AQ – 2852

First Semester M. E. (Mech. Engg.) (AMMSD) Examination

COMPUTER AIDED DESIGN AND ENGINEERING

1 MMD 3

P. Pages : 3

Time : Three Hours] [Max. Marks : 80

Note : (1) Separate answer book must be used for each section in the subject Geology, Engineering material of civil branch and Separate answer book must be used for Section A and B in Pharmacy and Cosmetic Tech.
(2) Answer **Three** questions from Section A and **Three** questions from Section B.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Assume suitable data wherever necessary.
(5) Illustrate your answer wherever necessary with the help of neat sketches.
(6) Discuss the reaction, mechanism wherever necessary.
(7) Use pen of Blue/Black ink/refill only for writing the answer book.

SECTION A

1. (a) Explain the various design tasks performed by CAD system. 6

   (b) Describe the analysis step of design process. Also state what is evaluation? 7

2. (a) Explain the scope of CAD in the conventional process of the product cycle. 7

   (b) Explain the editing commands generally given in any commercially available graphics package. 6

3. (a) Describe in brief the meaning of analytical and synthetic surface. 6

   (b) Explain the CSG approach of solid modeling with the help of suitable example. 7

4. (a) Discuss the various assembly analysis activities provided by CAD systems. 7

   (b) Describe in brief the description of IGES file, highlighting the philosophy of the conversion methodology. 7

5. (a) Explain feature-base modeling and feature based interface to geometric modeler. 6

(b) Explain by taking suitable example the different mating conditions used for locating and orienting parts in the assembly. 7

SECTION B

6. (a) Briefly describe the standard steps involved in the FEM. 7

(b) What is meshing in FEA ? Explain its types. 6

7. (a) Define the stiffness matrix and explain its special features. 7

(b) Explain the following terms clearly :—

(i) Local coordinates.

(ii) Global coordinates and

(iii) Natural coordinates. 6

8. (a) Determine the shape functions for CST element. Show that they are nothing but area coordinate. 9

(b) Explain with suitable example the three phases of FEA using commercial FEA package. 4

9. (a) An axially loaded stepped circular bar is having a diameter of 25 mm for a length of 300 mm and a diameter of 20 mm for a length of 200 mm. The bar is fixed at left end and is subjected to an axial loaded of 60N at right end. Determine the elemental stresses, strains and reaction force at left end. Take $E = 2 \times 10^5$ N/mm^2. 9

(b) What is the necessity of determining Von Mises stresses in FE static analysis ? Explain. 4

10. (a) Consider the truss element with the coordinates 1 (10, 10) and 2 (50, 40). If the displacement vector is $d = [15\ 10\ 21\ 43]^T$ mm, then Determine :—

(i) The vector d'

(ii) Stress in the element and

(iii) Stiffness matrix if E = 70 GPa and $A = 200mm^2$. 10

(b) Explain with suitable example when will you use a plane stress (2-D) elements. 4