4071 - JIG & FIXTURES DESIGN

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
Lectures	Practical	Credit			Theory		Practical Ex.	Total
3	2	5	25	25	4Hrs.	100	0	150

Pre-requisite	Source
2002	PRD

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	25	50	175

RATIONALE: -Modern business environment is growing more and more dynamic and competitive in nature. Today's market demands a good quality product delivered right in time. It is a very difficult task to maintain a good and stable quality of products without disturbing their time schedules. Properly planned use of jigs and fixtures on the shop floor reduces this problem to a great extent. Jigs and fixtures help to increase production rates and still maintain the dimensions well within specified tolerance. Hence it is essential for a production – shop supervision to be well equipped with the knowledge of jigs and fixtures. This subject aims at training the student in elementary design aspects and uses of jigs and fixtures.

COURSE CONTENTS	Hrs	Mks
1. INTRODUCTION	5	10
Significance & purpose of Jigs & Fixtures. Definition. Advantages. Economic consideration. Elements of Jigs & Fixtures: Locating elements, clamping elements. Tool guiding and setting elements. General design principles.		
2. LOCATION & LOCATING DEVICES	7	15
Location: Six degrees of freedom; Duty of location system; Choice of location system; Redundant location; Six point location principle; Locating Methods: From a plane surface, From a profile, From a cylindrical surface. Typical locators and their applications: Support / rest pads or pins; Fixed; Adjustable; Locators from a profile: Pins; Location nests; Locators from a cylindrical surface: Location post; Location pot; Conical locators; Cylindrical locator in combination and use of diamond pin; Vee locators: Fixed; Sliding.		

	8	20
3. CLAMPING Principles of clamping; Position; Strength; Productivity Operator Fatigue; Work-piece variation. Types of clamps: Screw clamps and use of floating pad; Strap or plate clamps; Retractable strap clamps; Swinging strap clamps; Edge clamps; Spider clamps; Pivoted clamps; Pivoted strap clamps; Pivoted edge clamps; Pivoted two way clamps; Hinged clamps; Swinging clamps; Quick action clamps: Use of 'C' washer & captive 'C' washer; Cam clamps; Eccentric shaft clamp; Toggle clamp; Use of quarturn nut; Multiple clamping: Equaliser; Stacking; Power clamps. (Introduction)	5	10
4. INDEXING DEVICES Linear Indexing; Rotary Indexing; Indexing plate; Rotary Indexing Tables.	5	10
5. DRILL JIG BUSHES Material and heat treatment. Types of bushes: Press fit bushes and slip bushes; Headed bushes and Headless bushes; Renewable bushes; Liner bushes; Threaded bushes; Special bushes; Fit & tolerances.	18	35
6. DESIGN OF JIGS & FIXTURES Drill jig designs - Types of jigs: Plate jigs & channel jigs; Angle plate jigs; Post jig and pot jig; Turn over jig; Leaf or Latch jig; Box jig; Provisions for swarf removal; Design procedure; Design of milling fixture; Use of tenons; Use of cutter setting block; Design procedure. Design of turning fixture: Arrangement for mounting the fixture on the spindle; Design procedure; Balancing.		
Total	48	100

PRACTICAL

Designs of simple drill-jig, for a given component, (Assembly & Details)- 2 components.
Design of simple milling fixture, for a given component, (Assembly & Details)- 2 components.
Design of simple turning fixture, for a given component, (Assembly & Details)- 1 component.

REFERENCE BOOKS

1. Fundamentals of Tool Design – ASTMI
2. Tools Design - Donaldson and Goold
3. Jigs & Fixtures - P. H. Joshi.