Ramgarhia Polytechnic College, Phagwara

Mechanical Engineering Department

Head of Department:	Er. Gaurav Kumar
Name of the Faculty:	Er Anil kumar
Discipline:	Mechanical Engineering Department
Semester:	5th
Subject:	WORKSHOP TECHNOLOGY - III
Lesson Plan Duration:	16 Weeks

RATIONALE

A diploma holder in this course is required to assist in the design and development of prototype and other components. For this, it is essential that he is made conversant with the principles related to design of components and machine and application of these principles for designing. The aim of the subject is to develop knowledge and skills about various aspects related to design of machine components.

Course Outcomes (CO)

After undergoing this course, the students will be able to:

CO1 perform boring. Internal threading on lathe machine.

CO2 perform milling machine operations on vertical and horizontal machine.

CO3 Operate tool and cutter grinding

CO4 Operate Cylindrical grinder. Surface grinder and internal grinder. use milling machine accessories and attachments.

CO5 Explain gear hobbing, gear shaping, gear shaving and gear finishing Processes

CO6 Explain the working and use of modern machining Practices.

CO7 Explain the working principle of metallic coating process

CO8 Explain the working principle of metal finishing process.

PO ⇨ / CO ⇩	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	✓		✓	✓	✓	✓	✓
CO2	✓		✓	✓	✓	✓	✓
CO3	✓		✓	✓	✓	✓	✓
CO4	✓		✓	✓	✓	✓	✓
CO5	✓		✓	✓	✓	✓	✓
CO6	✓	✓	✓	✓			✓
CO7	✓	✓	✓	✓			✓
CO8	✓	✓	✓	✓			✓

Syllabus

Units	Details	Hours
1.	Milling 1.Specification and working principle of milling machine . 2 Classification, brief description and applications of milling machines . 3 Details of column and knee type milling machine. 4 Milling machine accessories and attachment – Arbors, adaptors, collets, vices, circular table, indexing head and tail stock, vertical milling attachment shover chuck and rotary table. 5 Milling methods - up milling and down milling . 6 Identification of different milling cutters and work mandrels 7 Work holding devices. 8 Milling operations – face milling, angular milling, form milling, straddle milling and gang milling. 9 Cutting speed and feed, simple numerical problems. 10 Thread milling	(18hrs)
2.	Grinding Purpose of grinding . Various elements of grinding wheel – Abrasive, Grade, structure, Bond. Common wheel shapes and types of wheel – built up wheels, mounted wheels and diamond wheels. Specification ofgrinding wheels as per BIS. Truing, dressing, balancing and mounting of wheel. Grinding methods – Surface grinding, cylindrical grinding and centreless grinding. Grinding machine – Cylindrical grinder, surface grinder, internal grinder, centreless grinder, tool and cutter grinder. Selection of grinding wheel 2.8 Thread grinding	(14 hrs)
3.	Gear Manufacturing and Finishing Processes	(08 hrs)

	Gear hobbing Gear shaping Gear finishing processe	
4.	Modern Machining Processes . Mechanical Process - Ultrasonic machining (USM): Introduction, principle, process, advantages and limitations, applications. Electro Chemical Processes - Electro chemical machining (ECM) – Fundamental principle, process, applications Electrical Discharge Machining (EDM) - Introduction, basic EDM circuit, Principle, metal removing rate, dielectric fluid, applications Laser beam machining (LBM) – Introduction, machining process and applications . Plasma arc machining (PAM) and welding – Introduction, principle process and applications	(08 hrs)
5.	Metallic Coating Metal spraying – Wire process, powder process, applications . Electro plating, anodizing and galvanizing . Organic Coatings- oil base paint, rubber base coating	(08 hrs)
6.	Metal Finishing Processes Purpose of finishing surfaces. Surface roughness-Definition and units. Honing Process, its applications . Description of hones. Brief idea of honing machines. Lapping process, its applications. Description of lapping compounds and tools. Brief idea of lapping machines. Polishing . Buffing.	(08 hrs)

PRACTICAL EXERCISES

Advance Turning Shop

1. Exercise of boring with the help of boring bar
2. Exercises on internal turning on lathe machine

3. Exercises on internal threading on lathe machine
4. Exercises on external turning on lathe machine
5. Resharpening of single point cutting tool with given geometry

Machine Shop

1. Produce a rectangular block by facing on a slotting machine
2. Produce a rectangular slot on one face with a slotting cutter
3. Produce a rectangular block using a milling machine with a side and face cutter
4. Prepare a slot on one face using milling machine
5. Job on grinding machine using a surface grinder
6. Prepare a job on cylindrical grinding machine.
7. Exercise on milling machine with the help of a form cutter
8. Exercise on milling machine to produce a spur gear
9. Grinding a drill-bit on tool and cutter grinder
10. Exercise on dressing a grinding wheel

INSTRUCTIONAL STRATEGY

1. Teachers should lay special emphasis in making the students conversant with concepts, principles, procedures and practices related to various manufacturing processes.
2. Focus should be laid in preparing jobs using various machines/equipment in the workshop.
3. Use of audio-visual aids/video films should be made to show specialized operations.
4. Foreman Instructor should conduct classes of each Workshop explaining use of tools, jobs to be made and safety precautions related to each workshop prior to students being exposed to actual practical's.

Reference Books:

1. Manufacturing Technology by Rao; Tata McGraw Hill Publishers, New Delhi.

2. Workshop Technology Vol. I, II, III by Chapman; Standard Publishers Distributors, New Delhi.

3. Production Engineering and Science by Pandey and Singh; Standard Publishers Distributors, New Delhi.

4. A Text Book of Production Engineering by P.C. Sharma; S. Chand and Company Ltd., New Delhi.

5. Workshop Technology Vol-III, by R.P. Dhiman, Ishan Publications Jalandhar 6. Production Technology by HMT; Tata McGraw Publishers, New Delhi

Delivery/Instructional Methodologies

Sr.No.	Description
1.	Chalk and Talk
2.	PowerPoint Presentation

Assessment Methodologies

Sr. No.	Description	Type
1.	Student Assignment	Direct
2.	Test	Direct
3.	Board Examination	Direct
4.	Student Feedback	Direct

Gaps in the syllabus - to meet industry/profession requirements

S.NO.	DESCRIPTION	PROPOSED ACTIONS	PO MAPPING
	N/A	N/A	N/A

Topics beyond syllabus/advanced topics

Units	Details	Hours
N/A	N/A	N/A

Web Source References

Sr. No.	URL
1.	https://nptel.ac.in/

Lesson Plan

Week	Theory		Practical	
	Lecture Day		Practical Day	07 Hours a Week
1st	1st	Introduction about milling		**Advance Turning Shop**
	2nd	Specification and working principle of milling machine Classification, brief description and applications of milling machines		
	3rd	Details of column and		

		knee type milling machine Milling machine accessories and attachment – Arbors, adaptors, collets, vices, circular table, indexing head and tail stock, vertical milling attachment shover chuck and rotary table.,	1.	Exercise of boring with the help of boring bar
	4th	Milling methods - up milling and down milling Identification of different milling cutters and work mandrels		
2nd	5th	Work holding devices Milling operations – face milling, angular milling	2.	Exercises on internal turning on lathe machine
	6th			
	7th	Milling operations – face milling, angular milling, form milling, straddle milling and gang milling.		
	8th	Cutting speed and feed, simple numerical problems.		
3rd	9th		3.	Exercises on internal threading on lathe machine
	10th			
	11th			
	12th	Thread milling		
4th	13th		4.	Exercises on external turning on lathe machine
	14th	Milling operations – face milling, angular milling, form milling, straddle milling and gang milling		
	15th			
	16th	Milling methods - up milling and down milling Identification of different milling cutters and work mandrels		
	17th	Details of column and knee type milling		

5th		machine	5.	Resharpening of single point cutting tool with given geometry
	18th	Details of column and knee type milling machine		
	19th	Introduction to Grinding & Purpose of grinding Various elements of grinding wheel – Abrasive, Grade, structure, Bond		
	20th	Common wheel shapes and types of wheel – built up wheels, mounted wheels and diamond wheels. Specification of grinding wheels as per BIS.		
6th	21st	**PTM**	6.	**Machine Shop** Produce a rectangular block by facing on a slotting machine
	22nd			
	23rd	**HOUSE TEST**		
	24th			
7th	25th	Truing, dressing	7.	Produce a rectangular slot on one face with a slotting cutter
	26th	Grinding methods – Surface grinding, cylindrical grinding and centre less grinding.		
	27th			
	28th	Grinding machine – Cylindrical grinder, surface grinder		
8th	29th	Internal grinder, centre less grinder, tool and cutter grinder..	8.	Produce a rectangular block using a milling machine with a side and face cutter
	30th			
	31st	Selection of grinding wheel & Thread grinding		
	32nd			
	33rd	Introduction to Gear Manufacturing and		

9th	34th	Finishing Processes	9.	Prepare a slot on one face using milling machine
	35th	Gear hobbing		
	36th			
10th	37th	Gear shaping	10.	Job on grinding machine using a surface grinder
	38th	Gear finishing processes & Gear shaping		
	39th			
	40th			
11th	41st	Modern Machining Processes	11.	Prepare a job on cylindrical grinding machine.
	42nd	Mechanical Process - Ultrasonic machining (USM): Introduction, principle, process, advantages and limitations, applications		
	43rd			
	44th	Electro Chemical Processes - Electro chemical machining (ECM) – Fundamental principle, process, applications		
12th	45th	**PTM**	12.	Exercise on milling machine with the help of a form cutter
	46th			
	47th	**HOUSE TEST**		
	48th			
13th	49th	Electrical Discharge Machining (EDM) - Introduction, basic EDM circuit, Principle, metal removing rate, dielectric fluid, applications	13.	Exercise on milling machine to produce a spur gear
	50th	Laser beam machining (LBM) – Introduction, machining process and applications		

	51st	Plasma arc machining (PAM) welding – Introduction, principle process and applications		
	52nd	Metallic Coating Processes & Metal spraying – Wire process, powder process, applications		
14th	53rd	Electro plating, anodizing and galvanizing	14	Grinding a drill-bit on tool and cutter grinder
	54th	Organic Coatings- oil base paint, rubber base coating		
	55th	Metal Finishing Processes		
	56th	Purpose of finishing surfaces. Surface roughness- Definition and units		
15th	57th	Honing Process, its applications Description of hones. Brief idea of honing machines.	15.	Exercise on dressing a grinding wheel
	58th	Lapping process, its applications.		
	59th	Description of lapping compounds and tools.		
	60th	Brief idea of lapping machines. Polishing Buffing		
16th	61st	**PTM**	16.	VIVA/ VOICE
	62nd			
	63rd	**HOUSE TEST**		
	64th			