Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

G 1421

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Fifth Semester

Mechanical Engineering

ME 335 — COMPUTER AIDED DESIGN

(Common to B.E. Mechatronics Engineering)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by morphology of design? Mention the 3 phases of preliminary design phases in morphology of design.

2. List the major benefits of CAD in Mechanical Engineering.

3. What are the various display control facilities in graphics?

4. What is viewing transformation and windowing transformation?

5. What are the three phases of data processing system? Explain.

6. List the major steps involved in information system.

7. Differentiate wire frame and solid modeling.

8. Derive the shape functions for ID axial element.

9. Differentiate between plane stress and plane strain analysis.

10. What are the important sources of errors in FEA solutions?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Compare Conventional product cycle with Computer Aided product cycle. (8)

 (ii) Compare Concurrent Engineering with Sequential Engineering. (8)

Or

 (b) (i) Explain the various spectrum of activities of Computer Aided Engineering (CAE). (10)

 (ii) Explain the General guidelines to be followed in DFM. (6)

12. (a) Explain the DDA algorithm for drawing a straight line connecting two points (4,9) and (18,15).

Or

 (b) Explain the 2-D display control facilities or display information in 2D.

13. (a) Explain the following in detail

 (i) Model Storage and data structure. (8)

 (ii) Data Bank information storage and retrieval. (8)

Or

 (b) Data storage and Search methods.

14. (a) (i) Compare and differentiate CSG 4 B-REP modeling techniques. (10)

 (ii) Parametric and feature based modeling. (6)

Or

 (b) Explain the various steps involved in FEM with numerical example.

15. (a) Consider a bar as shown in fig. below. An axial load of P = 300 kN is applied at 'P'.

Take $A_1 = 2600$ mm²; $E_1 = 70 \times 10^9$ N/m²

$A_2 = 800$ mm² $E_2 = 200 \times 10^9$ N/m²

Determine the

    (i)   the nodal displacement at 'P'.

    (ii)   Stress in each material.

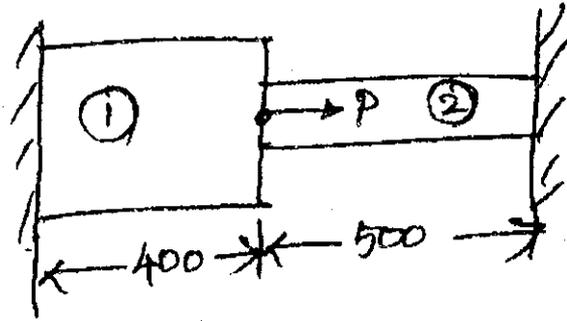   (iii) Reaction force.

Figure 1

Or

(b)   Explain the following in detail in application to Finite Element Analysis.

    (i)   Numbering of Nodes and Elements.   (6)

    (ii)   Selection of a Displacement Function or Interpolation function. (5)

    (iii) Mesh Generation.   (5)