

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE: PREVENTIVE MAINTENANCE
(COURSE CODE: 3355803)**

Diploma Programs in which this course is offered	Semester in which offered
Printing Technology	5 th Semester

1. RATIONALE

With the advent of advancements in Graphic Art Technology advanced and sophisticated, machines involving huge investments are being used by the industry. Productivity can be improved by maintaining high standards of preventive maintenance of these machines along with reliability and safety.

2. LIST OF COMPETENCY

The course content should be taught and implemented with the aim to develop required skills in students so that they are able to acquire following competency.

- **Undertake preventive maintenance of printing machines**

3. COURSE OUTCOMES

The theory should be taught in such a manner that students are able to acquire required learning outcomes in cognitive and affective domain to demonstrate following course outcome

- Describe the basic need, functions and types of preventive maintenance
- Identify types of wear and suggest appropriate lubrication.
- Recognize type of corrosion and advise remedy.
- Determine faults and prepare schedules for inspection, up keeping and overhaul.
- Describe various safety mechanism utilised in printing machines.
- Prepare preventive maintenance plan for printing machines.
- Ensure safe working of printing machines.
- Recommend appropriate foundation for different printing machines.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
3	0	0	3	70	30	00	00	100

Legends: L-Lecture; T – Tutorial/Teacher Guided Student Activity; P –Practical; C – Credit;; ESE –End Semester Examination; PA – Progressive Assessment.

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Wear and tear in Printing Equipment	1a. Explain causes of wear and their remedies. 1b. State the effects of friction in printing equipments and the steps to reduce it. 1c. State the characteristics of lubricants 1d. Compare the features of the lubricating methods 1e. Describe centralized lubrication system.	1.1 Wears causes, effects and reduction methods 1.2 Friction and its effects. 1.3 Lubrication: Methods: Characteristics, manufacturer's service manual. 1.4 Centralized lubrication system.
Unit– II Corrosion and its prevention	2a. Compare the features of the different types of corrosion 2b. Describe the factors affecting corrosion. 2c. Compare the different types of corrosion prevention methods.	2.1 Types of corrosion. 2.2 Factors affecting corrosion. 2.3 Corrosion prevention methods.
Unit – III Maintenance of Printing Equipments	3a. Justify the need of preventive maintenance. 3b. Differentiate different types of maintenance. 3c. Describe responsibilities of maintenance department 3d. Describe different common types of faults that occur in printing equipments. 3e. Describe the method to prepare schedules for inspection, up keeping and overhaul of printing equipment. 3f. Describe the steps to overhaul components of printing machines and auxiliary systems in printing processes 3g. Describe different maintenance activities for printing Equipment and its frequency cycle. 3h. Apply different Aids of preventive maintenance to printing equipment for break down free operation.	3.1 Types of maintenance: Preventive , Breakdown , Predictive 3.2 Responsibility of maintenance department: Cleaning, Washing, Degreasing , lubricating process 3.3 Preventive maintenance: Primary and secondary function 3.4 Printing Equipment : Flexographic Printing machine, Packaging manufacturing machines, Ink metering systems, Solvent recovery systems, Gravure Printing machine, Electroplating systems and auxiliary systems in printing processes 3.5 Types of common faults in printing equipment 3.6 Periodic inspection: Degreasing, cleaning, lubricating and repairing schemes in printing equipment. 3.7 Problems occurring in different substrates with their remedies. 3.8 Overhauling components of

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		printing equipments. 3.9 <i>Different maintenance activities for the printing Equipment.</i> 3.10 Aspects of good preventive maintenance a. Program and schedule b. Division c. Frequency cycle
Unit– IV Safety and Hazards in printing Industry	4a. Define safety and state unsafe situations / locations in printing processes and equipments. 4b. State the steps to prevent accidents -Safety color code , safe guarding methods. 4c. Describe the safety procedures to be followed in printing press. 4d. Describe places where safe guarding is required in printing equipment. 4e. Define hazards and state the types of hazards viz environmental ,health , fire.at printing equipments and process 4f. State the places / locations that are hazardous in the printing equipments / process . 4g. State the mechanical and electrical hazards in printing equipments used for printing process.	4.1 <i>Safety and Hazards in printing industry- printing equipments and process area</i> Safety for printing equipments and process area : Awareness, Accident-Cause, type, result and control. -Safety color code. -Major division of activity. - Safe guarding methods 4.1 Mechanical and electrical hazards in Printing Equipment viz. Flexographic, photogravure and rotogravure Printing machine , Packaging manufacturing machines, Ink metering systems, Solvent recovery systems, , Electroplating systems and auxiliary systems in printing processes
Unit – V Installation and commissioning of printing machines.	5a. Describe the foundation process for installing different types of printing equipment. 5b. Interpret the service manuals of different types of printing equipment for implementation of servicing, installation and commissioning. 5c. Select appropriate foundation to erect different printing machines used in printing processes. 5d. Describe Foundation size and	5.1 <i>Foundations of printing Equipment used in printing processes:</i> plan, design and materials 5.2 Installation and commissioning procedure of different type of printing equipment 5.3 Servicing of printing equipment Foundation design, materials, size and plan Erecting of printing equipments, Instruction for erection procedures. 5.4 Application of erection equipment in erecting the printing equipments.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	5e. Plan different printing machines used in printing process. 5f. State the engineering activities required to be carried out to install and commission the printing Equipment 5g. State the application of erection equipment for different printing machines used in printing process.	

6. SUGGESTED SPECIFICATION TABLE WITH HOURS and MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Wear and tear in Printing Equipment	10	4	6	6	16
II	Corrosion and its prevention	6	2	4	4	10
III	Maintenance of printing equipment	14	6	6	8	20
IV	Safety and Hazards in printing industry.	6	4	4	4	12
V	Installation and commissioning of printing machines.	6	4	4	4	12
	Total	42	20	24	26	70

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom's Revised taxonomy)

Note: This specification table shall be treated as general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF STUDENT ACTIVITIES

- Students will visit a printing industry for studying preventive maintenance system and prepare a report.
- Students will learn centralized maintenance process used in industry
- Students will list common troubles related to maintenance in different printing machines.

8. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- Arrange industrial visits to printing units and demonstrate wears, corrosion, lubricating systems, lubricants, tools used in preventive maintenance, preventive maintenance schedules, standby equipment, safety mechanisms, safety equipment, safety instructions, different types of foundations and erection mechanism.
- Motivate students to use internet and collect name, addresses, catalogues, rates, specifications of manufacturers of preventive maintenance machines and equipment.

9. SUGGESTED LEARNING RESOURCES

A. List of Books

S. No.	Title of Books	Author	Publication
1	Plant maintenance and safety	C.M. Desai and K. K. Patel	Atul Prakashan
2	Maintenance for reliability	A. V. S. Rao	Media promoters and publishers ltd.

A. List of Major Equipment/ Instrument With Broad Specification

- i. Assorted maintenance mechanical tool kit
- ii. Assorted maintenance electrical tool kit and fault finding electrical panel with measuring instruments of short circuit current meter, DPMs of 1 pahase and 3 phase ,Volt , Frequency , series test lamp ckt, elcb , mcb,devices mounted with relevant cables and probes.
- iii. Assorted maintenance electronic tool kit
- iv. General supporting equipments: Air Compressor, Oil suction unit.

B. List of Software/Learning Websites.

- i. <http://www.polygraphlimited.com/content.php?pagename=Rotogravure-Printing-Machines>
- ii. <http://www.automation.siemens.com/mcms/infocenter/dokumentcenter/ce/Documenttsu20Catalogs/e86060-k7010-a121-a1-7600.pdf>
- iii. <http://www.sharpgraphicsindia.com/services.html>

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. B. I. Patel**, I/C Head of Department of Printing Technology, RCTI, Ahmedabad.
- **Prof. S. D. Gohel**, Lecturer in Printing Technology, RCTI, Ahmedabad.
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Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Nishith Dubey**, Professor, Department of Vocational Education and Entrepreneurship Development.
- **Prof. Joshua Earnest**, Professor, Department of Electrical and Electronics Engineering