# GUJARAT TECHNOLOGICAL UNIVERSITY
## DIPLOMA IN MECHANICAL ENGINEERING
## SEMESTER: V

Subject Name: **Tool Design Practice**

**Laboratory Experiences:**

| Experience Type | Experience Number | Description of Laboratory Experience | Hours |
|---|---|---|---|
| Preperatory Activity(Includes Home Assignments) | 1 | a. Orthographic projections.<br>b. Limits, fits and tolerances.<br>c. Surface roughness symbols.<br>d. Drafting symbols(specifically threads, welding and sections).<br>e. Heat treatment processes.<br>f. Tool materials and their applications. | 2 |
| Manual Drafting On Half Imperial Drawing Sheets.Use Both Sides Of Drawing Sheets. | 2 | Various cutting tools including single point cutting tool, twist drill, side and face milling cutter, centre drill type A, form tool. | 24 |
| | 3 | Design and draw details and assembly of jig for given component. | |
| | 4 | Design and draw details and assembly of fixture for given component. | |
| | 5 | Design and draw details and assembly of blanking and piercing progressive die for given component. | |
| Reports(Includes Home Assignments) | 6 | Prepare a report of various cutting tools you have drafted for experience no.2. (Include cutting tool material, its composition, applications and resharpening methods and setups). | |
| | 7 | Steps and considerations for designing jig at experience number 3.Include calculations/thumb rules/sketches wherever necessary. | |
| | 8 | Steps and considerations for designing fixture at experience number 4. Include calculations/thumb rules/sketches wherever necessary. | |
| | 9 | Steps and considerations for designing press tool at experience number 5. Include calculations/ thumb rules/ sketches wherever necessary. | |

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| Visual Aids | 10 | Collect / Download photographs/ catalogues / images of various types of locators, clamps , jig bushes, etc (related to jigs and fixture) | 2 |
| | 11 | Collect / Download photographs/ catalogues / images of various types of punches, punch holders, pilots, stops, stripper plates, die blocks and die shoes, etc, (related to progressive die - press tools) and various types of dies. | |
| Download And Seminar Presentation (Copy Downloaded Content And Seminar Of Whole Batch In One /One Set Of Cd/Dvd ) | 12 | Download videos for jigs and fixtures in working conditions. | 4 |
| | | Download videos for working of various press tool operations. | |
| | | On topic approved by batch faculty, prepare the Seminar. Also present the seminar at least for 10 minutes using Power point Presentation. | |
| Process Planning (Home Assignments) | 13 | Prepare process plan of at least five components. Select the components from the designs of jig/fixture/press tool. Process plan must include sequencing of operations, selection of machines, tools required, cutting parameters, and time estimation .Components must be selected from the designs of jig/fixture/press tools student has designed and must have minimum five-six operations. | - |
| Study And Demonstration | 14 | Explain 3D modeling commands in AutoCAD or available CAD software (Drawing, Editing, Modifying, View and other required commands).Students will have to prepare a report/write-up on this. | 24 |
| Modeling In Cad Software | 15 | Using AutoCAD or available CAD software, prepare 3D model of exact dimensions of at least five cutting tools (From milling cutters, turning tools, gear cutting tools, broaches, etc.). Get 2D drawing from software only. Attach printout copy for 2D/3D. | |
| | 16 | Using AutoCAD or available CAD software, prepare 3D model of exact dimensions (parts and assembly) of the jig you have designed at experience number 3 and drafted it manually. Also write down steps in detail. Get 2D drawing from software only. Attach printout copy for 2D/3D. | |

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| | 17 | As above, but for Fixture.(Experience number 4). | |
| | 18 | As above, but for Press Tool. (Experience number 5). | |
| Industrial Visit | 19 | Visit at least three related industries and prepare a report. | - |
| Assignments<br><br>(Home Assignment) | 20 | Solve the given assignments. One assignment must be on preparation of chart / diagram / poster / graph / drawing / etc on half imperial size of drawing sheet.(For subject Tool Engineering). | - |

## Notes:

1. Term work report content of each experience should also include following.
   a. Experience description / data and objectives.
   b. Skill/s which is / are expected to be developed in student after completion of experience.
2. Term work report of student of regular mode should exclude Distance Learning manual, photocopies & printed content(except experience number 10 and 11), etc. However prints ( and their photocopies) for experience numbers 14,15,16 and 17 will be allowed. Focus should be on developing the term work as original efforts of students.
3. Term work content of industrial visit report should also include following.
   a. Brief details of industry visited.
   b. Type, location, products, rough layout, human resourse, etc of industry.
   c. Details, description and broad specifications of machineries/processes /utilization of jigs, fixtures and press tools observed.
   d. Safety norms and precautions observed.
   e. Student's own observation on Industrial environment, culture and attitude.
   f. Any other details / observations asked by accompanying faculty.
4. Term work should also include experience logbook duly certified by subject teachers.
5. Term work is to be defended (along with term work) with practical examination by external and internal examiners .Practical examination will include followings:
   i. Viva
   ii. Design sketches of assembly and details of jig or fixture or press tool and then modeling the same in AutoCAD or in available CAD software.

## Reference Books:


1. Fundamentals of tool design, ASTME PHI.
2. Tool design Donaldson & Lecain, TME.
3. Tool engineering, Doyal.
4. Principles of tool & jig design, M.H.A.Kempster.
5. Die design fundamentals, J. R. Paquino Industrial press.
6. Production tooling equipments, S. N. Parsons.
7. Production engineering science, Pandey-sign Standard publishers.
8. Design data book, K. Mahadeven Reddy, BPB, Delhi.
9. Design data book, P S G.
10. An introduction to jig & tool design, M.H.A. Kempster Mc GH. Publication.
11. Jigs and fixture design, Produced by institution of Production engineering.
12. Basic die making, D. Engine Ostergard Mc GH Publication.
13. Jigs and fixture, P.H.Joshi TMGH publication.

14. Production technology, HMT.
15. BIS 1983,3019, 2163 for single point Cutting tool.
    BIS 5101 for twist drills
    BIS 5989 for hole mills
    ISO 236/II for reamers
    BIS for plain milling cutter
    BIS 6308 for S/F milling cutter
    BIS 6353 for end mills
16. ISO for carbide inserts.