=8]**

1. a) What is refresh rate of a CRT?
   b) What is CADD?
   c) Enumerate a list of graphics software.
   d) What is DDA?
   e) Who is J.E. Bresenham?
   f) What is clipping of lines?
   g) Define affine transformation.
   h) Is efficiency important in creating successive views of an object?

Group-B

(Answer any 8 questions) **[8x1.5=12]**

2. a) What is horizontal scan rate?
   b) What is the use of shrinking raster?
   c) LCD is made up of .....layers.
   d) How CAM and CAD different from each other?
   e) What is the use of flatbed plotter?
   f) Write the name of an algorithm for clipping a line very effectively.
   g) What do you mean by planar geometric projections?
   h) Are two successive 2D rotations additive?
   i) What are the different charges used in laser printer?
   j) What are the different types of color sprayed by ink-jet printer?

Group-C

(Answer any 8 questions) **[8x2=16]**

3. a) What is virtual reality environments?
   b) What is addressability? How is it related with Dot size?
   c) State one of the merits of Midpoint Line Algorithm over Basic incremental algorithm.
   d) What are the sequence of transformations required for rotating an object about some arbitrary point 'p'.
   e) What is weighted area sampling?
   f) What is window to viewpoint transformation?

g) What is homogenized point?

h) What is antialiasing?

i) Define edge coherence.

j) What is SRGP?

Group-D

(Answer any 4 questions) **[4x6=24]**

4. a) Discuss Sutherland-Hodgman Polygon clipping algorithm.

b) An object is to be scaled by a factor S in the direction whose direction cosines are (α, β, γ). Derive the transformation matrix.

c) Discuss the subclasses of planar geometric projections.

d) Write an algorithm for drawing a line y=mx+c, where 'm' and 'c' are constants.

e) Write the procedure for filling a polygon.

f) Draw the architecture of a raster display system.

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BCA Sem-VI
NT-CC-14(R/B)

April,2024

NUMERICAL TECHNIQUES

Full Marks:60 **Time: 3 Hours**

Answer all the questions.
The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

1. Answer all the questions. **[8x1]**

(a) Find the number of significant digits in the number 0.000358000200.

(b) The number 0.859378, when rounded off to four significant figure becomes_____.

(c) Explain the geometrical interpretation of Newton's Raphson method.

(d) The rate of convergence of secant method is ____.

(e) Write the first order relation between forward and backward differences?

(f) If the number of interpolating points are n+1, then write the possible degrees of the corresponding interpolating polynomial.

(g) How many nodes should be there for Simpson's $\frac{1}{3}rd$ rule?

(h) What is the truncation error of Euler's method?

2. Answer any **Eight** questions. **[8x1.5]**

(a) How many roots are there for the equation $tan\ x = x$?

(b) Write on advantage and one disadvantage of Regulafalsi method.

(c) Explain simple trapezoidal rule geometrically.

(d) Taking h as the interval of difference determine $\Delta^2 x^2$.

(e) If $f(x) = x^3$, determine $f[x_0, x_1, x_2]$.

(f) Write the error term in interpolation.

(g) What is the difference between chopping and rounding off errors?

(h) Write the sum of 0.123×10^3 and 0.456×10^2 in three digit mantissa form.

(i) When does Simpson's $\frac{1}{3}rd$ rule for the integration $\int_a^b f(x)dx$ give exact result?

(j) Perform 2 iterations of the bisection method to obtain the smallest positive root of the equation $x^3 - 5x + 1 = 0$.

3. Answer any **Eight** questions. **[8x2]**

(a) What do you mean by loss of significant digits?

(b) Using the data sin(0.1) = 0.09983 and sin (0.2) = 0.19867, find an approximate value of sin(0.15) by Lagrange interpolation.

(c) How many iteration is required to approximation a root f(x)=0 in [a,b], for which error less than 10^{-6} in bisection method?

(d) Using Newton-Raphson method find the smallest negative real root of the equation $x^3 - x^2 - x + 1 = 0$.

(e) Write the relative error, when 37.46235 rounded off to four significant figures.

(f) If $f(x) = e^{ax}$, find $\nabla^3 f(x)$.

(g) Write two iterations methods which are based on first degree equations.

(h) Write the Newton-Cotes quadrature integration formula?

(i) Show that $\delta = \nabla(1 - \nabla^{-\frac{1}{2}})$, δ =central difference operator, ∇=backward difference operator.

(j) Solve the initial value problem $y' = -2xy^2$, u(0)=1 on [0,1], with $h = 0.2$.

4. Answer any **Four** questions. **[4x6]**

(a) Define truncation error. What is the absolute, percentage and relative errors involved if $y = \frac{2}{3}$ is represented in normalized decimal form with 6-digits?

(b) Using Newton-Raphson method find the smallest positive root of the equation $x^4 - 3x^2 + x - 10 = 0$.

(c) Find the smallest positive real root of the $\tan x + \tanh(x) = 0$ by using Bisection method.

(d) Find the missing term in the table using interpolation

x	0	1	2	3	4
y	1	3	9	–	81

(e) Evaluate $\int_0^1 (1 + \frac{\sin x}{x})dx$ correct to 3 decimal places using trapezoidal rule.

(f) Using the modified Euler method, find y(0.6) if h=0.1 and $y' = x^2 + y^2, y(0) = 1$.

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BCA Sem-VI

DS-DSE-3(R/B)

April,2024

Data Science

Full Marks: 60 **Time: 3 Hours**

Answer all the questions.

The figure on the right-hand margin indicates marks.

Group-A

1. Answer **all** the questions **[8 x 1 = 8]**
   a) Data science primarily focuses on turning raw data into actionable knowledge. (True/False)
   b) What is Git primarily used for?
   (i) Version control *(ii)* Data Analysis *(iii)* Cloud computing *(iv)* Social Networking
   c) Numeric data type in R can store both integer and floating-point numbers. (True/False)
   d) The data type used to represent missing or undefined values in R is _____.
   e) "Getting and cleaning data" is a not crucial step in the data science process. (True/False)
   f) What is 'tidy' in data science?
   g) What is a statistical measure called the middle value of a dataset?
   A. Mean *B.* Median *C.* Mode *D.* Variance
   h) Eliminating potential hypotheses is a crucial step in the hypothesis testing process. (True/False)

2. Answer any **eight (8)** questions. **[8 x 1.5 = 12]**
   a) Which tool is used for collaborative coding and version control in data science projects?
   b) What is RStudio?
   c) What are the three main types of control structures in R?
   d) What is code profiling in R?
   e) What precautions should you take when obtaining data from web sources for analysis?
   f) What is a database in the context of data science?
   g) What is descriptive statistics in data science?
   h) Give any two uses of data science.
   i) How do you write a while loop in R?
   j) How can you list objects in R?

3. Answer any **eight (8)** questions. **[8 x 2 = 16]**
   a) What is the difference between data and information?
   b) What is cleaning and preparing data?
   c) Write a R code to print 1 to 10.
   d) What do you mean by version control?
   e) Write four features of the R programming language.
   f) What is the purpose of data cleaning?
   g) Give two examples of high-dimensional data.
   h) Define API.
   i) What is GitHub?
   j) What is a Data frame?

Answer all the questions. **[4x6]**

4. What is data science? How is data science beneficial for society? Explain.

OR

Explain the different toolboxes used to turn data into actionable knowledge.

5. Explain different data types of R programming language.

OR

Write an R program to find the simple interest. [SI = (principal * rate * time) / 100]

6. What is the difference between obtaining data from APIs and from databases?

OR

What are the various data formats?

7. Explain two exploratory techniques for summarizing data.

OR

Write a short-notes on "Data analysis".

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