

## **PART – B**

### **(Only for Demo/Viva voce)**

1. FMS (Flexible Manufacturing System): Programming of Automatic storage and Retrieval system (ASRS) and linear shuttle conveyor Interfacing CNC lathe, milling with loading unloading arm and ASRS to be carried out on simple components.
2. Robot programming: Using Teach Pendant & Offline programming to perform pick and place, stacking of objects, 2 programs.

## **PART – C**

### **(Only for Demo/Viva voce)**

Pneumatics and Hydraulics, Electro-Pneumatics: 3 typical experiments on Basics of these topics to be conducted.

### **Scheme of Examination:**

Two questions from Part A	- 40 Marks (20 Write up +20)
Viva - Voce	- 10 Marks
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<b>Total:</b>	<b>50 Marks</b>

## **ELECTIVE-II (GROUP B)**

### **MECHANISM DESIGN**

<b>Subject Code</b>	<b>: 10ME751</b>	<b>IA Marks</b>	<b>: 25</b>
<b>Hours/Week</b>	<b>: 04</b>	<b>Exam Hours</b>	<b>: 03</b>
<b>Total Hours</b>	<b>: 52</b>	<b>Exam Marks</b>	<b>: 100</b>

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## **PART - A**

### **UNIT-1**

**Planar Mechanisms and Geometry of Motion:** Definitions and basic concepts, Classification of links, Classification of pairs, Mechanism and machine, Inversions, Grashoff's law, Transmission of torque and force in

mechanisms, Mobility, Degree of freedom permitted by joints other than turning and sliding, Equivalent mechanisms, Unique mechanisms.

**07 Hours**

#### **UNIT-2**

**Number Synthesis:** Effect of even or odd number of links on degree of freedom, Minimum number of binary links in a mechanism, Minimum possible number of turning pairs, Enumeration of kinematic chain, Degree of freedom of special mechanisms.

**06 Hours**

#### **UNIT-3**

**Synthesis of Linkages:** Type, Number and dimensional synthesis, Function generation, Path generation and body guidance, Precision positions, Structural error, Chebychev spacing, Two position synthesis of slider crank mechanisms, Crank-rocker mechanisms with optimum transmission angle.

**07 Hours**

#### **UNIT-4**

**Motion Generation:** Poles and relative poles, Relative poles of 4-bar mechanism, Relative poles of slider crank mechanism.

**06 Hours**

### **PART – B**

#### **UNIT-5**

**Graphical Methods of Dimensional Synthesis:** Two position synthesis of crank and rocker mechanisms, Three position synthesis, Four position synthesis (point position reduction), Overlay method.

**06 Hours**

#### **UNIT-6**

**Coupler Curves:** Equation of coupler curves, Synthesis for path generation, Graphical synthesis for path generation, Robert-Chebyshev theorem (cognate linkages), Coupler curves from 5-bar mechanisms, Examples.

**07 Hours**

#### UNIT-7

**Analytical Methods of Dimensional Synthesis:** Freudenstein's equation for 4-bar mechanism and slider crank mechanism, Examples, Bloch's method of synthesis.

**06 Hours**

#### UNIT-8

**Cams:** Introduction, Pressure angle, Parameters affecting pressure angle, Effect of offset follower motion, Radius of curvature and undercutting, Cams with specified contours.

**07 Hours**

#### TEXT BOOKS:

1. "Theory of Machines & Mechanisms", J.J. Uicker, , G.R. Pennock, J.E. Shigley. OXFORD 3<sup>rd</sup> Ed.
2. 'Mechanism & Machine Theory', A.G. Ambekar, PHI, 2007

#### REFERENCE BOOKS:

1. 'Kinematics, Dynamics & Design of Machinery', K. J. Waldron, G. L. Kinzel, Wiley India, 2007.
2. 'Advanced Mechanism Design', Erdman Sandoor, Vol-I PHI, 2006,
3. "Kinematics & Dynamics of Machinery" H.H. Mabie, F.W. Ocvirk, John Wiley & Sons, New York, 3<sup>rd</sup> Ed.

### THEORY OF PLASTICITY

Subject Code	: 10ME752	IA Marks	: 25
Hours/Week	: 04	Exam Hours	: 03
Total Hours	: 52	Exam Marks	: 100

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### PART – A

#### UNIT - 1

**Fundamental Of Elasticity:** Concept of stress, stress transformation laws, spherical and deviator stress tensors, equilibrium equations, octahedral stresses, concept of strain, deviator and spherical strain tensors, strain