



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

PRECISION ENGINEERING								
I SEMESTER: CAD/CAM								
Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
BCCD08	Elective	3	-	-	3	40	60	100
		Contact Classes:48			Tutorials Classes: Nil		Practical Classes: Nil	
Pre requisites: Quality and Precision Engineering						Total Classes:48		

I. COURSE OVERVIEW:

Precision engineering is involved with the design, manufacturing and measurement of highly specified parts for the medical, aerospace, automotive, oil and gas exploration and related industry. This course has been designed with industry to respond efficiently and effectively to the needs of the Precision Engineering industry.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. The importance of accuracy in machine tools, significance of selection of Tolerance & datum features
- II. The field of tolerance analysis and geometric tolerances of mechanical products.
- III. The importance of operation sequence for typical shaft type of components and preparation of process drawings.
- IV. The conceptions of Measurements and working systems of CMM

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

- CO1 Recall the meaning of precision and the importance of employ in industries
- CO2 Outline the principles of various precision engineering processes and apply them in actual field.
- CO3 Illustrate the precision measurements, engineering design process for manufacturing the components
- CO4 Explain the basic concepts of GD and tolerancing based on ASME and ISO standards
- CO5 Summarize the concepts of datums and their classifications.
- CO6 Apply the knowledge of Tolerance analysis of different machining process based on customer expectation

IV. COURSE CONTENT:

MODULE -I: Concept of Accuracy and Tolerance Zone Conversion (10)

Concepts of accuracy: Introduction, concept of accuracy of machine tools, spindle and displacement accuracies, accuracy of numerical control systems, errors due to numerical interpolation displacement measurement system and velocity lags; geometric dimensioning and tolerancing: Tolerance zone conversions, surfaces, features, features of size, datum features, datum Oddly configured and curved surfaces as datum features, equalizing datums datum feature of representation; form controls, orientation controls logical approach to tolerancing.

MODULE -II: Datums (09)

Datum systems: Design of freedom, grouped datum systems, different types, two and three mutually perpendicular grouped datum planes; Grouped datum system with spigot and recess, pin and hole; Grouped datum system with spigot and recess pair and tongue, slot pair, computation of translational and rotational accuracy, geometric analysis and application.

MODULE -III: Tolerance Analysis (10)

Tolerance analysis: Process capability, mean, variance, skewness, Kurtosis, process capability metrics, Cp, Cpk, Cost aspects, feature tolerances. Geometric tolerances; surface finish, review of relationship between attainable tolerance grades and different machining process, cumulative effect of tolerances surfeit law, normal law and truncated normal law.

MODULE -IV: Tolerance Charting Techniques (10)

Tolerance charting techniques: Operation sequence for typical shaft type of components, preparation of process drawings for different operations, tolerance worksheets and centrally analysis, examples, design features to facilitate machining; datum features, functional and manufacturing components design, machining considerations, redesign for manufactured.

MODULE -V: Measuring System Processing (09)

In Processing or In-Situ measurement of position of processing, point-post process and on machine Measurement of dimensional features and surface-mechanical and optical measuring systems; working systems of CMM; Laser alignment and testing.

V. TEXT BOOKS:

1. R. L. Murthy, "Precision Engineering in Manufacturing", New Age International limited, 1st edition, 1996.
2. James D. Meadows, "Geometric Dimensioning and Tolerancing", Marcel Dekker, 1st edition, 1995.

VI. REFERENCE BOOKS:

1. Norio Taniguchi, "Nano Technology", Oxford University Press, 1st edition, 1996.
2. Matousek, "Engineering Design—A systematic Approach", Blackie & Son Ltd., London, 1st edition, 2013.

VII. WEB REFERENCES:

1. <http:// nptel.ac.in/courses/112/104/112104250/>

VIII. E-TEXT BOOK:

http://books.google.co.in/books/about/Precision_Engineering.html?id=7LehRTx2krQC&redir_esc=y

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Assignments
4. Model question paper – I
5. Model question paper – II
6. Lecture notes
7. PowerPoint presentation