GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

Course Curriculum
MECHANICAL ENGINEERING FOR PRINTING
(Course Code: 3335801)

Diploma Programs in which this course is offered	Semester in which offered
Diploma in Printing Technology	Third Semester

1. RATIONALE

The aim of this subject is to enhance the knowledge of machinery and equipment used in printing. Study of working characteristics will help in selection of proper machinery for effective printing. Skills developed by this course would also help in preventive and minor maintenance of machines for smooth functioning of printing shop. This course therefore is of a great importance for printing engineers. .

2. COMPETENCY

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

- **Apply mechanical engineering fundamentals for smooth and efficient functioning of machinery in printing shop**

3. 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	
2	0	2	4	70	30	20	30	150

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

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit -I Introduction	1a. Identify materials and hardware components. 1b. Explain use of fitting and measuring tools.	1.1 Classification; properties and applications of various engineering materials. 1.2 Types, sketches, specifications and uses of : i. Fasteners. ii. Belts. iii. Bearings. iv. Gears. 1.3 Fitting tools-types, sketches, material and applications. 1.4 Measuring tools - Vernier, micrometer.
Unit– II Power Transmission	2 a. Identify reasons for troubles and suggest remedies for troubleshooting in power transmission.	2.1.1 Methods of power transmission (belt, rope, chain, gear). 2.1.2 Associated terms, working principle, working and applications of above methods. 2.1.3 Applied simple calculations, common troubles and remedies of above methods.
	2b. Explain cams and cam profiles	2.2.1 Introduction, function and types of cams and cam followers. 2.2.2 Types of motions and displacement for different types of cam and cam followers. 2.2.3 Construction of different types of cam profile for given data.
Unit– III Metal Casting and Metal Forming	3 a. Describe casting process. 3b. Compare hot and cold working. 3c. Explain sheet metal working process.	3.1 Concept of foundry, pattern and core. 3.2 Ferrous and non-ferrous metal casting process. 3.3 Hot and cold working -definitions, differences, types and applications. 3.4 Sheet metal working-types and applications of processes.
Unit– IV Basic Machine Tools	4a. Select basic machine tools for making/repairing printing machine components.	4.1 Block diagram, main parts, working, functions/uses of main parts, types of cutting tools used, accessories and their functions, types of processes which can be performed and types of parts which can be produced, of machine tools: (i) Lathe. (ii) Milling. (iii) Drilling.
Unit– V Air Compressors, Blowers,	5a. Differentiate among various Types of Air Compressors & Blowers.	5.1.1 Types of Air Compressors and their Uses. 5.1.2 Comparison of different Air Compressors. 5.1.3 Use of Filters and Moisture Oil Separator. 5.1.4 Types of Blowers and their uses.

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Pumps and Valves	5b. Explain functioning of various types of Pumps and Valves	5.1.5 Use of Air Compressors and Blowers in Printing Industry. 5.2.1 Different types of Pumps, their constructions and functions. 5.2.2 Use of Pumps in Printing Industry. 5.2.3 Merit and limitations of different type of Pumps. 5.2.4 Different types of Valves, their construction and working 5.2.5 Application of Valves in Printing Industry

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Theory)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Introduction.	06	04	06	04	14
II	Power Transmission.	06	04	06	08	18
III	Metal Casting and Metal Forming.	06	06	04	04	14
IV	Basic Machine Tools.	06	04	04	04	12
V	Air Compressors, Blowers, Pumps and Valves	04	04	04	04	12
	Total	**28**	**22**	**24**	**24**	**70**

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

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

6. SUGGESTED LIST OF PRACTICAL/EXERCISES:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills (**Course Outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies (Programme Outcomes). Following is the list of practical exercises for guidance.

Note: Here only Course Outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

Sr. No.	Unit No.	Practical/Exercises (Course Outcomes in Psychomotor Domain according to NBA terminology)	Approx Hours Required
1	I	Demonstrate features and uses of various : i. Fasteners. ii. Belts. iii. Bearings. iv. Gears. v. Fitting tools. Students will prepare the report including following. a. Sketches. b. Specifications. c. Uses of above all.	02
2	I	a. Measure at least ten dimensions using vernier. b. Measure at least ten dimensions using micrometer.	02
3	II	a. Demonstrate functioning of various drives. (Belt, rope, chain, gear). b. Demonstrate various troubles in each drive. Also suggest remedies. (Solve at least two numerical related to each drive.)	04
4	III	Demonstrate metal melting, metal pouring, metal casting and casting finishing processes. (Use wax in place of molten metal for the purpose of demonstration.)	04
5	IV	Prepare one job having turning operation (facing, turning, taper turning, grooving, threading, knurling), milling and drilling operations.	10
6	V	(1) Demonstrate functioning of different types of Air Compressors used in Printing Industry. (2) Demonstrate functioning of different types of Blowers used in Printing Industry. (3) Demonstrate functioning of different types of Valves used in Printing Industry.	06
Total			28

7. SUGGESTED LIST OF STUDENT ACTIVITIES

i. Students will prepare Journal for the above mentioned Practical.
ii. Identify various power transmission mechanisms on any one printing machine available in department. Also sketch them.
iii. List common troubles with their remedies for any one printing machine available in department.

8. SPECIAL INSTRUCTIONAL STRETAGIES (If Any)

Students should be asked to visit some nearby big printing shop and study the different printing machines including pumps and valves etc in use. They should also discuss with the operators about frequent maintenance problems and possible solutions. Teachers should accompany them for better explanation.

9. SUGGESTED LEARNING RESOURCES

A. List of Books:

Sr. No.	Author	Title of Books	Publication
1	R. C. Patel	Theory of Machines	
2	Tyler and Hicks	Pump Operations and maintenance	
3	S. C. Rangwala	Engg. Materials	
4	Rajaraman	Engg. Materials	
5	Hazara Chaudhary	Elements of Workshop Technology	

B. List of Major Equipment/ Instrument.

Lathe machines, Milling, Drilling, Compressors, Blowers, Pumps, Filters, Ducts, Valves, Tools Belts, Bearings, Gears, Cams, Chains.

C. List of Software/Learning Websites.

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. A. M. Talsaniya**, Lecturer in Mechanical Engineering, Sir B.P.I., Bhavnagar.
- **Prof. B. L. Patel**, HOD Printing Technology, R C Technical Institute, Ahmedabad
- **Prof. B. A. Patel**, Retd. HOD, Printing Technology, R. C. Technical Institute, Ahmadabad.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Nishith Dubey**, Professor, Department of Vocational and Entrepreneurship Education
- **Dr. Haji Naik Dharavath**, Associate Professor, Department of Vocational and Entrepreneurship Education