

P1717

[3965] - 719

M.E. (Production) (CAD/CAM)

COMPUTER AIDED DESIGN

(2010 Course) (511201) (Sem. - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any three from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat self - explanatory sketches wherever required.*
- 4) *Use of pocket calculators is allowed.*
- 5) *Assume suitable data whenever necessary.*

SECTION - I

Q1) A software is to be developed through which following entities are to be drawn and to be manipulated. Design Graphic User Interface (GUI) for the same. Entities are as follows: **[16]**

- | | |
|-------------|-------------|
| a) Line. | b) Circle. |
| c) Polygon. | d) Ellipse. |

Q2) a) Why parametric representation of geometrical entities are preferred in CAD software? Explain your answer with non-parametric and parametric equations of appropriate geometric entity. **[8]**

b) What is Homogeneous Co-ordinate system? Explain the necessity of Homogeneous Co-ordinate system for transformations of geometric entities using suitable examples. **[8]**

Q3) a) Show that the midpoint of a line transforms to the midpoint of the transformed lines. **[8]**

b) A point is rotated about Z axis by two successive angles θ_1 and θ_2 . Show that this is equivalent to rotating the point about the same axis once with an angle $\theta = \theta_1 + \theta_2$. **[8]**

Q4) a) Find the equation of a closed B spline curve defined by four control points. **[8]**

b) What is blending of curves? Explain how two Bezier segments can be blended with suitable numeric example. **[8]**

P.T.O.

Q5) Write short notes (any three):

[18]

- a) Manipulation techniques used in Spline.
- b) CAD-CAM Product Cycle.
- c) Wire Frame Modelling.
- d) Computer configuration for CAD application.

SECTION - II

Q6) What is the liaison diagram and precedence diagram? Develop the liaison diagram and precedence diagram for the assembly shown in figure 1. **[16]**

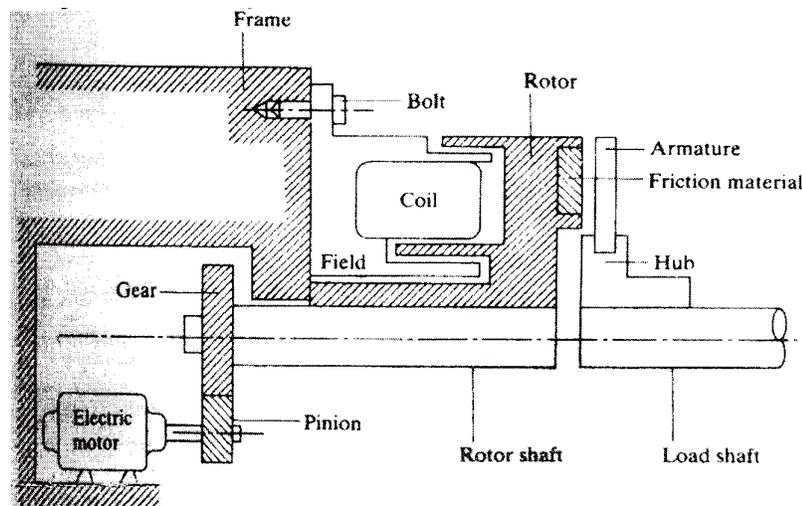


Fig. 1 Electric Clutch Assembly

Q7) a) Find the tangent and normal vectors to a surface of revolutions in terms of its profile equation. **[8]**

b) Find the minimum distance between: **[8]**

- i) A point and a surface.
- ii) A curve and a surface.
- iii) Two surfaces.

Q8) a) How a solid fillet can be created using unbounded half-spaces? **[8]**

b) What sweep representation scheme used for representation of a solid? **[8]**

Q9) a) Derive the principal moments of inertia of an object given its moments about a co-ordinate system. **[8]**

b) A sphere with a radius R and a center at (X_0, Y_0, Z_0) is described by the following equation: **[8]**

$$P(u, v) = \begin{bmatrix} x_0 + R \cos u \cos v \\ y_0 + R \cos u \sin v \\ z_0 + R \sin u \end{bmatrix}, \begin{cases} -\pi/2 \leq u \leq \pi/2 \\ 0 \leq v \leq 2\pi \end{cases}$$

For $R = 1$ and center at $(1,1,1)$, calculate the surface area and the centroid exactly, use the three - point Gauss quadrature. Compare the results.

Q10) Write short notes (any three): **[18]**

- a) Types of Animation.
- b) Boundary representation Scheme.
- c) Shading Algorithms.
- d) Hidden line removal Algorithm.

