COURSE TITLE : DESIGN OF JIGS, FIXTURE AND GAUGES
COURSE CODE : 5112
COURSE CATEGORY : E
SEMESTER : 5
PERIODS /WEEK : 4
PERIODS / SEMESTER : 60
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Basics of jigs and Fixtures General Design principles- design steps	15
2	Principles of location- types of location Principles of clamps – types of clamps	15
3	Jig bushing and drill jigs	15
4	Principles of fixture design Introduction of gauges Design of plug and snap gauges	15
	TOTAL	**60**

COURSE OUTCOMES

On completion of the course the student should be able to

1.Understand the basics of Jigs and fixtures.

2.Know the Location of clamping.

3.Comprehend the mounting of Jigs and Fixtures on machine tool.

4.Understand the different types of Fixtures and Gauges.

SPECIFIC OUTCOMES

MODULE: 1

1.1.0 Understand the basics of jig and fixtures

1.1.1 Identify the differences between jig and fixtures
1.1.2 List the plane of movements
1.1.3 Explain possible freedom of movement o job in a jig, fixture

MODULE: 2

2.1.0 Know the Location and clamping

2.1.1 Identify locating of work piece in a jig , fixture
2..1.2 Illutrate the different types of jig
2.1.3 Justify different types of fixtures

MODULE: 3

3.1.0 Comprehend the mounting of jigs & fixtures on machine tool

3.1.1 Explain mounting of jig on a machine tool
3.1.2 Describe the mounting of fixtures on the machine tool
3.1.3 Design of jigs and fixtures

MODULE: 4

4.1.0 Understand the different types of fixtures & gauges

4.1 Explain milling, welding, fixtures and grinding fixtures
4.2 Compare the different types of gauges

CONTENT DETAILS

MODULE: 1 BASICS OF JIGS AND FIXTURES

Introduction – Jigs and Fixtures – Difference between Jigs and Fixtures – Advantages of jigs and Fixtures –Economy and cost - Elements of Jigs and Fixtures – Fool Proofing – Materials used in Jigs and Fixtures - Degrees of Freedom – 12 degrees of freedom – 6point location principle – (or) 3-2-1 principle of location – Essential features of Jigs and Fixtures – General Design Principles – Design steps – Common defects in Jigs design.

MODULE: 2 PRINCIPLES OF LOCATION AND CLAMPING

Principles of location – location point – types of locators – pins and studs – V block – cup and cone location points – adjustable locating points – special adjustable stops – location from finished holes in the work – Diamond pin locator – Cam operated 'V' locator – Quick action 'V ' locator - Six point location of a three legged object – Location of a cylinder on a v-block.

Principles of clamping – types of clamping – lever clamp – hinged clamp – two way clamp – swinging clamp – wedge clamp – eccentric clamping arrangement – quick action clamp – Cam operated clamp – quarter turn screw – Toggle clamp – Pneumatic and hydraulic clamps – Washers - 'C' washer – spherical and flat washers.

MODULE: 3 JIGS AND BUSHINGS AND DRILL JIGS

Jig Bushing : Materials for jig bushing - press fit bushing – Fixed renewable bushing – slip renewable bushing – liner bushing – screw bushing – miscellaneous type of drill bushings – bushing specifications.
Drill Jigs : Open drill jig plate drill jig – plate drill jig – template drill jig – channel drill jig – turn over drill jig – angle plate drill jig – closed box drill jig – leaf drill jig – post jig – indexing drill jig – universal drill jig - design of template and leaf jig.

MODULE: 4

(a) PRINCIPLE OF FIXTURE DESIGN: Introduction - principles of fixture design – element of fixtures – design consideration of locators and clamps for fixtures – types of fixtures – design of turning fixtures – mandrels – type of mandrels – boring fixtures – milling fixtures – essentials of milling fixtures – method of locating milling fixtures with respect to cutter position – grinding fixtures – surface grinding and cylindrical grinding fixtures – broaching fixtures – internal and external broaching fixtures – welding fixtures –

(b) GAUGES: Introduction – limits gauges – Taylor's principle of limiting gauging application of limit gauges –material for limit gauge – three basic type of limit gauges– plug gauge – snap gauge – ring gauge – thickness and length gauges – recess gauges – step gauges – position gauges and receiver gauges – IS specifications for gauges – design of plug and snap gauges.

TEXTBOOKS

1) Tool Design by Donaldson, Lecain, Goold
2) Introduction to Jig and Tool Design by MHA. Kempster(Viva Books Pvt. Ltd.-Delhi)
3) Jigs and Fixtures by Joshy(TMH)

REFERENCE BOOKS

1) Tool Engineering & Design by GR. Nagpal(Khanna publishers)
2) Jig and fixture design- 5th edition by Hoffman
3) Jigs and Fixtures by Grant