

**Pune Vidyarthi Griha's  
College of Engineering and Technology, Pune**

**Curriculum Book**

<b>Course Title:SE PRINTING Engineering Mathematics -III</b>		<b>Course Number:207004</b>	
<b>Year:SE(Printing) AC.YR 2019-20</b>		<b>Semester: I</b>	
<b>Type of Course</b>	Basic		
<b>Teaching Scheme:</b> 4 Hrs/Week		<b>Tutorials:</b> 1 Hr/Week	
<b>Course Assessment Method Examples</b>	<b>Direct methods</b>	On-line Examination: 50Marks	Theory Examination: 50Marks
		Term-work 25 Marks	Practical/Oral: ----
	<b>Indirect Methods</b>	Tutorials,Assignments, Presentations, MCQs	Q&A session, Group Discussion
<b>Course Prerequisites</b>	A student requires sufficient amount of knowledge of certain topics related to Engineering Mathematics –I & Engineering Mathematics-II, to understand the concepts of Engineering Mathematics-III.		
<b>Course Objectives</b>	1.Linear Differential Equation with constant coefficient & its application.		
	2.Fourier Transform ,application to FT problems on one & two dimensional heat flow problem.		
	3.Laplace Transform ,its properties ,LT of some special functions ,applications of LT for solving differential equation .		
	4.Vector Differential Calculus ,physical interpretation of vector differentiation ,Gradient ,Curl ,Divergence ,Directional Derivative ,Solenoidal ,Irrotational .		
	5.Vector Integral Calculus & its application ,line surface & volume integrals ,Stokes Theorem ,Divergence Theorem.		
	6.Application to partial differential equation.		
<b>Course Outcomes</b>			
C207.1	Demonstrate wide knowledge in topics like Linear Differential Equations & its application.		
C207.2	Demonstrate the ability for understanding the concepts of Fourier Transform.		
C207.3	Demonstrate the ability for understanding the concepts of laplace transform ,LT of standard functions ,Inverse LT		
C207.4	Demonstrating the physical interpretation of vector differentiation, by understanding Gradient ,Divergence ,Solenoidal Field ,Irrotational Field.		
C207.5	Demonstrating the interpretation of vector integral calculus & its application by understanding line , surface ,volume integrals green`s lemma theorem, Gauss Divergence Theorem ,Stokes Theorem.		
C207.6	Demonstrate &evaluate the application of partial differential Equations.		

<b>Course Contents</b>			
<b>Unit-I</b>	<b><u>LINEAR DIFFERENTIAL EQUATION WITH CONSTANT COEFFICIENTS</u></b>		
	Differential equation of 1 <sup>st</sup> order , 1 <sup>st</sup> degree ,explanation about Order and degree of differential equation.Introduction to the concepts of complimentary function and particular integral.Various methods of finding particular integral namely General Method, Variation Parameter, Short Cut Method.Introduction to LDE with constant coefficients, Homogeneous equations,Cauchy`s & Legendre`s DE, Simultaneous & Symmetric Simultaneous DE.		
<b>Unit-II</b>	<b><u>FOURIER TRANSFORM</u></b>		
	Fourier Transform ,understanding of exponential form of Fourier series Fourier integral theorem, meaning of sine and cosine integrals and their inverses Fourier transform ,its meaning standard properties , and their inverses. Uses of fourier Transform in solving difference equations.		
<b>Unit-III</b>	<b><u>LAPLACE TRANSFORM AND APPLICATIONS</u></b>		
	Laplace transform of standard functions ,properties & theorems,LTof standard functions ,special functions ,periodic unit step, unit impulse,inverse Laplace transform application of Laplace transforms to solve DE, liquid level systems ,second order systems.		
<b>Unit-IV</b>	<b><u>VECTOR DIFFERENTIAL CALCULUS</u></b>		
	Physical Interpretation of vector differentiation, Radial ,transverse & Normal componentsOf velocity & acceleration, vector differential operator, Gradient, Divergence & Curl.Directiona derivatives Solenoidal, Irrotational & Conservative fields Scalar Potential ,Vector Identities.		
<b>Unit- V</b>	<b><u>VECTOR INTEGRAL CALCULUS</u></b>		
	Line, surface ,volume integral & its application to find work done ,Green`s Lemma theorem, Gauss`s Divergence Theorem, Stoke`s Theorem Application to problem in electromagnetic fields.		
<b>Unit-VI</b>	<b><u>APPLICATION OF PARTIAL DIFFERENTIAL EQUATIONS</u></b>		
	Basic concepts of partial differential equations ,modeling of vibration string ,heat flow equations ,method of separation of variables Problems based on application of PDE to chemical and allied engineering.		
<b>Text Books</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publication &amp; Edition</b>
T1	Erwin Kreyszig	Advanced Engineering Mathematics	Wiley Eastern Ltd
T2	Peter V .O`Neil	Advanced Engineering Mathematics	Thompson Learning
<b>Reference Books</b>			
R1	P.N.Wartikar	Applied Mathematics (Volumes I& II)	Pune Vidyarthi Griha Prakashan ,Pune

R2	Thomas L.Harman James Dabney & Norman Richert	Advanced Engineering Mathematics with MATLAB	2eCole, Thomson Learning
R3	M.D.Greenberg	Advanced Engineering Mathematics	Pearson Education2e
R4	B.S.Grewal	Higher Engineering Mathematics	Khanna Publication, Delhi
R5	B.V.Ramana	Higher Engineering Mathematics	Tata McGraw- Hill
<b>Self-Learning Material (OCW, Handouts, Web Recourses, Research papers etc.)</b>	Handouts related to important formulas based on algebra ,trigonometric functions ,identities are provided into the initial lectures.		
<b>Contents beyond Syllabus</b>	Lagrange method(Method of variation of parameter) : To understand the particular integral if short cut method fails ,then use of general method involves laborious integration ,in such cases method of variation of parameter helps to determine complete solution . Lagrange Method is also studied for 3 <sup>rd</sup> order linear differential Equation. This method may also be extended to higher order linear differential equations.		
<b>Additional Experiments (If any)</b>	NIL		
<b>Bridging Courses</b>	Before the commencement of regular classes ,respective teachers conducts 20 minutes session on everyday basis for the first 15 days which focuses on class 12level basic maths,also revision of certain important topics related to Engineering Mathematics- I and Engineering Mathematics-II are covered to understand the concepts of Engineering Mathematics-III.		

<b>Assignments</b>	
<b>Assignment No.1 &amp; Assignment No.2</b>	Numerical on C.F,P.I ,Shortcut cases Cauchys & Legendres Equation ,Symmetric and simultaneous Equations, Numerical on Fourier transform ,inverse fourier transform .
<b>Assignment No.3 &amp; Assignment No.4</b>	Numerical on Laplace Transform ,inverse laplace transform . Numerical on vector algebra ,gradient ,divergence ,curl & vector identities .
<b>Tutorials</b>	1. Numerical on complimentary function ,particular integral ,short cut methods .
	2.Numerical on cauchys legendres differential equation , symmetric and simultaneous equations.
	3.Numerical on fourier transform ,fourier cosine transform ,fourier sine transform
	4.Numerical on inverse fourier transform ,inverse fourier cosine and inverse fourier sine transform .
	5.Numerical on Laplace Transform of standard Functions ,properties & general theorems
	6.Numerical on Inverse Laplace Transform& general theorem
	7.Numerical on vector algebra ,Gradient ,Divergence ,Curl.
	8 Numerical on vector identities.

# **CURRICULUM BOOK**

## Curriculum Book (Published on website for students)

<b>Course Title: Introduction to Printing Processes</b>		<b>Course Number: :208281</b>	<b>Course Code:</b>
<b>Year: SE</b>		<b>Semester: I</b>	
<b>Designation of Course</b>		Professional Core	
<b>Teaching Scheme: 4 Hrs/Week</b>		<b>Practical: 2 Hrs/week</b>	
<b>Course Assessment Methods</b>	<b>Direct methods</b>	On-line Examination: 50	End Semester Examination: 50
		Term Work: 25 marks	Practical: 50 marks
	<b>Indirect Methods</b>	Assignments, Presentations	Seminars, Quiz, Q&A session, Group Discussion
<b>Prerequisites</b>	Nil		
<b>Course Objectives</b>			
1	To understand the flow of printing		
2	To understand details of prepress department		
3	To understand details of press department		
4	To understand details of post press department		
5	To understand the basics of design		
6	To learn the types of design for different products		
7	To know the specialized printing applications		
<b>Course Outcomes</b>			
CO207.1	Understand the printing workflow from pre-press to post press		
CO207.2	Analyze the basic printing processes to make a selection of printing processes for specific job		
CO207.3	Analyze the various binding & finishing techniques to make printing job more effective		
CO207.4	Apply the principals of design and fundamentals of design to create a effective design		
CO207.5	Apply the additive & subtractive theory to create a effective design		
CO207.6	Identify the specialised printing applications Course Contents Unit		
<b>Course Contents</b>			
<b>Unit-I</b>	<b>Pre-press</b>		
	Printing Workflow, Typography, 2D & 3D typefaces, family, series of type, legibility readability of type, type measurement, type alignment & arrangement, DTP, Camera Processing, Conversion to film output - negative, positive & tracing, CTP technology, Surface preparation for letterpress, lithography, screen, gravure & flexography		
<b>Unit-II</b>	<b>Press</b>		

	Principles of printing, conventional, inkjet and electrophotography printing processes, Configuration of machines, machine parts and accessories, Introduction to nonconventional printing processes – pad printing, dry offset, waterless offset.		
<b>Unit-III</b>	<b>Post-Press</b>		
	Binding techniques, Hard Binding, Paperback Binding, Mechanical loose leaf binding, finishing techniques such as Punching, embossing, foiling, lamination, varnishing, spot UV		
<b>Unit-IV</b>	<b>Basics of Design</b>		
	Introduction to graphic design, fundamental of design, principle of design, Types of design – natural, conventional, decorative, geometric, and abstract, Basic concepts of designing, Creativity, steps in creativity; Typography; Visual ingredients of graphic design; Design consideration; Symbols and logos. Layout – purpose & advantages; layout styles; layout components; stages in preparing a layout; marking-up; Dummy, Stages of layout, thumbnails, rough layout, comprehensive layout, artwork, Design for magazines, newspaper, catalogues, cartons, commercial stationary, flexible pouches		
<b>Unit- V</b>	<b>Layout and Color</b>		
	Stages of layout – thumbnails, rough layout, comprehensive layout, artwork, Design for magazines, newspaper, catalogues, cartons, commercial stationary, flexible pouches Color Definition of color, Light, Electromagnetic spectrum, Additive color theory, subtractive color theory, Colour Fusion, Colour originals for reproduction. reproduction objectives, resolution, bit depth, grey levels, relationship between grey levels and resolution, dimensions of color, color schemes, color symbolism		
<b>Unit-VI</b>	<b>Specialised Printing Applications</b>		
	Lenticular Printing, Thermographic printing, Dye sublimation, Large format printing- backlit and front lit, hologram printing, printing with encapsulated (scented) inks, RFID labels, Organ Printing		
<b>List of Experiments</b>	<b>Term Work shall consist of following any Eight experiments</b>		
<b>1.</b>	To prepare screen and cut stencil method and print single and multicolour Job		
<b>2.</b>	To prepare the screen by direct photographic method.		
<b>3.</b>	To prepare the screen by indirect photographic method		
<b>4.</b>	To prepare the screen by Direct-Indirect photographic method		
<b>5.</b>	To optimize the exposure time of PS plate using UGRA step control wedge		
<b>6.</b>	To prepare PS plate for offset		
<b>7.</b>	To prepare flexo plate for flexography printing		
<b>8.</b>	To take a print on digital printer		
<b>9.</b>	To take a print on ink jet printer		
<b>10.</b>	Print process identification from printed samples		
<b>Reference Books</b>			
R1	J. Michael Adams, Penny Ann Dolin	Printing Technology 5th edition Delmar Publishing	Delmar Publishing

R2	Rogue C. Parker	Looking Good in Print - A Guide to Basic Design for Desktop Publishing	3rd edition, Ventana Pr.
R3	Alastair Campbell	The Designers Handbook	Little Brown
R4	N. N. Sarkar	Art and Print Production	2nd edition, Oxford University Press, India
R5	D. C. Mulvihill	Flexo Primer	Foundation of FTA
R6	H. Kipphan	Handbook of Print Media	SpringerVerlag Berlin Heidelberg
<b>Self-Learning Facilities, Web Resources, Research papers for reference</b>			
<b>Contents beyond Syllabus</b>			
<b>Additional Experiments</b>	-		
<b>Bridging Courses</b>			
<b>Assignments</b>	1. List down the screen printing factors affecting printability and comment on each in detail with necessary diagrams. 2. Explain workflow of printing with suitable example.		
<b>Presentations</b>			



**Pune Vidyarthi Griha's**

**College of Engineering and Technology, Pune**

**Department of PRINTING Engineering**

# **Curriculum Book**

**SE (Printing Digital Electronics) (2015 Course)**

**Department of Printing Engineering**

To excel in quality education with emphasis on research, professional ethics and environmental sustainability to meet the challenges of the emerging technological needs of printing and packaging industry.

### **Mission**

1. To develop state of the art infrastructure to create outstanding engineers for the printing industry.
2. To develop a strong bond between industry and institute to promote training and consultancy activities in printing.
3. To motivate students and scholars to develop research culture in printing.
4. To develop knowledge and skill of students to adapt to the competitive and technical environment in printing industry.
5. To nurture the spirit of environmental sustainability and excellent work culture among students required in the society at large.

### **Program Educational Objectives (PEO):**

1. The printing engineering graduates in their chosen field of prepress, color and design, print, finishing shall be adaptive to the dynamic changes happening in the media publication or packaging industry.
2. The printing engineering graduates either in their employment or business shall try to implement integrated business processes keeping a strong focus on customers.
3. The printing engineering graduate shall focus on green printing that includes reduction of energy consumption in processes such as paper production, ink production, print production, recycling and deinking by way of carbon footprint initiatives.
4. The print graduate after completion of his higher studies through research shall be as 'enablers' in developing new technologies for better reading, better surface feel and attractive as well as better preservation of packages.

### **Program Outcomes (PO):**

1. The graduate shall be able to apply the engineering knowledge that includes fundamental physics, chemistry and mathematics for solving problems in the field of printing engineering.
2. The graduate shall be able to identify or formulate research problems in printing field by reviewing literature and solving it using basic principles of maths and sciences
3. The graduate shall be able to solve challenges related to health, environment and safety in printing field realizing their responsibility to society.
4. The graduate shall be able to conduct investigation of problems in the field of printing process and materials by using research methods such as design of experiments and using analytical tools to interpret data.
5. The graduate shall try to develop models to solve complex problems in the field of ink, substrate or process.
6. The graduate shall be able to evaluate and solve issues related not only to occupational safety, health hazards but related to society at large by his knowledge of correct use of material and process.
7. The graduate shall demonstrate greater sensitivity towards the spectrum of cultures present locally and globally.
8. The graduate shall be able to evaluate critically the implications of wrong practices that cause serious environmental problems and develop products that lead to greater sustainability.
9. The graduate shall follow ethics in his professional and research field and thus remain committed to the responsibilities of an engineer.
10. The graduate shall demonstrate individual leadership skills and team spirit in task oriented environment.
11. The graduate shall be able to comprehend problems and data and effectively communicate with clear objective.
12. The graduate shall effectively work together on various activities in the printing industry, print community and society with passion and pleasure having good interpersonal skills.
13. The graduate shall apply printing engineering concepts in building new projects and demonstrate this knowledge in project management.
14. The graduate shall demonstrate ongoing and self motivated pursuit of knowledge towards continuously changing technology.

**Course Name: Printing Digital Electronics**

<b>Teaching Scheme</b>	Theory: 4 Hours/Week	<b>Examination Scheme:</b> Paper: 100 Marks
	Practical: 2 Hours/ Week	Term Work:25 marks

**Course Objectives:**

1. Understand Fundamentals of Digital Electronics
2. Understand Number Systems
3. Understand Logic Families and Circuits
4. Understand Use of Digital Electronics in Printing

**Course Outcomes:**

The students shall be able to:

## CO1: Understand Fundamentals of Digital Electronics

CO2: Understand Logic Families and Circuits and Timing Concepts

### CO3: Understand Flip-Flops

#### CO4: Understand ADC and DAC

## CO5: Understand Applications in the Field of Printing and Automation

CO6: Work in a team to identify problem, factors affecting the problem etc with help of digital kits.

Course Outcome	Assessment Method 1	Assessment Method 2	Assessment Method 3	Assessment Method 4	Benchmark
	Question-Answer	Brainstorming	Class test	Assignments	
CO1	√	√		√	More than 70%

					students perform satisfactorily
CO2	√	√			More than 70% students perform satisfactorily
CO3	√	√	√	√	More than 70% students perform satisfactorily
CO4	√	√	√	√	More than 70% students perform satisfactorily
CO5	√	√	√	√	More than 70% students perform satisfactorily
CO6		√		√	More than 70% students perform satisfactorily

### Course Contents:

#### UNIT - I Introduction of number system

Decimal, Binary, Octal Hexadecimal number systems and their conversations. BCD codes, 8421, Excess - 3, Gray Code, ASCII code. Concept of bar code and its application in printing.

## **UNIT - II Fundamentals of Digital Electronics**

Boolean algebra, De-Morgan theorems, all types of gates and their truth tables.

Need of minimization, Minimization techniques, K-map simplification up to 4 variables, SOP and POS forms; don't care conditions, Logic families, and comparative study of TTL, ECL and CMOS.

## **UNIT - III Combination logic and Arithmetic**

Combination logic and Arithmetic such as addition, subtraction, 1's complement and 2's complement method. Binary multiplication and division.

Half adder / Half subtractor, Full Adder / Full Subtractor, BCD adder. One bit digital comparator Concept and Application of ALU.

## **UNIT - IV Sequential logic circuits and their applications in printing**

Study of level clocked S-R,D, JK, M-SJK flip-flops

(Includes logical diagrams, symbol truth - table, waveforms / timing diagrams).

Edge triggered flip flops (includes S-R, D, JK, M-S Jk flip-flops along with logical diagram, symbol truth table, waveforms / timing diagram)

Study of asynchronous and synchronous counters and their applications such as paper counting. Roller speed measurements etc Concept of modulo 'N' counter,

UP/Down counter. Principle operation of Universal shift register

(IC 7495 including all modes of operation - concept only) and its application in printing.

## **UNIT - V Digital signals and its storage and display**

Introduction to ADC's and DAC's (includes classification and specifications in brief),  
Classification of Memories, study of RAM, ROM, EPROM, E PROM, NVRAM,  
SRAM, DRAM, concept of PLA, PAL and PLD's. Display Devices and decoders 7  
segment LED display (includes basic diagrams of Common Anode and Common  
Cathode) study of decoder driver IC's such as IC 7447, 7448, LCD display &  
Display Drivers IC's such as 7106, 7107.

#### **UNIT - VI Introduction to Digital Computer**

Block diagram of digital computer, serial port / parallel port concept, Input devices  
such as Keyboard, Mouse, Joystick, Output Devices such as Printers (includes  
classification and one application of each), Floppy Disks, CD's concept of Modern,  
special accessories such as Digital Camera and Digital Scanner.

#### **References:**

1. R. P. Jain - Modern Digital Electronics Tata McGraw Hill Publication.
2. Gothman - Digital Electronics - An introduction to theory and practice  
Prentice Hall Publication.
3. Malvino and Leach Digital Electronics - Principles and applications -  
Prentice Hall Publication.
4. Tocci Digital systems Principles and application (6<sup>th</sup> edition) - Prentice Hall  
Publication.



**Additions:**

a) Contents beyond Syllabus: Loud /classroom reading of selected relevant and current articles to make the concept/topic clear

Arranging extra/ guest lectures for campaign execution and branding from the renowned persons from the advertising and media

b) Extra Experiments: Experiment is conducted for allowing the students to understand the circuit building

**Assignments:****1. Logic gates – I**

- a) Verification of truth-tables for fundamentals and derived gates (AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR)
- b) NAND and NOR gates as universal gates

**2. Logic gates - II**

- a) Verification of Boolean laws and theorems using logic gates.
- b) Verification of SOP and POS form by K-map (up to 4 variables only) using logic gates.

3. Comparative study of TTL and CMOS (Parameter measurement for any simple functional circuit using TTL IC and CMOS IC)

4. Study of code conversions and their applications in printing

a) Binary to gray and gray to binary.

b) Bar code evaluation

#### 5. Arithmetic Circuits

a) Half and Full Adder / Half and Full Subtractor functionality verification.

b) One bit digital comparator.

#### 6. Combinational Circuits

a) Study of multiplexers and demultiplexers.

b) Study of Encoders and Decoders.

#### 7. Sequential Circuits

a) Study of flip-flops SR, D, JK, T, M-SJK for both level and Edge triggered clock.

#### 8. Sequential circuits II

a) Ripple, Ring & Johnson Counter with application related to printing.

b) Study of mod N counter using IC 7490, IC 7492, IC7493 with application related to printing.

#### 9. Study of Shift Register IC 749 and its application in printing.

#### 10. Study of ADC & DAC IC (8 bit only) or Study of or Display Devices and Drivers

a) LED display (one type only)

b) LCD display (one type only)



**CURRICULUM BOOK**

**Curriculum Book (Published on website for students)**

<b>Course Title: Introduction to Printing Processes</b>		<b>Course Number: :208281</b>		<b>Course Code:</b>	
<b>Year: SE</b>		<b>Semester: I</b>			
<b>Designation of Course</b>		Professional Core			
<b>Teaching Scheme: 4 Hrs/Week</b>		<b>Practical: 2 Hrs/week</b>			
<b>Course Assessment Methods</b>	<b>Direct methods</b>	On-line Examination: 50		End Semester Examination: 50	
		Term Work: 25 marks		Practical: 50 marks	
	<b>Indirect Methods</b>	Assignments, Presentations		Seminars, Quiz, Q&A session, Group Discussion	
<b>Prerequisites</b>	Nil				
<b>Course Objectives</b>					
1	To understand the flow of printing				
2	To understand details of prepress department				
3	To understand details of press department				
4	To understand details of post press department				
5	To understand the basics of design				
6	To learn the types of design for different products				
7	To know the specialized printing applications				
<b>Course Outcomes</b>					
CO207.1	Understand the printing workflow from pre-press to post press				
CO207.2	Analyze the basic printing processes to make a selection of printing processes for specific job				
CO207.3	Analyze the various binding & finishing techniques to make printing job more effective				
CO207.4	Apply the principals of design and fundamentals of design to create a effective design				
CO207.5	Apply the additive & subtractive theory to create a effective design				
CO207.6	Identify the specialised printing applications				
<b>Course Contents</b>					
<b>Unit-I</b>	<b>Pre-press</b>				
	Printing Workflow, Typography, 2D & 3D typefaces, family, series of type, legibility readability of type, type measurement, type alignment & arrangement, DTP, Camera Processing, Conversion to film output - negative, positive & tracing, CTP technology, Surface preparation for letterpress, lithography, screen, gravure & flexography				
<b>Unit-II</b>	<b>Press</b>				

	Principles of printing, conventional, inkjet and electrophotography printing processes, Configuration of machines, machine parts and accessories, Introduction to nonconventional printing processes – pad printing, dry offset, waterless offset.		
<b>Unit-III</b>	<b>Post-Press</b>		
	Binding techniques, Hard Binding, Paperback Binding, Mechanical loose leaf binding, finishing techniques such as Punching, embossing, foiling, lamination, varnishing, spot UV		
<b>Unit-IV</b>	<b>Basics of Design</b>		
	Introduction to graphic design, fundamental of design, principle of design, Types of design – natural, conventional, decorative, geometric, and abstract, Basic concepts of designing, Creativity, steps in creativity; Typography; Visual ingredients of graphic design; Design consideration; Symbols and logos. Layout – purpose & advantages; layout styles; layout components; stages in preparing a layout; marking-up; Dummy, Stages of layout, thumbnails, rough layout, comprehensive layout, artwork, Design for magazines, newspaper, catalogues, cartons, commercial stationary, flexible pouches		
<b>Unit- V</b>	<b>Layout and Color</b>		
	Stages of layout – thumbnails, rough layout, comprehensive layout, artwork, Design for magazines, newspaper, catalogues, cartons, commercial stationary, flexible pouches Color Definition of color, Light, Electromagnetic spectrum, Additive color theory, subtractive color theory, Colour Fusion, Colour originals for reproduction. reproduction objectives, resolution, bit depth, grey levels, relationship between grey levels and resolution, dimensions of color, color schemes, color symbolism		
<b>Unit-VI</b>	<b>Specialised Printing Applications</b>		
	Lenticular Printing, Thermographic printing, Dye sublimation, Large format printing- backlit and front lit, hologram printing, printing with encapsulated (scented) inks, RFID labels, Organ Printing		
<b>List of Experiments</b>	<b>Term Work shall consist of following any Eight experiments</b>		
1.	To prepare screen and cut stencil method and print single and multicolour Job		
2.	To prepare the screen by direct photographic method.		
3.	To prepare the screen by indirect photographic method		
4.	To prepare the screen by Direct-Indirect photographic method		
5.	To optimize the exposure time of PS plate using UGRA step control wedge		
6.	To prepare PS plate for offset		
7.	To prepare flexo plate for flexography printing		
8.	To take a print on digital printer		
9.	To take a print on ink jet printer		
10.	Print process identification from printed samples		
<b>Reference Books</b>			
R1	J. Michael Adams,	Printing Technology 5th	Delmar Publishing

	Penny Ann Dolin	edition Delmar Publishing	
R2	Rogue C. Parker	Looking Good in Print - A Guide to Basic Design for Desktop Publishing	3rd edition, Ventana Pr.
R3	Alastair Campbell	The Designers Handbook	Little Brown
R4	N. N. Sarkar	Art and Print Production	2nd edition, Oxford University Press, India
R5	D. C. Mulvihill	Flexo Primer	Foundation of FTA
R6	H. Kipphan	Handbook of Print Media	SpringerVerlag Berlin Heidelberg
<b>Self-Learning Facilities, Web Resources, Research papers for reference</b>			
<b>Contents beyond Syllabus</b>			
<b>Additional Experiments</b>	-		
<b>Bridging Courses</b>			
<b>Assignments</b>	1. List down the screen printing factors affecting printability and comment on each in detail with necessary diagrams. 2. Explain workflow of printing with suitable example.		
<b>Presentations</b>			

**Pune Vidyarthi Griha's  
College of Engineering and Technology, Pune**

**Curriculum Book**

<b>Course Title: Material Science</b>		<b>Course Number: 208283</b>	
<b>Year: SE</b>		<b>Semester: I</b>	
<b>Type of Course</b>	Professional Core		
<b>Teaching Scheme:</b> 4 Hrs/Week		<b>Laboratories:</b> 2 Hrs/Week	
<b>Course Assessment Method Examples</b>	<b>Direct methods</b>	On-line Examination: 50 Marks	Theory/End Semester Examination: 50 Marks
		Term-work	Practical
	<b>Indirect Methods</b>	Assignments, Presentations, MCQs	Seminars, Quiz, Q&A session, Group Discussion
<b>Course Prerequisites</b>	Applied Chemistry		
	Applied Physics		
<b>Course Objectives</b>	<b>Assessment Method Used</b>		
1	Select appropriate metals and polymers material used in different printing processes		
2	Discuss the importance of surface energy and surface tension for the better interaction of substrate and coatings.		
3	Distinguish the various types of printing inks and their properties required in different printing processes.		
4	Select the various grades of papers used for printing and packaging applications and their properties		
5	Classify different packaging materials according to applications.		
6	Understand the working concept of various instruments used for testing in printing materials.		
<b>Course Outcomes</b>			
C205.1	Apply the knowledge to use of metals and polymers in printing and allied industry.		
C205.2	Relate the knowledge to select the appropriate consumable for the effective use in printing and converting applications.		
C205.3	Analyse the characteristics of various raw material used in printing ink and to predict the properties through suitable testing methods of printing ink for runnability, printability and shelf life.		



C205.4	Analyse the characteristics of various raw materials used to manufacture paper and its properties for runnability, printability and shelf life.
C205.5	Analyse the various materials used to for manufacture of packaging as per the applications.
C205.6	Explain the various methods and instruments used for material analysis in printing and converting.
<b>Course Contents</b>	
<b>Unit-I</b>	<b>Metals and Polymers</b>
	Metals used as image carriers, Metals used as substrate for various applications. Introduction to polymer, Thermo set & thermoplastic polymer, natural & synthetic polymer, application of polymers in printing industry as printing substrates, image carrier emulsion, types of rollers for various printing applications.
<b>Unit-II</b>	<b>Printing Chemicals and Surface Tension</b>
	Role of acids, alkalis and other chemicals in various printing process, Types and role of adhesives in printing and packaging, Surface tension, angle of contact, shape of a liquid surface in a capillary tube, determination of surface tension by capillary tube method, bubble pressure method, dynamic surface tension, Surface Tension measurement of liquid by Ring and Plate method
<b>Unit-III</b>	<b>Printing Inks, Properties and Testing</b>
	Classification & General characteristics of printing inks for various printing processes, Ingredients of printing ink such as pigments, Vehicles, solvents and additives etc. Manufacturing of printing ink, Drying and curing mechanism of printing inks, rheological properties of ink like viscosity, shear, yield, thixotropy, length and tack, Subjective & objective ink testing methods. Various ink problems like Set off, trapping, filling, caking, end use properties of ink
<b>Unit-IV</b>	<b>Paper Manufacturing, Properties and Testing</b>
	Importance of paper and paper products in printing industry, Paper manufacturing process including Pulping, Bleaching, waste paper utilization and deinking, Stock preparation, Sizing, Different machines used for paper manufacturing, Single wire and Two wire, Pressing, Drying, Calendering, Super calendaring, Embossers etc., Different surface finishes obtained in paper, selection criteria of paper substrate for printing and converting applications Surface and Physical properties of paper such as GSM, thickness, density etc., strength properties of paper such as tensile, tearing, folding strength etc., chemical and optical properties of paper like pH, color, gloss, brightness and opacity, Importance of BIS & TAPPI standards for paper & its relation to printing industry
<b>Unit- V</b>	<b>Packaging Materials</b>
	Specialty papers for Packaging, Folding board cartons and coated cartons; Types of Corrugated Boards, Applications
<b>Unit-VI</b>	<b>Instruments and Methods for Material Analysis</b>

	Working principle of Confocal Laser Scanning Microscopy, Scanning Electron Microscopy and Atomic Force Microscopy, 2-D and 3-D analysis of substrate, measurement of surface energy of paper, surface tension of a liquid ink and interfacial tension between ink and paper.		
Experiments			
1	To identify various types of plastic films		
2	To measure the contact angle of liquid ink and surface energy of substrate		
3	To measure the surface tension of an ink by ring and plate tensiometer		
4	To take a proof of paste ink and study physical properties of an ink		
5	To take a proof of liquid ink by bar coater and flexo lab printer		
6	To measure the viscosity of paste and liquid ink		
7	To study the end use properties of an ink		
8	To find GSM and caliper thickness of substrate		
9	To find top and bottom side and cross and machine direction of paper		
10	To find Cobb value and measure opacity of paper		
11	To measure brightness and gloss of substrate		
12	To measure smoothness and porosity of substrate		
Text Books	Author	Title of Book	Publication & Edition
T1			
T2			
Reference Books			
R1	L.C. Young	Printing Science	Pitman publication
R2	L.C. Young	Materials in Printing Processes	Focal Press publication
R3	Leach and Pierce	Printing Ink Manual	Springer Publication
R4	Dr. Nelson R. Eldred	What Printer Should Know About Ink	GATFPress, Pittsburgh
R5	Lawrence A. Wilson	What Printer Should Know About Paper	GATFPress, Pittsburgh
R6	E.A. Apps	Printing Ink technology	Leonard Hills, London Publication

R7	A. J. Athaley	Plastics in Packaging	Multi-tech publication
R8	R. Holman	Technology of Printing Inks	All India PIMA Publication
R9	C.H.Williams	Printing Ink Technology	PIRA UK Publication
R10	K.W. Britt	Handbook of Pulp and Paper technology	CBS Publishers
R11	P.J.Hartsuch	Chemistry of Lithography	GATF Publication
R12	D.S. Mathur	Properties of Matter	S. Chand & Co. Ltd.
R13	Dara.S. S	A Textbook of Engineering Chemistry	S. Chand & Company Ltd., New Delhi
R14	B. Sivasankar	Engineering Chemistry	TATA McGraw Hill
R15	Kenneth G. Budinski, Michael K. Budinski	Engineering Materials: Properties and Selection, Ninth Edition	Pearson Publication
R16	P. Kannan and A. Ravi Krishnan	Engineering Chemistry 9 <sup>th</sup> edition	Sri Krishna Hitech Publishing Company (P) Ltd, Chennai.
R17	Gauri Shankar Misra	Introductory Polymer Chemistry	New Age International
<b>Self-Learning Material (OCW, Handouts, Web Recourses, Research papers etc.)</b>	Paperonweb.com		
<b>Contents beyond Syllabus</b>	Standard procedures to be followed in testing lab		
	Sampling and sampling procedures for testing		
	Standards used in printing material testing		
<b>Additional Experiments (If any)</b>			

<b>Bridging Courses</b>	
<b>Assignments</b>	
1	
2	
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5	
<b>Tutorials</b>	
<b>Presentations</b>	Technical videos on Testing of Materials

**Pune Vidyarthi Griha's  
College of Engineering and Technology, Pune**

**Curriculum Book**

<b>Course Title: <i>Printing Digital Electronics</i></b>		<b>Course Number: 208282</b>	
<b>Year: SE</b>		<b>Semester: I</b>	
<b>Type of Course</b>		Professional Core	
<b>Teaching Scheme: 4Hrs/Week</b>		<b>Laboratories: 2Hrs/Week</b>	
<b>Course Assessment Method Examples</b>	<b>Direct methods</b>	On-line Examination: 50 Marks	Theory/End Semester Examination: 50 Marks
		Term-work	Practical
	<b>Indirect Methods</b>	Assignments, Presentations, MCQs	Seminars, Quiz, Q&A session, Group Discussion
<b>Course Prerequisites</b>	Printing Digital Electronics, Microprocessor and Microcontroller		
<b>Course Objectives</b>	<b>Assessment Method Used</b>		
1	Understand fundamentals of number system different number systems and their conversions		
2	Understand different codes and their conversions, fundamentals of digital electronics, truth table and K-map technique		
3	Understand SOP and POS technique		
4	Understand Logic families		
5	Understand binary arithmetic Circuits		
6	Understand different types of flipflops, counters, ADC , DAC Understand different types of input and output devices		
7	Understand different types memories and different types of decoders		
<b>Course Outcomes</b>			
1	Understand and apply knowledge of different codes and number systems to understand different circuits		
2	Understand and apply KMAP and truth table techniques to design different circuits		
3	Understand and design adder subtractor circuits to perform addition and subtraction		
4	Understand and apply flipflop and counter circuits to get memory blocks and timings		
5	Understand and use ADC and DAC circuits for conversions		
6	Understand and use different input and output devices		

<b>Course Contents</b>	
<b>Unit-I</b>	<b>Introduction of number system</b>
	Decimal, Binary, Octal Hexadecimal number systems and their conversions, BCD codes, 8421, Excess - 3, Gray Code, ASCII code, Concept of bar code and its application in printing
<b>Unit-II</b>	<b>Fundamentals of Digital Electronics</b>
	Boolean algebra, De-Morgan theorems, all types of gates and their truth tables Need of minimization, Minimization techniques, K-map simplification up to 4 variables SOP and POS forms; don't care conditions Logic families and comparative study of TTL, ECL and CMOS.
<b>Unit-III</b>	<b>Combination logic and Arithmetic</b>
	Combination logic and Arithmetic such as addition, subtraction, 1's complement and 2's complement method. Binary multiplication and division. Half adder / Half subtractor, Full Adder / Full Subtractor, BCD adder. One bit digital comparator Concept and Application of ALU
<b>Unit-IV</b>	<b>Sequential logic circuits and their applications in printing</b>
	Study of level clocked S-R, D, JK, M-SJK flip-flops (Includes logical diagrams, symbol truth - table, waveforms / timing diagrams). Edge triggered flip flops (includes S-R, D, JK, M-S Jk flip-flops along with logical diagram, symbol truth table, waveforms / timing diagram). Study of asynchronous and synchronous counters and their applications such as paper counting. Roller speed measurements etc Concept of modulo 'N' counter, UP/Down counter. Principle operation of Universal shift register (IC 7495 including all modes of operation - concept only) and its application in printing
<b>Unit- V</b>	<b>Digital signals and its storage and display Basic</b>
	Introduction to ADC's and DAC's (includes classification and specifications in brief). Classification of Memories, study of RAM, ROM, EPROM, E PROM, NVRAM, SRAM, DRAM, concept of PLA, PAL and PLD's. Display Devices and decoders 7 segment LED display (includes basic diagrams of Common Anode and Common Cathode) study of decoder driver IC's such as IC 7447, 7448, LCD display & Display Drivers IC's such as 7106, 7107.
<b>Unit-VI</b>	<b>Introduction to Digital Computer</b>
	Block diagram of digital computer, serial port / parallel port concept, Input devices such as Keyboard, Mouse, Joystick, Output Devices such as Printers (includes classification and one application of each), Floppy Disks, CD's concept of Modern, special accessories such as Digital Camera and Digital Scanner
<b>Experiments</b>	
<b>1</b>	Logic gates – I
<b>2</b>	Logic gates – II
<b>3</b>	Comparative study of TTL and CMOS (Parameter measurement for any simple functional circuit using TTL IC and CMOS IC)
<b>4</b>	Study of code conversions and their applications in printing a. Binary to gray and gray to binary. b. Bar code evaluation
<b>5</b>	Arithmetic Circuits: Half and Full Adder / Half and Full Subtractor functionality verification
<b>6</b>	Combinational

<b>7</b>	Sequential Circuits I, Sequential circuits II
<b>8</b>	Study of Shift Register IC 749 and its application in printing
<b>9</b>	Study of ADC & DAC IC (8 bit only) or Study of or Display Devices and Drivers
<b>Self-Learning Material (OCW, Handouts, Web Recourses, Research papers etc.)</b>	
<b>Contents beyond Syllabus</b>	
<b>Additional Experiments (If any)</b>	
<b>Bridging Courses</b>	
<b>Assignments</b>	
1	
2	
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<b>Tutorials</b>	
<b>Presentations</b>	

**Pune Vidyarthi Griha's  
College of Engineering and Technology, Pune**

**Curriculum Book**

Course Title:SE PRINTING Strength of machine elements		Course Number:202281	
Year:SE(Printing) AC.YR 2019-20		Semester: I	
Type of Course	Basic		
Teaching Scheme:4 Hrs/Week		Tutorials: None	
Course Assessment Method Examples	Direct methods	On-line Examination: 50Marks	Theory Examination: 50Marks
			Practical/Oral: ----
	Indirect Methods	Class Test (units 1,2)	Assignment 1 (units 3,4) Assignment 2 (units 5,6)
Course Prerequisites	A student requires sufficient amount of knowledge of certain topics related to Engineering Mathematics & Engineering Mechanics		
Course Objectives	1. To introduce the basic elements of the subject like mechanical properties of materials, stress-strain diagram and various elastic constants and their interrelation.		
	2. To introduce students the concept of shrear force diagram (SFD) and bending moment diagram (BMD) as applicable in cantilever beams, simply supported beams		
	3. To introduce flexural formula applicable to bending stresses and its application to beams of variety of cross-sections (T, I and C).		
	4. To study principal stresses & theories of failure		
	5. To explain the slope and deflection of beams.		
Course Outcomes			
C202.1	Students will be able to determine various constants of elasticity of a material and also calculate stress and strain induced in various types of structural member when subjected to axial loading and temperature changes.		
C202.2	Students will be able to draw shear force diagram and bending moment diagram for different types of beams under various loading conditions.		
C202.3	Students will be able to determine bending stress and shear stress occurring in beams of variety of cross-sections with given loading conditions.		
C202.4	Students will be able to calculate the stress and strain in a shaft transmitting torque and also determine safe load that can be supported by short and long columns.		
C202.5	Students will be able to determine and illustrate principal stresses, maximum shearing stress acting on a structural member and locate the principal plane. Students will be able to apply various theories of failure for static loading.		
C202.6	Students will be able to determine slope and deflections produced in the beams of various sections due to various types of loads. Students will be able to determine strain energy due to axial load, bending and torsion.		



<b>Course Contents</b>	
<b>Unit-I</b>	<b>Simple stresses &amp; strains</b>
	Introduction to Engineering materials, their classification, designation & applications Mechanical properties - strength, hardness, toughness, ductility, malleability, stiffness, resilience, fatigue, endurance limit & creep. Types of stresses & strains, Hooke's Law, stress - strain diagram for ductile & brittle materials, allowable stress, factor of safety, modulus of elasticity, modulus of rigidity, volumetric strain, bulk modulus, Poisson's ratio, relationship between elastic constants, thermal stresses & strains, thermal stresses in composite sections.
<b>Unit-II</b>	<b>Shear Force &amp; Bending Moment Diagrams of Beams</b>
	Concept of SFD & BMD SFD & BMD for cantilevers, simply supported beams & over hanging beams subjected to point load Uniformly Distributed Load, Uniformly Varying Load and couple, Point of contra- flexure Relation between SF, BM and rate of loading at a section of a beam, Loading diagram from SFD and BMD, Numericals on above.
<b>Unit-III</b>	<b>Bending and shear stresses</b>
	Bending stresses- Theory of simple bending, derivation of Flexural formula, area centre & moment of inertia of common cross sections such as rectangular, circular, T, I & C sections. Moment of resistance, section modulus calculations for above sections. Beams of uniform strength. Shear stresses-Introduction, assumptions, derivations of shear stress formula. Shear stress distribution diagram for common cross-sections such as rectangular, circular, T, I & C sections
<b>Unit-IV</b>	<b>Axially Loaded Columns and Torsion in circular shafts</b>
	Axially Loaded Columns - Concept of buckling of columns, Derivation of Euler's formula for buckling load for column with hinged ends, concept of equivalent length for various end conditions, Limitations of Euler's formula, Rankine's buckling load, Johnson's buckling load, safe load on column Torsion in circular shafts-Stresses, strains and deformations in solid and hollow shafts, homogeneous and composite circular cross sections subjected to torsion, Derivation of torsion equation. Stresses subjected to combined torsion, bending and axial force on shafts. Shafts in series & parallel.
<b>Unit- V</b>	<b>Principal Stresses &amp; Strains, Theories of Elastic Failure, Strain Energy</b>
	Principal Stresses & Strains -Normal shear stresses & strains on oblique plane, concept of principal planes, derivation of principal stresses & maximum shear stresses, position of principal planes & planes of Maximum shear, graphical solution using Mohr's circle. Theories of Elastic Failure-Maximum principal stress theory, Maximum shear stress theory & distortion energy theory. Strain Energy & Impact -Concept of strain energy, derivations & use of expression for deformations of axially loaded members under gradual, sudden & impact loads, strain energy due to self load, strain energy due to shear, strain energy due to bending, strain energy due to torsion.
<b>Unit-VI</b>	<b>Slope and deflection of beams</b>
	Importance of deflection in practical applications. Relation between bending moment and slope, slope and deflection of statically determinate beams. Derivation of equations for slope & deflection of beams in case of cantilevers & simply supported beams loaded with point loads, uniformly distributed loads & couple Determination of slope & deflection for cantilevers, simply supported beams & beams with overhang, subjected to point loads & uniformly distributed load by double integration method, Macaulay's method.

Text Books	Author	Title of Book	Publication & Edition
T1	S. Ramamurtham	Strength of Materials	Dhanpat Rai and sons
T2	S.S.Bhavikatti	Strength of Materials	Vikas Publications
Reference Books			
R1	E. P. Popov	Introduction to Mechanics of Solids	Prentice Hall Publishers
R2	Singer & Pytel	Strength of Materials	Harper & Row publications
R3	Beer F.P. & Johnston E.R	Mechanics of materials	McGrew Hill publishers
Self-Learning Material (OCW, Handouts, Web Recourses, Research papers etc.)	Hand-outs related to important formulae		
Contents beyond Syllabus	Beam of uniform strength		
Additional Experiments (If any)	Not applicable		
Bridging Courses	Before the commencement of regular S.E. syllabus, teacher conducts 5 lectures of revision of important topics from Engineering mechanics		
Assignments			
Assignment 1	Based on units 3 and 5		
Assignment 2	Based on units 5 and 6		
Tutorials	None		

**Pune Vidyarthi Griha's  
College of Engineering and Technology, Pune**

**Curriculum Book**

**Academic Year: 2019-20**

Course Title: Print Layout and Design		Course Number:208284	
Year: SE		Semester: I	
Type of Course	Professional Core		
Teaching Scheme: -		Laboratories: 2 Hrs/Week	
Course Assessment Method Examples	Direct methods	On-line Examination: NA	Theory Examination: NA
		Practical - 50 Marks	
	Indirect Methods	Assignments,	Q&A session, Group Discussion
Course Prerequisites	Application of Page lay outing software, vector based software and photo editing software		
Course Objectives	Assessment Method Used		
1	To learn and work with various types of Original		
2	To prepare Page Lay-outing and processing		
3	To do Proofing and Dummy Preparation		
4	To understand Halftone techniques		
5	To work with Digital Input Systems		
6	To work with Densitometry, and use Densitometer		
7	To do Costing of Print jobs		
Course Outcomes			
CO6.1	Analyze the requirements of typesetting to create a effective design		
CO6.2	Analyze the requirements of Page lay outing standards to create effective design for specific job		
CO6.3	Apply the various halftone techniques for dot reproduction		
CO6.4	Analyze the various digital input systems for effective selection of digital devices for specific job		
CO6.5	To understand the densitometer and its application		
CO6.6	Apply the production strategy for costing of specific job		
Course Contents			
List of Experiments	Term Work shall consist of following any <b>eight</b> experiments		
1	Introduction to page lay-outing software.		
2	Prepare a pamphlet by using lay-outing software in A5 size and create step and repeat in A3 size.		

<b>3</b>	Design a single color brochure using lay-outing software for A4 size and create print layout for offset machine size such as 15 x 20 inches, 18 x 23 inches, 20 x 30 inches etc.		
<b>4</b>	To design a bookwork using lay-outing software and different imposition styles.		
<b>5</b>	Introduction to image editing tools using photo editing software.		
<b>6</b>	Create a background for specific design by using filters from photo editing software.		
<b>7</b>	Convert color image into gray scale image and adjust the highlight, mid tone and shadow areas.		
<b>8</b>	Introduction to vector graphic software.		
<b>9</b>	Design a magazine cover page using vector base software.		
<b>10</b>	Designing of newspaper advertisement using vector based software.		
<b>Reference Books</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publication &amp; Edition</b>
R1	H.Kipphan	Handbook of Print Media	Springer Publication
R2	Leo	Manual of Graphic Design	
R3	Eric Chambers	Manual of reproduction for Lithography	
<b>Self-Learning Material (OCW, Handouts, Web Recourses, Research papers etc.)</b>	Studying various layouts of magazines, leaflets, brochures, packages		
<b>Contents beyond Syllabus</b>	Use of Esko software		
<b>Additional Experiments (If any)</b>	Book designing		
<b>Bridging Courses</b>	NIL		
<b>Assignments</b>	To create a 4 page brochure on different themes such as travel, fitness, and similar		
<b>Tutorials</b>	Nil		
<b>Presentations</b>	Nil		

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO6.1</b>	1	-	1	1	2	3	3	1	3	1	1	2
<b>CO6.2</b>	1	-	1	1	2	3	3	1	3	1	1	2
<b>CO6.3</b>	1	-	1	1	2	3	3	1	3	1	1	2
<b>CO6.4</b>	1	-	1	1	2	3	3	1	3	1	1	2
<b>CO6.5</b>	1	-	1	1	2	3	3	1	3	1	1	2
<b>CO6.6</b>	1	-	1	1	2	3	3	1	3	1	1	2

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO6.1</b>	3	3
<b>CO6.2</b>	3	3
<b>CO6.3</b>	3	3
<b>CO6.4</b>	3	3
<b>CO6.5</b>	3	3
<b>CO6.6</b>	3	3