Course code | Course Name | L-T-P Credits | Year of Introduction
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CS401 | COMPUTER GRAPHICS | 4-0-0-4 | 2016

Course Objectives:
- To introduce concepts of graphics input and display devices.
- To discuss line and circle drawing algorithms.
- To introduce 2D and 3D transformations and projections.
- To introduce fundamentals of image processing.

Syllabus:

Expected Outcome:
The Students will be able to:
  i. compare various graphics devices
  ii. analyze and implement algorithms for line drawing, circle drawing and polygon filling
  iii. apply geometrical transformation on 2D and 3D objects
  iv. analyze and implement algorithms for clipping
  v. apply various projection techniques on 3D objects
  vi. summarize visible surface detection methods
  vii. interpret various concepts and basic operations of image processing

Text Books:
2. E. Gose, R. Johnsonbaugh and S. Jost., Pattern Recognition and Image Analysis, PHI PTR, 1996 (Module VI – Image Processing part)

References:
<table>
<thead>
<tr>
<th>Module</th>
<th>Contents</th>
<th>Hours</th>
<th>End Sem. Exam Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Basic concepts in Computer Graphics – Types of Graphic Devices – Interactive Graphic inputs – Raster Scan and Random Scan Displays.</td>
<td>7</td>
<td>15%</td>
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<tr>
<td>II</td>
<td>Line Drawing Algorithm– DDA, Bresenham’s algorithm – Circle Generation Algorithms –Mid point circle algorithm, Bresenham’s algorithm- Scan Conversion-frame buffers – solid area scan conversion – polygon filling algorithms</td>
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<tr>
<td>III</td>
<td>Two dimensional transformations. Homogeneous coordinate systems – matrix formulation and concatenation of transformations. Windowing concepts –Window to Viewport Transformation- Two dimensional clipping-Line clipping – Cohen Sutherland, Midpoint Subdivision algorithm</td>
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<tr>
<td>IV</td>
<td>Polygon clipping-Sutherland Hodgeman algorithm, Weiler-Atherton algorithm, Three dimensional object representation-Polygon surfaces, Quadric surfaces – Basic 3D transformations</td>
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<tr>
<td>VI</td>
<td>Image processing – Introduction - Fundamental steps in image processing – digital image representations – relationship between pixels – gray level histogram –spatial convolution and correlation – edge detection – Robert, Prewitt, Sobel.</td>
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**FIRST INTERNAL EXAM**

**SECOND INTERNAL EXAM**

**END SEMESTER EXAM**
Question Paper Pattern (End semester exam)

1. There will be **FOUR** parts in the question paper – A, B, C, D
2. **Part A**
   a. Total marks : 40
   b. **TEN** questions, each have 4 marks, covering all the SIX modules (*THREE* questions from modules I & II; *THREE* questions from modules III & IV; *FOUR* questions from modules V & VI).
      *All the TEN* questions have to be answered.
3. **Part B**
   a. Total marks : 18
   b. **THREE** questions, each having 9 marks. One question is from module I; one question is from module II; one question *uniformly* covers modules I & II.
   c. *Any TWO* questions have to be answered.
   d. Each question can have *maximum THREE* subparts.
4. **Part C**
   a. Total marks : 18
   b. **THREE** questions, each having 9 marks. One question is from module III; one question is from module IV; one question *uniformly* covers modules III & IV.
   c. *Any TWO* questions have to be answered.
   d. Each question can have *maximum THREE* subparts.
5. **Part D**
   a. Total marks : 24
   b. **THREE** questions, each having 12 marks. One question is from module V; one question is from module VI; one question *uniformly* covers modules V & VI.
   c. *Any TWO* questions have to be answered.
   d. Each question can have *maximum THREE* subparts.
6. There will be **AT LEAST 50%** analytical/numerical questions in all possible combinations of question choices.