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Code No. : 16504 AS N

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (Mech. Engg.: CBCS) VI-Semester Advanced Supplementary Examinations, July-2019

Geometric Modeling

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Compare conventional and modern product life cycle.
2. List the synthetic wireframe entities.
3. What is the need for concatenation of transformations?
4. Represent Mathematically the reflection transformation about $X=Y$.
5. What is Coons patch?
6. Draw surface of revolution and mention its applications.
7. What do you mean by spatial enumeration method?
8. What is cell decomposition in solid modeling?
9. What is top-down approach of assembly modelling?
10. Explain the role of assembly modelling in CAD.

Part-B (5 × 10 = 50 Marks)

- 11.a) Solve the equation of a Bezier curve which is defined by the four control points as (80, 30, 0), (100, 100, 0), (200, 100, 0), and (250, 30, 0). [5]
- b) Express the continuity requirements for a curves and how these are to be specified. [5]
- 12.a) Consider the triangle ABC with A (4,1), B (5,2) and C (4,3). Solve for the transformation matrix to reflect the triangle about x-axis followed by a reflection about a line $y = -x$. [5]
- b) Derive the transformation Matrix to rotate the object with respect to an arbitrary point. [5]
- 13.a) Sketch and describe the properties of three types of analytical surface entities. [5]
- b) Derive the parametric representation of a bi-linear surface which can interpolate the four boundary curves given as the input. [5]
- 14.a) Differentiate between B-Rep and C-Rep of the solid modelling. [5]
- b) Make a table with the counts of various variables involved in Euler formula for: [5]
 - i) cube
 - ii) tetrahedron
 - iii) cube with a blind hole of square shape and (iv) a cube with through hole of square shape.
- 15.a) State and explain various assembly constrains with an example. [5]
- b) Develop an assembly tree for a given simple example by bottom-up approach. [5]

- 16.a) Derive the mathematical equation for the cubic spline curve. [4]
- b) Prove that transformation matrix for a reflection about the line $y = x$ is equivalent to reflection relative to X-axis followed by counter-clockwise rotation of 90^0 . [6]
- 17. Answer any *two* of the following:
 - a) List and explain any three types of synthetic surface entities. [5]
 - b) Brief about the solid modelling primitives. [5]
 - c) Develop a history tree for a given simple assembly with an example. [5]

