BRAC UNIVERSITY

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Department of Computer Science and Engineering

Examination: Midterm Exam
Duration: 1 hour 15 minutes

Semester: Spring 2023
Full Marks: 30

CSE 423: Computer Graphics

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Answer the following questions.
Figures in the right margin indicate marks.

1. $f(x, y) = \frac{x}{3} - \frac{y}{5} - 2 = 0$

Suppose, you have to plot the above line starting from its intersection with the x-axis and ending at that of the y-axis.

a. CO1 **Identify** the Zone (from Zone-0 to Zone-7) of the above line. **2**

b. CO1 **Derive** starting/initial deviation (**'d'**) and its derivatives (**Δs**)/decision parameters using mid-point line drawing algorithm. **4**

c. CO1 Using the mid-point line drawing algorithm, **compute** all the pixels (from start to end) to be colored for the given line segment. **Show** the present value of **d** as well as **Δs** at each stage. **4**

2. a. CO1 **Derive** starting/initial deviation (**'d'**) and its derivatives (**Δs**)/decision parameters for drawing one octant of a circle starting from (**0, r**) using mid-point circle drawing algorithm. **5**

b. CO1 **Calculate** all the pixels of one octant of a Circle starting from (**0, r**) where, **r = 10**, and origin/center of the circle is at (**-2, 3**), showing the present value of **d** as well as **Δs** at each stage. **5**

3. a. CO2 **Write** an algorithm for making **region-outcode** of a 3D end-point using Cohen-Sutherland line clipping algorithm (assuming lowest bits for x and highest bits for z) **4**

b. CO3 Suppose, a viewing window from (-200, -150) to (200, 150) is given. **6**
(i) **Compute** the numerical value of '**t**' for all boundaries for a given line segment starting from **(-220, 350)** to **(350, 120).**
(ii) **Classify** them as '$\mathbf{t_E}$' or '$\mathbf{t_L}$'.
(iii) **Determine** the new endpoints using the value of '$\mathbf{t_{Emax}}$' and '$\mathbf{t_{Lmin}}$'