NATIONAL INSTITUTE OF TECHNOLOGY, PATNA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
END-SEMESTER EXAMINATION – MAY 2021
B. Tech. 6th Semester CSE
Date: 20th May 2021(FN)   Time: 02 Hrs.   CS6401 – Computer Graphics
Max. Marks: 40

Instructions: *It will be same as per the Exam section of NIT Patna.*

Q. 1. Define the following terms in brief with suitable diagram (if possible):   **[10*1=10]**
    (i) Computer Graphics (ii) Virtual Reality (iii) Frame (iv) Frame Buffer (v) Raster-Scan Systems (vi) Octree representation (vii) Resolution and Aspect ratio (viii) Anti-Aliasing (ix) Fractal dimension (x) Ray Casting.

Q. 2. Differentiate between parallel and perspective projections with suitable example. Also explain the perspective projection equations in the special cases if the projection reference point could be limited to positions along the z_{view} axis.   **[04]**

Q. 3. Explain the Cohen-Sutherland Line clipping algorithm with suitable example and also differentiate between Cohen-Sutherland and Mid-point Subdivision line clipping algorithms. Also describe steps of 2D viewing-transformation pipeline with suitable diagram.   **[04]**

Q. 4. A cube is defined by 8 vertices A (0,0,0), B (2,0,0), C (2,2,0), D (0,2,0), E (0,0,2), F (2,0,2), G (2,2,2), and H (0,2,2). Find the final coordinates after it is rotated by 45 degree around a line joining the points (2,0,0), and (0,2,2).   **[04]**

Q. 5. Differentiate between Spline, B-Spline, and Bézier Curves. What are the cubic Bézier (blending) functions (Bernstein polynomials of order three) used to define the cubic Bézier curve with the help of equation in **range [0, 1]** by t.   **[06]**

Q. 6. Proof the following in 2D transformations: **[2*3=06]**
    (a) Prove that successive 2D rotations are additive; i.e. R(θ1) . R(θ2) = R(θ1 + θ2).
    (b) Prove that 2D rotation and scaling commute if Sx = Sy or θ = nπ for integral n and that otherwise they do not.

Q. 7. Are we using GPU model in our normal PCs? Answer with proper justification. Also explain the benefits for using an external GPU models/cards as heterogeneous system? Also explain the GPU enabled CUDA architecture processing flow by suitable diagram.   **[06]**

All the Best