

KATHMANDU UNIVERSITY
End Semester Examination
August, 2018

Marks scored:

Level : B.E. / B.Sc.

Year : III

Exam Roll No.:

Time: 30 mins.

Course : COMP 342

Semester: II & I

F.M. : 10

Registration No.:

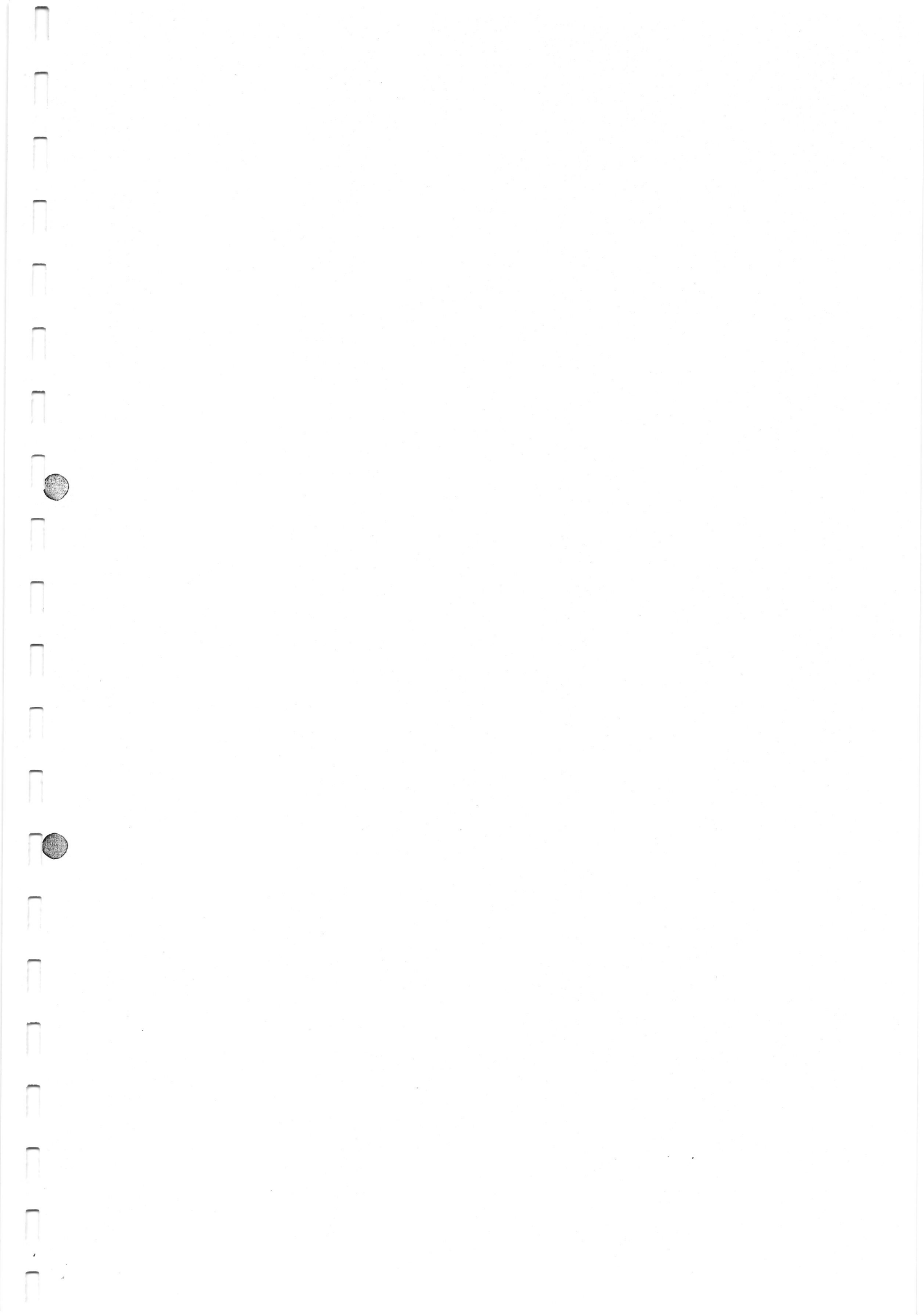
Date AUG 27 2018

SECTION "A"

[20 Q.×0.5=10 marks]

Tick (✓) the best answer.

- Which applications of Computer Graphics provide realistic exterior building displays, and facilities for experimenting with 3D interior layouts and lighting?
 Computer-Aided Design Visualization
 Education and Training Image Processing
- While drawing a line with end point (20, 10) and (30, 18) using DDA algorithm, the X_{inc} and Y_{inc} value will be _____
 (1.25, 1) (0.8, 1.25) (1.25, 0) (1, 0.8)
- While drawing a circle section from $x = 0$ to $x = y$ in the first quadrant with radius 10 and center (50, 50) using midpoint algorithm, the decision parameter P_1 will be _____.
 -9 4950.25 -6 110
- In high quality raster display systems with two frame buffers, frame buffers can be alternately used for:
a. Refreshing
b. Filling intensity values
c. Mixing the frame buffer image with an input image from television camera
 a & b a & c b & c a only
- In architecture of a raster system with a fixed portion of the system reserved for the frame buffer, the video controller has direct access to:
a. System Memory
b. Frame Buffer memory
c. Monitor
 a & b b & c b only c only
- How long would it take to load a 640 by 480 frame buffer with 12 bits per pixel, if 10^5 bits can be transferred per second?
 3.072 S 3686400 S 36.864 S 25600S
- Reflection of a point about x-axis, followed by a counter-clockwise rotation of 90° , is equivalent to reflection about the line?
 $x = -y$ $y = -x$ $x = y$ $x + y = 1$
- In **y-direction** shear relative to the line $x = x_{ref}$, with shearing factor Sh_x and Sh_y , the transformed x- coordinate will be _____
 $x + Sh_x * y$ x
 $x + Sh_x (x - x_{ref}) * y$ $sh_y * (x - x_{ref}) + y$



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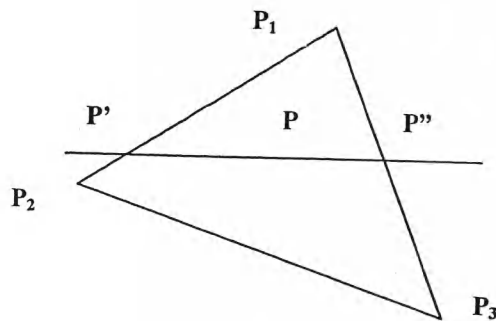
Level : B.E. / B.Sc.
Year : III
Time : 2 hrs. 30 mins.

AUG 27 2018
Course : COMP 342
Semester: II & I
F.M. : 40

SECTION "B"
[6 Q. × 4=24 marks]

Attempt **ANY SIX** questions.

1. What is Computer Art in context of computer graphics? Innovation Center, Nepal is planning to develop a course module for supporting the High school students to understand the concept of Mathematics and its application in our daily life. You as a student of Computer Graphics, which application of computer graphics you think will be appropriate for this purpose, and explain with examples how will you make use of computer graphics for preparing these modules? [1+3]
2. What is the fraction of the total refresh time per frame spent in retrace of the electron beam for **interlaced raster system** with a resolution of 1280 by 1024, a refresh rate of 60 Hz, a horizontal retrace time of 5 microseconds, and vertical retrace time of 500 microseconds? Describe the architecture of raster-graphics system with attached display processor with suitable block diagram? [2+2]
3. Write the general matrix form which is capable of performing basic transformations in **Cartesian form**; mention the size of matrix and its content for different transformations? Show that two successive reflections about any line passing through the coordinate origin is equivalent to a single rotation about the origin using homogeneous coordinate? [2+2]
4. Differentiate between Window and Viewport? Clip the line **LI (1, -2, 3, 3)** against the rectangular window **R (-3, 1, 2, 6)** using Cohen-Sutherland algorithm? [1+3]
5. Why is it easier to locate hidden surfaces when parallel projection is used? Describe Scan line method for hidden surface detection technique with suitable example and also lists its advantage over Z-buffer method? [1+3]
6. When a light source is relatively far away from a polyhedron, the diffuse reflection determined by the Phong formula varies little within each polygonal face. Why? How can you compute the color of **P** using Intensity interpolation technique from the given figure? [1+3]



7. Write Short notes on:
a. RGB Color model
b. Generation of in between frames

[2+2]

SECTION "C"

[2Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

8. Compare and contrast between Bresenham and Mid-point approach for drawing 2D Geometrical shapes? Derive all the required decision parameters and write an algorithm for plotting the line with $|m| \geq 1$ using Mid-point algorithm? Digitize a circle with radius 5 and center at origin using Mid-point algorithm? [1.5+ 5+1.5]
9. Find the transformation co-ordinates of a pyramid whose co-ordinates are A(0,0,0), B(1,0,0), C(0,1,0) and D(0,0,1) after performing a **cavalier projection** that makes an angle 30° with horizontal axis in X_v, Y_v plane? Derive the composite transformation matrix for rotating a 3D object about an arbitrary axis using homogeneous coordinate (*make necessary assumptions*)? [3+5]
- 10.a) Differentiate between phong shading and Gouraud shading? Explain diffuse reflection with supporting mathematical relations? [2+3]
- b) Reflect the diamond-shaped polygon whose vertices are A(-1,0), B(0,-2), C(1,0), and D(0,2) about the horizontal line $y = 2$? [3]