



GOVT.TOOL ROOM & TRAINING CENTRE

SEMESTER: SIXTH

Course: DIPLOMA IN TOOL & DIE MAKING

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Syllabus -Theory and practical Subjects

Scheme of Examination

SL. NO	CODE	SUBJECTS	Contact Hours/Week	Contact Hours/Semester
1	DTDM –VIS601	Mould Theory-II	3	64
2	DTDM –VIS602	Hydraulics & Pneumatics	3	64
3	DTDM –VIS603	Industrial Management	3	64
Practical's				
4	DTDM –VIS604	Press Tool Design-II	4	94
5	DTDM –VIS605	Mould Design-II	4	94
6	DTDM –VIS606	Hydraulics & Pneumatics Lab	3	64
7	DTDM –VIS607	Information Search Analysis Lab	3	64
8	DTDM –VIS608	Workshop-VI	17	292

Course: DIPLOMA IN TOOL & DIE MAKING

SI. No	Sub. Code	Subjects	Contact Hours per Week	Exam Duration	Scheme of Examination				Total Marks	Min marks for passing
					Exam		Internal Assessment			
					Max	Min	Max	Min		
					Marks	Marks	Marks	Marks		
1	DTDM – VIS601	Mould Theory-II	4	4	100	50	20	10	120	60
2	DTDM – VIS602	Hydraulics & Pneumatics	4	4	100	50	20	10	120	60
3	DTDM – VIS603	Industrial Management	3	3	100	50	20	10	120	60
Practical's										
4	DTDM – VIS604	Press Tool Design-II	4	8	100	50	20	10	120	60
5	DTDM – VIS605	Mould Design-II	4	8	100	50	20	10	120	60
6	DTDM – VIS606	Hydraulics & Pneumatics Lab	3	3	100	50	20	10	120	60
7	DTDM – VIS607	Information Search Analysis Lab	3	3	100	50	20	10	120	60
8	DTDM – VIS608	Workshop-VI		10	900	540	100	60	1000	600
Total			47.5		1600	890	240	130	1840	1020



PRESS TOOL DESIGN-II

SUBJECT CODE: DTDM-VI604

Contact Hrs. /Week: 4

Contact Hrs. / Semester: 80

Learning goals for PRESS TOOL DESIGN-II

On completion of this subject, the trainees will be able to:

- Calculation of Blank Diameter, Drawing force.
- Calculation of Bend Allowance, Bending force.
- Single Stage 'U' Bending, V Bending, & Wiping Tool.
- Design progressive bending tool with Floating type strippers.
- Design progressive bending tool with Cut off & Part off operations.
- Design multiple bends progressive tool.
- Design progressive bending tool with Ball Cage in three views.
- Design a combination tool assembly with part list.
- Design a drawing tool assembly with part list.
- Design & structure of a complete Project on Press Tool with reference to Component assigned.



PRESS TOOL DESIGN-II

Contact Hrs. /Week: 4

Contact Hrs. / Semester: 94

PRESS TOOL DESIGN-II

SPECIFIC INSTRUCTIONAL OBJECTIVES:

1. DESIGNING CONCEPT OF NON-CUTTING OPERATIONAL PRESS TOOLS

- DESIGN ANALYSES

- Punch & Die Radius
- Nesting
- Pressure Pad (Blank Holding Pressure)
- Die Cushion construction
- Ejector / Knockout Pins
- Corner Setting Design on Punches (To minimize spring back)
- Stop Pin (to control the downward movement of the Moving Half)

2. SINGLE STAGE 'U' BENDING TOOL ON REAR PILLAR DIE SET

- Calculation of size of tool elements
- Developed Blank Size Calculation
- Assembly Plan view
- Assembly Sectioned Front View
- Assembly Side view
- Bill of Material
- Detail Part Drawings

3. PROGRESSIVE CUT OFF TOOL WITH FLOATING STRIPPER, PITCH PUNCH & PILOTS ON A DIAGONAL PILLAR DIE SET

- Calculation of size of tool elements
- Economical Strip Layout
- Assembly Plan view
- Assembly Sectioned Front View
- Assembly Side view
- Bill of Material
- Detail Part Drawings

4. PROGRESSIVE PART OFF TOOL WITH FLOATING STRIPPER, PITCH PUNCH & PILOTS ON A DIAGONAL PILLAR DIE SET

- Calculation of size of tool elements
- Economical Strip Layout
- Assembly Plan view
- Assembly Sectioned Front View
- Assembly Side view
- Bill of Material
- Detail Part Drawings

5. PROGRESSIVE BENDING TOOL WITH PITCH PUNCH & PILOTS ON A DIAGONAL PILLAR DIE SET

(CONSTRUCTION TO SUIT DOWNWARD BENDING)

- Calculation of size of tool elements
- Economical Strip Layout



- Assembly Plan view
- Assembly Sectioned Front View
- Assembly Side view
- Bill of Material
- Detail Part Drawings

6. PROGRESSIVE BENDING TOOL WITH PITCH PUNCH & PILOTS ON A DIAGONAL PILLAR DIE SET (CONSTRUCTION TO SUIT UPWARD BENDING)

- Calculation of size of tool elements
- Economical Strip Layout
- Assembly Plan view
- Assembly Sectioned Front View
- Assembly Side view
- Bill of Material
- Detail Part Drawings

7. PROGRESSIVE BENDING TOOL WITH PITCH PUNCH & PILOTS ON A FOUR PILLAR DIE SET (CONSTRUCTION TO SUIT 3 SIDES UPWARD BENDING)

- Calculation of size of tool elements
- Economical Strip Layout
- Assembly Plan view
- Assembly Sectioned Front View
- Assembly Side view
- Bill of Material
- Detail Part Drawings

8. COMBINATION TOOL CENTRE PILLAR DIE SET (BLANK & DRAW)

- Calculation of size of tool elements
- Economical Strip Layout
- Assembly Plan view
- Assembly Sectioned Front View
- Assembly Side view
- Bill of Material
- Detail Part Drawings

9. CASE STUDY (REPORT TO BE SUBMITTED WITH SPIRAL BINDING ALONG WITH DRAWN DESIGNS)

- Component Analysis
- Designing of Tool with BOM
- Manufacturing & Heat Treatment
- Try outs, Defects & Remedy
- Estimation & Costing

10. DESIGN HANDS ON SOFTWARE

1. Progressive Tool

- Calculation of size of tool elements
- Economical Strip Layout
- Assembly Plan view
- Assembly Sectioned Front View
- Assembly Side view
- Bill of Material
- Detail Part Drawings

WEEK PLAN FOR PRESS TOOL DESIGN -II

WEEK No.	CHAPTER	TOPICS	ACTIVITY
1	Designing Concept of Non-Cutting Operational Press Tools	1. DESIGN ANALYSES <ul style="list-style-type: none"> - Punch & Die Radius - Nesting - Pressure Pad (Blank Holding Pressure) - Die Cushion construction - Ejector / Knockout Pins - Corner Setting Design on Punches (To minimize Spring back) - Stop Pin (to control the downward movement of the Moving Half) 	<ul style="list-style-type: none"> ✓ Ask students to get different Components (Bend, Drawn, and Forming) before commencement of the Design Classes. ✓ Show the animated Function of Single stage Bending Tools, Draw Tools & Forming Tools.
2 & 3	Blank Developed Size & Strip lay out	<ul style="list-style-type: none"> - Calculation of Bend Allowance(Bending) - Calculation of Blank Diameter(Drawing) 	Explain one each Component of Bend & Draw How a Pre-Cut Blank can be developed then ask students to Draw Blank drawing with dimensions for Bend 5 Components & Draw 5 Components.
4 & 5	Single Stage ' U ' Bending Tool on Rear Pillar Die Set	<ul style="list-style-type: none"> - Calculation of size of tool elements - Developed Blank Size Calculation - Assembly Plan view - Assembly Sectioned Front View - Assembly Side view - Bill of Material - Detail Part Drawings 	Display Bending Tool Chart. High light the Importance of Nesting & Stop Pin to Control the Bending Depth
6&7	Progressive Part off Tool with Floating Stripper, Pitch Punch & Pilots on a Diagonal Pillar Die Set	<ul style="list-style-type: none"> - Calculation of size of tool elements - Economical Strip Layout - Assembly Plan view - Assembly Sectioned Front View - Assembly Side view - Bill of Material - Detail Part Drawings 	Highlight the Importance of following areas. 1.Pitch Punch Design 2.Pilot Design 3. Die Design with Part-off arrangement. Assignment 1component
8&9	Progressive Cut off Tool with Floating Stripper, Pitch Punch & Pilots on a Diagonal Pillar Die Set	<ul style="list-style-type: none"> - Calculation of size of tool elements - Economical Strip Layout - Assembly Plan view - Assembly Sectioned Front View - Assembly Side view - Bill of Material - Detail Part Drawings 	Highlight the Importance of following areas. 1.Pitch Punch Design 2.Pilot Design 3. Die Design with Cut-off arrangement. Assignment 1component
10&11	Progressive Bending Tool with Pitch Punch & Pilots on a Diagonal Pillar Die Set (Construction to Suit Downward Bending)	<ul style="list-style-type: none"> - Calculation of size of tool elements - Economical Strip Layout - Assembly Plan view - Assembly Sectioned Front View - Assembly Side view - Bill of Material - Detail Part Drawings 	Highlight the Importance of following areas. 1.Pitch Punch Design 2.Pilot Design 3. Die Design with Cut-off arrangement. Assignment 1component
12&13	Progressive Bending Tool with Pitch Punch & Pilots on a Diagonal Pillar Die Set (Construction to Suit upward Bending)	<ul style="list-style-type: none"> - Calculation of size of tool elements - Economical Strip Layout - Assembly Plan view - Assembly Sectioned Front View - Assembly Side view - Bill of Material 	Highlight the Importance of following areas. 1.Pitch Punch Design 2.Pilot Design 3. Die Design with Cut-off arrangement. Assignment 1component

		- Detail Part Drawings	
14 & 15	Progressive Bending Tool with Notching Punch & Pilots on a Four Pillar Die Set (Construction to Suit three sides upward Bending)	<ul style="list-style-type: none"> - Calculation of size of tool elements - Economical Strip Layout - Assembly Plan view - Assembly Sectioned Front View - Assembly Side view - Bill of Material - Detail Part Drawings 	Highlight the Importance of following areas. 1. Pitch Punch Design 2. Pilot Design 3. Die Design with Cut-off arrangement Explain their application & function in the Die Set Assignment 1 component
16&17	Combination Tool Centre Pillar Die Set (Blank & Draw)	<ul style="list-style-type: none"> - Calculation of size of tool elements - Economical Strip Layout - Assembly Plan view - Assembly Sectioned Front View - Assembly Side view - Bill of Material - Detail Part Drawings 	Similar to the Compound Tool Construction. Highlight the Importance of Pressure Pad, Shedder & Die Construction (Cutting & Non Cutting) Assignment 1 component
18 & 19	CASE STUDY (Report to be Submit with spiral binding along with drawn Designs)	<ul style="list-style-type: none"> - Component Analysis - Designing of Tool with BOM - Manufacturing & Heat Treatment - Try outs, Defects & Remedy - Estimation & Costing 	Ask each student to get a component for designing Progressive Bending Tool. (Allot 25% of sectionals Marks by this Report)
DESIGN HANDS ON SOFTWARE			
20 to 22	Seven Stages Progressive Bending Cutting Tool With Floating Stripper, Cut-off arrangement on four Pillar Die set.	<ul style="list-style-type: none"> - Calculation of size of tool elements - Economical Strip Layout - Assembly Plan view - Assembly Sectioned Front View - Assembly Side view - Bill of Material - Detail Part Drawings 	Designing to be done using Software's

MOULD DESIGN -II

SUBJECT CODE: DTDV-VIS605

WEEKLY SYLLABUS FOR MOULD DESIGN – II

1&2	Design of a Four Cavity, Two Plate, Injection Mould as per GTTC Standards	<ul style="list-style-type: none"> a. Introduction - Edge Gate, Modified Trapezoidal Runner, Stripper Ejection – Size, location. b. Parting surface selection, Design of Core & Cavity, Dimensioning with Shrinkage, Fits & Tolerances c. Mould Size selection d. Suitable Cooling Circuit for Core & Cavity e. Top View / Plan View f. Selection of Section Plane g. Sectional Front View as per Section Plane h. Side view - Missing Views, Partial Sectioning. i. Dimensioning Top View & Front View, plate Thickness, Pitches and Shut Height j. Ballooning & Parts Numbering Part List to Standard Practice
3&4	Design of a Eight Cavity, Two Plate, Injection Mould as per GTTC Standards	<ul style="list-style-type: none"> a. Introduction – Fan Gate, Round Runner, Pin Ejection – Size, location. b. Parting surface selection, Design of Core & Cavity, Dimensioning with Shrinkage, Fits & Tolerances c. Mould Size selection d. Suitable Cooling Circuit for Core & Cavity e. Top View / Plan View f. Selection of Section Plane g. Sectional Front View as per Section Plane h. Side view - Missing Views, Partial Sectioning. i. Dimensioning Top View & Front View, plate Thickness, Pitches and Shut Height j. Ballooning & Parts Numbering Part List to Standard Practice
5	ASSIGNMENT: COMPONENT SELECTION BY TRAINEE FOR THE ABOVE CONCEPT	SUITABLE SELECTION OF PARTING SURFACE, FEED SYSTEM, COOLING & EJECTION TECHNIQUES
6&7	Design of a Two Cavity Injection Mould – Side Core Actuation	<ul style="list-style-type: none"> a. Introduction – Necessities for a Side Core, Guiding, Actuation & Locking methods b. Submarine Gate, Modified Trapezoidal Runner, Blade Ejection – Size, location, Runner Layout c. Parting surface selection, Design of Core & Cavity, Dimensioning with Shrinkage, Fits & Tolerances d. Mould Size selection e. Suitable Cooling Circuit for Core & Cavity f. Top View / Plan View g. Selection of Section Plane h. Sectional Front View as per Section Plane i. Side view - Missing Views, Partial Sectioning. j. Dimensioning Top View & Front View, plate Thickness, Pitches and Shut Height k. Ballooning & Parts Numbering Part List to Standard Practice

8&9	ASSIGNMENT: COMPONENT SELECTION BY TRAINEE FOR THE ABOVE CONCEPT	SUITABLE SELECTION OF PARTING SURFACE, FEED SYSTEM, COOLING & EJECTION TECHNIQUES
10	TEST - I	
11&12	Design of a Three Plate Four Cavity Injection Mould	<ul style="list-style-type: none"> a. Introduction – Comparison with 2 plate mould, Parting Surfaces sequential opening, Operating methods of 1st & 2nd Parting Surfaces, Feed Plate Parting Surface Length Selection, Design of Feed System, Sprue Puller, Ejection Methods of Feed System. b. Pin Point Gate, Modified Trapezoidal Runner, Pin Ejection – Size, location, Runner Layout c. Parting surface selection, Design of Core & Cavity, Dimensioning with Shrinkage, Fits & Tolerances d. Mould Size selection e. Suitable Cooling Circuit for Core & Cavity f. Top View / Plan View g. Selection of Section Plane h. Sectional Front View as per Section Plane i. Side view - Missing Views, Partial Sectioning. j. Dimensioning Top View & Front View, plate Thickness, Pitches and Shut Height k. Ballooning & Parts Numbering Part List to Standard Practice
13&14	ASSIGNMENT: COMPONENT SELECTION BY TRAINEE FOR THE ABOVE CONCEPT	SUITABLE SELECTION OF PARTING SURFACE, FEED SYSTEM, COOLING & EJECTION TECHNIQUES
15&16	Design of a 2- Cavity Split Actuation Injection Mould	<ul style="list-style-type: none"> a. Introduction – Need for Splits, Consideration for Design of Split, Guide Ways & Wedges. Finger Cam Design, Selection of Movement of Splits & Calculation of Finger Cam Angle & Length. Wedge angle Consideration, Methods of arresting Splits movement. b. Parting surface selection, Design of Core & Cavity, Dimensioning with Shrinkage, Fits & Tolerances c. Edge Gate, Round Runner, Pin & Sleeve Ejection – Size, location. d. Mould Size selection e. Suitable Cooling Circuit for Core & Cavity f. Top View / Plan View g. Selection of Section Plane h. Sectional Front View as per Section Plane i. Side view - Missing Views, Partial Sectioning. j. Dimensioning Top View & Front View, plate Thickness, Pitches and Shut Height k. Ballooning & Parts Numbering Part List to Standard Practice
17&18	ASSIGNMENT: COMPONENT SELECTION BY TRAINEE FOR THE ABOVE CONCEPT	SUITABLE SELECTION OF PARTING SURFACE, FEED SYSTEM, COOLING & EJECTION TECHNIQUES

19	TEST - II	
20&21	Design of a 2- Cavity Split Actuation Injection Mould	<ul style="list-style-type: none"> a. Introduction – Need for Splits Delay, Consideration for Delay Length, Design of Split, Guide Ways & Wedges. Dog Leg Cam Design, Selection of Movement of Splits & Calculation of Dog Leg Cam Angle & Length. Wedge angle Consideration, Methods of arresting Splits movement. b. Parting surface selection, Design of Core & Cavity, Dimensioning with Shrinkage, Fits & Tolerances c. Edge Gate, Round Runner, Pin & Sleeve Ejection – Size, location. d. Mould Size selection e. Suitable Cooling Circuit for Core & Cavity f. Top View / Plan View g. Selection of Section Plane h. Sectional Front View as per Section Plane i. Side view - Missing Views, Partial Sectioning. j. Dimensioning Top View & Front View, plate Thickness, Pitches and Shut Height k. Ballooning & Parts Numbering Part List to Standard Practice
22&23	Design of a Eight Cavity, Two Plate, Injection Mould as per GTTC Standards	SUITABLE SELECTION OF PARTING SURFACE, FEED SYSTEM, COOLING & EJECTION TECHNIQUES
24	SEMESTER EXAMINATION	



INDUSTRIAL MANAGEMENT

SUBJECT CODE: DTDM-VIS603

Learning goals for INDUSTRIAL MANAGEMENT

On completion of this subject, the trainees will be able to:

- Understand the estimation and costing procedure in industries
- Know the actual costing process and calculation of selling prices
- Understand the depreciation of equipments, plants and to know the different methods of calculating depreciation
- Know the procedure for calculating material cost of various components
- Understand the procedure for estimation of various shops
- Know the labour wages and incentives
- Know about basics of financial management
- Understand the concepts of project planning and breakeven analysis



INDUSTRIAL MANAGEMENT (THEORY)

Contact Hrs. /Week: 2

Contact Hrs. / Semester: 60

SPECIFIC INSTRUCTIONAL OBJECTIVES:

1. INTRODUCTION TO ESTIMATION AND COSTING

- Estimation - Definition, Importance and Aims
- Qualities and functions of an Estimator
- Source of errors in estimation
- Constituents of Estimation
- Costing - Definition and Aims
- Standard cost and its Advantages
- Difference between estimation and costing
- Advantages of efficient costing

2. ELEMENTS OF COST

- Elements of cost- material, labour, expenses
- Material - Direct material, indirect material and examples
- Calculation of Material cost
- Labour - direct, indirect labour and examples
- Calculation of labour cost
- Expenses - direct, indirect expenses and examples
- Classification of expenses - factory, administrative, selling and distribution expenses and examples
- Fixed and variable expenses and examples
- Components of cost - prime cost, factory cost, office cost, total cost
- Selling price
- Block diagram to show the relationship between elements and components of cost
- Simple problems on above
- Allocation of on-cost - methods and simple problems

3. INDIRECT EXPENSES AND DEPRECIATION

- Indirect expenses - depreciation, obsolescence, inadequacy, idleness, repair and maintenance
- Depreciation - causes, methods of calculating depreciation

4. MENSURATION AND ESTIMATION OF MATERIAL COST

- Area of regular plane figures
- Volume and surface area of solids (formulae only)
- Estimation of material costs of tool elements and total cost of tool.
- Mechanical Estimation
- Estimation in machine shop - Definition of cutting speed, feed, depth of cut
- Estimation of time for various operations like Turning, Knurling, Facing, Drilling, Boring, Reaming, Threading, Tapping, Milling, Grinding, Shaping and Planning
- Estimation in sheet metal shop - Sheet material and gauge number, Select suitable formula for Estimation



INDUSTRIAL MANAGEMENT

5. WAGES AND INCENTIVES

- Definition of wages, normal wages, real wages, living wages, fair wages
- Minimum wages, methods of wage payment
- Incentives - definition of incentive, types of incentives, examples
- Characteristics of a good wage and incentive systems
- Standard time - work measurement
- Bonus system - collective bonus system, group bonus system

6. INTRODUCTION TO FINANCIAL MANAGEMENT

- Definition of terms such as assets, liabilities, current and long term assets and liabilities, capital, income, expenses, gain
- Working capital - definition - net and gross working capital - factors affecting working capital.
- Maintenance of accounts through journal ledger, cash book, balance sheet.
- Transaction with bank - credits, payments overdraft, current account, securities.

7. PROJECT PLANNING AND BREAK EVEN ANALYSIS

- Concept of project work.
- Project planning like market survey, project capacity, selection of site, plant Layout, product design, drawing, specification, material requirement operation planning,
- Break even analysis - break event chart, diagram to illustrate break event point, Simple problems on break even analysis

8. OPERATION RESEARCH

- Game theory: definitions- strategy, saddle point, two person zero sum game, dominance property, problems
- Transportation problem: NW corner rule, Least cost method (simple problems)
- Assignment problem (balanced problems only)

REFERENCE BOOKS

1. Mechanical estimation and costing- T.R.Banga and S.C.Sharma
2. Estimation and costing – by Acharya and Narang
3. Industrial Organisation and Engineering Economics by Banga and Sharma
4. Mechanical Estimation by Malhotra
5. Operations research by S D Sharma
6. Operations research by Phaneesh

<u>WEEKLY PLAN FOR</u>		
<u>INDUSTRIAL MANAGEMENT</u>		
WEEK NO	CHAPTER TITLE	CONTENTS OF TOPICS
1-3	INTRODUCTION TO ESTIMATION AND COSTING	Estimation - Definition, Importance and Aims Qualities and functions of an Estimator Source of errors in estimation Constituents of Estimation Costing - Definition and Aims Standard cost and its Advantages Difference between estimation and costing Advantages of efficient costing
4-6	ELEMENTS OF COSTS	Elements of cost- material, labour, expenses Material - Direct material, indirect material and examples Calculation of Material cost Labour - direct, indirect labour and examples Calculation of labour cost Expenses - direct, indirect expenses and examples Classification of expenses - factory, administrative, selling and distribution expenses and examples Fixed and variable expenses and examples Components of cost - prime cost, factory cost, office cost, total cost Selling price Block diagram to show the relationship between elements and components of cost Simple problems on above Allocation of on-cost - methods and simple problems
7-9	INDIRECT EXPENSES AND DEPRECIATION	Indirect expenses - depreciation, obsolescence, inadequacy, idleness, repair and maintenance Depreciation - causes, methods of calculating depreciation
10-13	MENSURATION AND ESTIMATION OF MATERIAL COST	Area of regular plane figures Volume and surface area of solids (formulae only) Estimation of material costs of tool elements and total cost of tool. Mechanical Estimation Estimation in machine shop - Definition of cutting speed, feed, depth of cut Estimation of time for various operations like Turning, Knurling, Facing, Drilling, Boring, Reaming, Threading, Tapping, Milling, Grinding, Shaping and Planning Estimation in sheet metal shop - Sheet material and gauge number, Select suitable formula for Estimation
14-16	WAGES AND INCENTIVES	Definition of wages, normal wages, real wages, living wages, fair wages Minimum wages, methods of wage payment Incentives - definition of incentive, types of incentives, examples

		Characteristics of a good wage and incentive systems Standard time - work measurement Bonus system - collective bonus system, group bonus system
<u>WEEKLY PLAN FOR</u> <u>INDUSTRIAL MANAGEMENT</u>		
WEEK NO	CHAPTER TITLE	CONTENTS OF TOPICS
17-18	INTRODUCTION TO FINANCIAL MANAGEMENT	Definition of terms such as assets, liabilities, current and long term assets and liabilities, capital, income, expenses, gain Working capital - definition - net and gross working capital - factors affecting working capital. Maintenance of accounts through journal ledger, cash book, balance sheet. Transaction with bank - credits, payments overdraft, current account, securities.
19-20	PROJECT PLANNING AND BREAK EVEN ANALYSIS	Concept of project work. Project planning like market survey, project capacity, selection of site, plant Layout, product design, drawing, specification, material requirement operation planning, Break even analysis - break event chart, diagram to illustrate break event point, Simple problems on break even analysis
	OPERATION RESEARCH	Game theory: definitions- strategy, saddle point, two person zero sum game, dominance property, problems Transportation problem: NW corner rule, Least cost method (simple problems) Assignment problem (balanced problems only)



HYDRAULICS AND PNEUMATICS (THEORY)

SUBJECT CODE: DTDM-VIS602

Learning Goals of Hydraulics & Pneumatics

- Understand basics of Hydraulics and its application
- Know the components of Hydraulic Power
- Understand Motor and Pumps
- Understand the types of Hydraulic Valves
- Understand Hydraulic oil
- Understand about sealing and its Materials
- Understand about Hydraulic and Pneumatic symbol
- Understand about basics of Pneumatic
- Understand different types of Pneumatic Valves with examples.
- Understand accumulators
- To know about compressor
- Understand the circuit diagram



HYDRAULICS AND PNEUMATICS (THEORY)

Contact Hrs. /Week: 3

Contact Hrs. / Semester: 60

SPECIFIC INSTRUCTIONAL OBJECTIVES:

1. Introduction to Hydraulics

- Fluid Power
- Basic Law- Pascal's law, continuity equation
- Introduction to conversion of units
- Application and advantages of fluid power

2. Hydraulic fluids and properties

- Types of fluids
- Properties of fluids
- Problems caused by gases in fluids

3. Pumps

- Introduction to pumps
- External Gear Pumps
- Internal Gear Pumps
- Unbalanced vane pump
- Pressure compensated variable delivery pump

4. Introduction to actuators

- Gear type Hydraulic Motors
- Vane motors
- Piston motors
- Semi Rotary Actuator
- Vane Type Actuator
- Rack and pinion semi rotary actuator
- Lever arm semi rotary actuator
- Chain and sprocket semi rotary actuator
- Helical screw semi rotary Actuator
- Hydraulic cylinder
- Single, and double acting cylinder

5. Seals and Filters

- Introduction
- Static Seals
- Dynamic Seals
- Materials for seals
- Strainer
- Filters
- Types of filters
- Accumulators, types

HYDRAULICS AND PNEUMATICS(THEORY)

6. Industrial Hydraulic System

- Introduction
- Deceleration circuit
- Intensifier -
- Intensifier press circuit
- Circuits for operation of machine tools
- Planning machine
- Vertical milling machine
- Control of single and double acting hydraulic cylinders

7. Pneumatics

- Introduction to pneumatic
- Comparison of Pneumatic system with hydraulic system
- Basic Pneumatic system
- Air Filter
- Pressure regulator
- Lubricator
- Mufflers
- Pneumatics valves, Direction control valves
- Symbolic representation of Pneumatics valves
- a) Two way b) Three way c) Four way d) Five way
- Time delay valve
- Air Motors
- Types
- Pneumatic circuit
- Basic Pneumatic circuit

8. Hydro pneumatic

- Introduction
- Air-oil Reservoir
- Air-Oil Cylinder
- Air-Oil intensifier

9. Pneumatic logic controls

- Introduction
- Pneumatic Sensors
- Pneumatic limit valves
- Back Pressure sensors
- Proximity sensor
- Gap sensor
- Limit switch
- Pneumatic logic Circuit



HYDRAULICS AND PNEUMATICS(THEORY)

10. Electric control of fluid power

- Introduction
- Components of electrical controls
- switches
- solenoids
- relays
- Timers
- Electro hydraulic pneumatic circuit
- Reciprocation of a cylinder using pressure switches
- Control of a cylinder using a single limit switch

11. Installation, maintenance, trouble shooting of fluid power systems

- Introduction
- Installation of pumps, cylinders, valves, compressors, driers, filters and lubricators
- Maintenance of hydraulic system
- Production of compressed air
- Trouble shooting of hydraulic system

12. Test and revisions

WEEKLY PLAN FOR		
HYDRAULICS AND PNEUMATICS (THEORY)		
WEEK NO	CHAPTER TITLE	CONTENTS OF TOPICS
1-2	Introduction to Hydraulics	- Fluid Power
		- Basic Law- Pascal's law, continuity equation
		- Introduction to conversion of units
		- Application and advantages of fluid power
3-4	Hydraulic fluids and properties	- Types of fluids
		- Properties of fluids
		- Problems caused by gases in fluids
	Pumps	- Introduction to pumps
		- External Gear Pumps
		- Internal Gear Pumps
- Unbalanced vane pump		
5-6	Introduction to actuators	- Gear type Hydraulic Motors
		- Vane motors
		- Piston motors
		- Semi Rotary Actuator
		- Vane Type Actuator
		- Rack and pinion semi rotary actuator
		- Lever arm semi rotary actuator
		- Chain and sprocket semi rotary actuator
		- Helical screw semi rotary Actuator
		- Hydraulic cylinder
- Single, and double acting cylinder		
7-8	Seals and Filters	- Introduction
		- Static Seals
		- Dynamic Seals
		- Materials for seals
		- Strainer
		- Filters
		- Types of filters
		- Accumulators, types
9-10	Industrial Hydraulic System	- Introduction
		- Deceleration circuit
		- Intensifier
		- Intensifier press circuit
		- Circuits for operation of machine tools
		- Planning machine
		- Vertical milling machine
- Control of single and double acting hydraulic cylinders		

WEEKLY PLAN FOR		
HYDRAULICS AND PNEUMATICS (THEORY)		
WEEK NO	CHAPTER TITLE	CONTENTS OF TOPICS
11-15	Pneumatics	- Introduction to pneumatic
		- Comparison of Pneumatic system with hydraulic system
		- Basic Pneumatic system
		- Air Filter
		- Pressure regulator
		- Lubricator
		- Mufflers
		- Pneumatics valves, Direction control valves
		- Symbolic representation of Pneumatics valves
		- a) Two way b) Three way c) Four way d) Five way
		- Time delay valve
		- Air Motors
		- Types
		- Pneumatic circuit
- Basic Pneumatic circuit		
16	Hydro pneumatics	- Introduction
		- Air-oil Reservoir
		- Air-Oil Cylinder
		- Air-Oil intensifier
17-18	Pneumatic logic controls	- Introduction
		- Pneumatic Sensors
		- Pneumatic limit valves
		- Back Pressure sensors
		- Proximity sensor
		- Gap sensor
		- Limit switch
- Pneumatic logic Circuit		
19	Electric control of fluid power	- Introduction
		- Components of electrical controls
		- Switches
		- Solenoids

WEEKLY PLAN FOR <u>HYDRAULICS AND PNEUMATICS(THEORY)</u>		
20	Electric control of fluid power	- relays
		- Timers
		- Electro hydraulic pneumatic circuit
		- Reciprocation of a cylinder using pressure switches
		- Control of a cylinder using a single limit switch
21-22	Installation, maintenance, trouble shooting of fluid power systems	- Introduction
		- Installation of pumps, cylinders, valves, compressors, driers, filters and lubricators
		- Maintenance of hydraulic system
		- Production of compressed air
	- Trouble shooting of hydraulic system	
	Test and revisions	- Test and revisions