

STATE BOARD OF TECHNICAL EDUCATION, BIHAR
Scheme of Teaching and Examinations for
IIIRD SEMESTER DIPLOMA IN PRINTING TECHNOLOGY

(Effective from Session 2020-21 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test (CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Applied Mathematics	2000301	04	03	10	20	70	100	28	40	03
2.	Computer Programming Through 'C'	2000302	03	03	10	20	70	100	28	40	03
3.	Basics of Printing Technology	2027303	03	03	10	20	70	100	28	40	03
4.	Printer's Science	2027304	03	03	10	20	70	100	28	40	03
5.	Press Work	2027305	03	03	10	20	70	100	28	40	03
			Total: - 16				350	500			15

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical		Total Marks	Pass Marks in the Subject	
					Internal (PA)	External (ESE)			
6.	Computer Programming Through 'C' Lab.	2000306	06 50% Physical 50% Virtual	03	15	35	50	20	03
7.	Basics of Printing Technology-Lab.	2027307	04 50% Physical 50% Virtual	03	15	35	50	20	02
8.	Printer's Science Lab.-I	2027308	02 50% Physical 50% Virtual	03	15	35	50	20	01
			Total: - 12				150		06

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal (PA)	Marks of External (ESE)	Total Marks	Pass Marks in the Subject	
9.	Press Work (TW)	2027309	03	23	52	75	30	02
10.	Python / Others (TW)	2000310	02	07	18	25	10	01
			Total: - 05			100		03
			Total Periods per week Each of duration One Hours = 33			Total Marks = 750		24

APPLIED MATHEMATICS

Subject Code 2000301	Theory				Credits		
	No. of Periods Per Week			Full Marks		:	100
	L	T	P/S	ESE	:	70	03
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents: Theory		Hrs	Marks
Unit -1	<p>Integration:</p> <p>1.1 Definition of integration as anti-derivative. Integration of standard function.</p> <p>1.2 Rules of integration (Integrals of sum, difference, scalar multiplication).</p> <p>1.3 Methods of Integration.</p> <p>1.3.1 Integration by substitution</p> <p>1.3.2 Integration of rational functions.</p> <p>1.3.3 Integration by partial fractions.</p> <p>1.3.4 Integration by trigonometric transformation.</p> <p>1.3.5 Integration by parts.</p> <p>1.4 Definite Integration.</p> <p>1.4.1 Definition of definite integral.</p> <p>1.4.2 Properties of definite integral with simple problems.</p> <p>1.5 Applications of definite integrals.</p> <p>1.5.1 Area under the curve.</p> <p>1.5.2 Area between two curves.</p> <p>1.5.3 Mean and RMS values</p>	12	20
Unit -2	<p>Differential Equation</p> <p>2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation for function containing single constant.</p> <p>2.2 Solution of differential equations of first order and first degree such as variable separable type, reducible to Variable separable, Homogeneous, Nonhomogeneous, Exact, Linear and Bernoulli equations.</p> <p>2.3 Applications of Differential equations.</p> <p>2.3.1 Laws of voltage and current related to LC, RC, and LRC Circuits.</p>	10	15
Unit - 3	<p>Laplace Transform</p> <p>3.1 Definition of Laplace transform, Laplace transform of standard functions.</p> <p>3.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by t^n, division by t.</p> <p>3.3 Inverse Laplace transforms. Properties-linearly first shifting, second shifting. Method of partial fractions,</p> <p>3.4 Convolution theorem.</p> <p>3.5 Laplace transform of derivatives,</p> <p>3.6 Solution of differential equation using Laplace transform (up to second order equation).</p>	08	14
Unit - 4	<p>Fourier Series</p> <p>4.1 Definition of Fourier series (Euler's formula).</p> <p>4.2 Series expansion of continuous functions in the intervals $(0, 2l)$, $(-l, l)$, $(0, 2\pi)$, $(-\pi, \pi)$</p> <p>4.3 Series expansions of even and odd functions.</p> <p>4.4 Half range series.</p>	08	07

Unit - 5	Numerical Methods		
	5.1 Solution of algebraic equations Bisection method. Regula-falsi method. Newton – Raphson method.	05	07
	5.2 Solution of simultaneous equations containing 2 and 3 unknowns Gauss elimination method. Iterative methods- Gauss seidel and Jacobi's methods.	05	07
	Total	48	70

Text /Reference Books:

Name of Authors	Titles of the Book	Name of the Publisher
Mathematics for polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan, Pune
Calculus: single variable	Robert T. Smith	Tata McGraw Hill
Laplace Transform	Lipschutz	Schaum outline series.
Fourier series and boundary value problems	Brown	Tata McGrawHill
Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Dehli
Introductory Methods of Numerical analysis	S. S. Sastry	Prentice Hall Of India, New Dehli
Numerical methods for scientific & engineering computations	M. K. Jain & others	Wiley Eastern Publication.

COMPUTER PROGRAMMING THROUGH 'C'

Subject Code 2000302	Theory			No of Period in one session: 50			Credits 03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	03	—	—	TA	:	10	
				CT	:	20	

Course Learning Objective:

Computers play a vital role in present day life, more so, in the professional life of technician engineers. In order to enable the students, use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various engineering applications of computers.

Objective:

The objectives of this course are to make the students able to:

- Develop efficient algorithms for solving a problem.
- Use the various constructs of a programming language viz. conditional, iteration and recursion.
- Implement the algorithms in “C” language.
- Use simple data structures like array, stacks and linked list solving problems.
- Handling File in “C”.

Contents: Theory		Hrs	Marks
<u>Unit -1</u>	<u>Introduction to computer software:</u> Classification of computer software. System software. Application software. Programming languages. Machine languages. Assembly languages. High level programming languages. Algorithms and flowchart.	[03]	
<u>Unit -2</u>	<u>Fundamental of C languages.</u> Introduction. Background. Characteristics of C. Uses of C. Structure of a C program. Writing the first C program. Files used in a C program. Source code files. Header files. Object files. Binary executable files. Compiling and Executing C programs. Using comments. Characters used in C. Identifier. Keyword or Reserved words. Tokens. Constants.	[08]	

	<p>Numeric constant. String Character constant. Variables. Variable Declaration. Basic Data Types. Additional Data types. Operators and Expressions. Operator Precedence and Associativity. Type conversion and Type casting. Input/ Output statements in C.</p>		
<u>Unit -3</u>	<p><u>Decision Control and Looping Statements:</u> Introduction to Decision control statements. Conditional Branching statements. If statement. If-else statement. If-else-if statement. Switch case. Iterative statements. While loop. Do-while loop. For loop. Nested loops. Break and continue statements. Break statement. Continue statement. Goto statement.</p>		
<u>Unit -4</u>	<p><u>Functions in 'C'.</u> Uses of functions. User defined functions. Function Declaration. Calling a function. Actual and formal Arguments. Rules to call a function. Function propotype. Recursion. Use of Recursive function. Local or Internal variables. Global or External variables. Void function. Storage classes in C. Auto or Automatic Storage class. Static Storage class. Extern Storage class. Register Storage class.</p>	[07]	

<p><u>Unit -5</u></p>	<p><u>Arrays.</u> Introduction. Declaration of Arrays. Accessing the Elements of an Array. Calculating the address of Array elements. Calculating the length of an Array. Storing values in Arrays. Initializing Arrays during Declaration. Inputting values from the keyboard. Assigning values to Individual Elements. Operations on Arrays. Traversing an Array. Inserting an Element in an Array. Deleting an Element from an Array. Merging Two Arrays. Searching for a value in an Array. Passing Arrays to functions. Two dimensional Arrays. Declaring Two-dimensional Arrays. Initializing Two-dimensional Arrays. Accessing the Elements of two dimensional Arrays. Operations on Two-dimensional Arrays.</p>	<p>[07]</p>	
<p><u>Unit -6</u></p>	<p><u>Pointers.</u> Understanding the Computer's Memory. Introduction to pointers. Declaring pointer variables. Pointer Expressions and pointer Arithmetic. Null pointers. Passing Arguments to function using pointer. Pointers and Arrays. Passing an Array to a Function. Dynamic Memory Allocation. Malloc () function. Calloc () function. Realloc () function. Free () function.</p>	<p>[07]</p>	
<p><u>Unit -7</u></p>	<p><u>Structures and Unions.</u> Structures. Structure variables and Arrays. Initialization of structure variable and Array. Dot (•) Operator. Assigning value of a structure to Another structure. Structure within structures. Site of () of a structure. Unions.</p>	<p>[04]</p>	

Site of () unions.		
Difference between a structure and an union.		
Enum Data Type.		
Typedef Declaration.		

Text / Reference Books -

Programming with C. Second Edition. Tata McGraw-Hill, 2000 -	Byron Gottfried
How to solve by Computer, Seventh Edition, 2001, Prentice hall	R.G. Dromey of India.
Programming with ANSI-C, First Edition, 1996, Tata McGraw	E. Balaguruswami hill.
Programming with ANSI & Turbo C. First Edition, Pearson	A. Kamthane Education.
Programming with C. First Edition, 1997, Tara McGraw hill.	Venugopla and Prasad
The C Programming Language, Second Edition, 2001, Prentice	-B. W. Kernighan & D.M. Ritchie Hall of India.
Programming in C, Vikash Publishing House Pvt. Ltd., Jungpura,	R. Subburaj New Delhi.
Programming with CLanguage, Tara McGraw Hill, New Delhi. -	C. Balagurswami
Programming in C, Galgotia Publications Pvt. Ltd. Dariyaganj,- Kris A. Jamsa New Delhi.	
The Art of C Programming, Narosa Publishing House, New-Jones, Robin & Stewart Delhi.	
Problem Solving and Programming. Prentice Hall International. -	A.C. Kenneth
Cmadeeasy, McGraw Hill Book Company, 1987.	- H. Schildt
Software Engineering, McGraw Hill, 1992.	- R.S. Pressman
Pointers in C, BPB publication, New Delhi.	- Yashwant Kanetka

BASICS OF PRINTING TECHNOLOGY

Subject Code 2027303	Theory			No of Period in one session: 50			Credits 03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	03	—	—	TA	:	70	
				CT	:	10	

Objective

This subject deals with the basic knowledge in Printing that will given the students to understand the detailed study of the trade in further studies.

Sl.No.	Topics	Period
1.	Introduction to Printing Technology	(08)
2.	Introduction to Printing Inks	(07)
3.	Introduction to Printing Subtracts	(07)
4.	Introduction to Printing Plates	(07)
5.	Introduction to Printing Design	(07)
6.	Education in Printing Technology	(07)
7.	Careers in Printing Technology	(07)

Contents: Theory		Hrs	Marks
Unit -1	Introduction to Printing Technology 1.1 : Definition of Printing 1.2 : Scope of Printing Technology in modern day world.	(08)	
Unit -2	Introduction to Printing Inks 2.1 : Its role in Printing 2.2 : Types of Printing Inks 2.3 : Drying Processes of Printing inks.	(07)	
Unit -3	Introduction to Printing Subtracts 3.1 : Printing Paper 3.2 : Plastics 3.3 : Aluminium foil	(07)	
Unit -4	Introduction to Printing Plates 4.1 : Suitability of Nature of plate as per Printing Process. 4.2 : Different Printing plates used today	(07)	
Unit -5	Introduction to Printing Design 5.1 : Role of Design on Printing Products 5.2 : Originals used in Printing	(07)	
Unit -6	Education in Printing Technology 6.1 : Certificate Level courses in Printing Technology imparted in I.T.I's 6.2 : Diploma level courses available in polytechnic's 6.3 : Degree level courses in Colleges & Universities	(07)	
Unit -7	Careers in Printing Technology 7.1 : Careers in operating of Printing Machines & equipment's. 7.2 : Supervisory level career. In Printing houses, Publishing houses, advertising agencies & a lot more 7.3 : Management & top-level management careers in Printing & allied Trades.	(07)	
Total		50	

PRINTER'S SCIENCE

Subject Code 2027304	Theory			No of Period in one session: 60			Credits 03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

The student will learn the scientific approach to the different printing materials. They will also learn about the testing of material for quality control. The subject will make the students to learn about the chemical reactions involved in various stages of Reproduction Photography, Surface Preparation,

Pr	esswork etc.	Sl. No.	Topics	Periods
		01	Materials used for Image Carriers	(10)
		02	Photographic Materials.	(10)
		03	Polymers	(10)
		04	Colloids	(10)
		05	Substrates.	(10)
		06	PH	(10)
Total 60				

Contents: Theory		Hrs	Marks
Unit -1	MATERIAL USED FOR IMAGE CARRIERS 1.1 Relief process, Type metal alloys, original plates; Zinc & Copper for Blocks, Photopolymer plates, Duplicate plates; Stereo and Electro. 1.2 Planography: Zinc, aluminium, anodized aluminium, bi-metallic and tri-metallic plates, presensitised plates, photopolymer plates. 01.03. Intaglio: Metals used for gravure cylinders and plating. 01.04 Materials used for other processes, e.g., Flexography, Screen, Dry offset.	10	
Unit -2	PHOTOGRAPHIC MATERIALS: 2.1 Basic Ingredients of emulsion and their functions. 2.2 Emulsion process, control of sensitometric qualities and sensitometric properties, emulsion structure. 2.3 Developer's constituents and their functions. 2.4 Chemicals for after –treatment. 2.5 Introduction to non-silver material.	10	
Unit -3	POLYMERS: 3.1 Monomers and Polymers. 3.2 Homopolymers and Copolymers. 3.3 Types of polymerization reactions: Addition polymerization and condensation polymerization. 3.4 Types of polymers: Plastics, Rubber and Fibres. 3.5 Composition and characteristic properties of the polymers printing Ink resin and vehicles, adhesives, film base, cellulose and gelatin.	10	
Unit -4	COLLOIDS 4.1 Characteristics. 4.2 Methods of preparation and properties. Application in printing industry.	10	
Unit -5	SUBSTRATES: 5.1 Fibrous and non-fibrous raw materials used in paper and board manufacture. 5.2 Surface treatment related to ultimate use. 5.3 Varieties of papers and boards: Characteristics, Classifications, identification selection of choice for different classes of print jobs and printing processes. 5.4 Other substrates: Metal foil, plastic, cellophane, etc.	10	

Unit -6	<p>pH</p> <p>6.1 PH Scale, range of acidity and alkalinity</p> <p>6.2 PH of fountain Solutions, optimum range required, problems encountered when PH is higher or lower than the optimum range.</p> <p>6.3 Optimum PH of printing inks, problem encountered when pH is higher or lower than the optimum range.</p> <p>6.4 PH of paper, problems encountered when pH is higher or lower than the optimum range.</p> <p>6.5 PH of adhesives used in laminating printed materials, optimum value required, problems encountered when PH is higher or lower than the optimum value.</p>		
Total		50	

PRESS WORK

Subject Code 2027305	Theory			No of Period in one session: 50			Credits 03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	03	—	—	TA	:	70	
				CT	:	10	

Rationale & Objective:

This subject deals with the Printing Techniques, Relief printing process, Planographic Printing Process and Silk Screen. Intaglio Printing; Knowledge of this subject is very essential for diploma Holder.

S.No.	Topics	Period
01	Relief Printing.	(10)
02	Planographic Printing	(10)
03	Secreen Printing	(10)
04	Intaglio Printing	(10)
05	Flexography Printing	(10)

Total 50

Contents : Theory		Hrs	Marks
Unit -1	RELIEF PRINTING: 1.1 Letter press planten machine, kinds-purpose sizes of machine, Different kinds of inking systems- Makeready systems. 1.2 Letterpress cylinder machine single revolution, perfecting machine sizes-speeds-suitability, inking systems, make ready, Feeding and delivery systems. 01.03. Web-fed printing machine and their characteristics.	[10]	
Unit -2	PLANOGRAPHIC PRINTING: 2.1 Offset machine (sheet-fed), kinds of presses-sizes-speeds suitability, single, two and multi-colour and perfecting machine. 2.2 Different Kinds of feeding system and its control (ramp controls) 2.3 Plate cylinder, Blanket cylinder, impression cylinder. Packing of these cylinder-their purposes. 2.4 Inking systems-Dempening Systems-drying system-different kinds of delivery systems.	[10]	
Unit -3	SCREEN PRINTING: 03.01 Screen printing machine and printing tables, its flatbod machine their accessories-suitability.	[10]	
Unit -4	INTAGLIO PRINTING 04.01 Intaglio: sheet fed machine kinds-sizes and suitability.	[10]	
Unit -5	FLAXOGRAPHY PRINTING 5.1 Flexography-sheet fed machine, web fed, kinds-sizes and suitability. 5.2 Features, classification of various presses. 5.3 Various unwinding and rewinding units, printing units.	[10]	
Total		50	

COMPUTER PROGRAMMING THROUGH 'C' LAB

Subject Code 2000306	Practical			No. of Period in one session: 84			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	—	—	06	Internal (PA)	:	15	
				External (ESE)	:	35	

Course Learning Objectives:

This Lab course is intended to practice what is taught in theory class of 'Computer Programming' and become proficient in computer programming. Computer programming is all about regular practice. Students should work on solved and unsolved problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below.

Course outcomes:

Student should be able to write code snippets, and then compile, debug and execute them.

Content: Practical

<u>Unit – 1</u>	Familiarization with programming environment (Editor, Compiler, etc.)
<u>Unit – 2</u>	Programs using, I/O statements and various operators
<u>Unit – 3</u>	Programs using expression evaluation and precedence
<u>Unit – 4</u>	Programs using decision making statements and branching statements
<u>Unit – 5</u>	Programs using loop statements
<u>Unit – 6</u>	Programs to demonstrate applications of n dimensional arrays
<u>Unit – 7</u>	Programs to demonstrate use of string manipulation functions
<u>Unit – 8</u>	Programs to demonstrate parameter passing mechanism
<u>Unit – 9</u>	Programs to demonstrate recursion
<u>Unit – 10</u>	Programs to demonstrate use of pointers
<u>Unit – 11</u>	Programs to demonstrate command line arguments
<u>Unit – 12</u>	Programs to demonstrate dynamic memory allocation
<u>Unit – 13</u>	Programs to demonstrate file operations

The language of choice will be C. This is a skill course. More you practice, better it will be.

Reference Books:

1. Let Us C, Yashavant Kanetkar
2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
3. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.

BASICS OF PRINTING TECHNOLOGY LAB

Subject Code 2027307	Practical			No. of Period in one session:			Credits 02
	No. of Periods Per Week			Full Marks			
	L	T	P/S	Internal (PA)	:	50	
	—	—	04	External (ESE)	:	15	
						35	

Contents: Practical	
Unit -1	Introduction to Primary & Secondary Colours-Lab demonstration
Unit-2	Mixing of Primary Colours to get a secondary Colour.
Unit-3	Practical demonstration of different thicknesses of papers & bonds.
Unit-4	Making designs of different Printing Products.

PRINTER'S SCIENCE LAB - I

Subject Code 2027308	Practical			No of Period in one session:			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal (PA)	:	15	
	—	—	02	External (ESE)	:	35	

Contents: Practical	
Unit -1	Mass, Ink Tests, tone and under tone tests.
Unit -2	Opacity test
Unit -3	Drying and Bleeding tests.
Unit -4	Emulsification tests.
Unit -5	Test for end use requirements of Ink and Papers.
Unit -6	PH meter & Desito meter application.

PRESS WORK -TW

Subject Code 2027309	Term Work			No of Period in one session:			Credits
	No. of Periods Per Week			Full Marks	:	75	02
	L	T	P/S	Internal (PA)	:	23	
	—	—	03	External (ESE)	:	52	

Sl.No. Topics

- 1 Letter Press.
- 2 Offset

	Contents: Term Work	Hrs	Marks
Unit -1	<p><u>LETTER PRESS:</u></p> <p>1.1 Automatic platens and cylinder machine makeready operations for text, line and halftone, setting of feeding, inking and delivery units, levelling the impression.</p> <p>1.2 Simple imposition schemes.</p> <p>01.03 Printing problem and their remedies for sheet-fed presses.</p> <p>01.04 Mounting and locking of Blocks.</p>		
Unit -2	<p><u>OFFSET:</u></p> <p>2.1 Adjustment of automatic feeders.</p> <p>2.2 Mounting of plate on cylinder, fitting of offset blanket, preparing it for printing.</p> <p>2.3 Preparation of fountain solution, dampening rollers setting.</p> <p>2.4 Adjustment of inking and dampening rollers, ink fountain zero setting.</p> <p>2.5 Colour mixing and matching.</p> <p>2.6 Make-ready and printing of line and halftone, one-and-two colour work.</p> <p>2.7 Ink roller wash up, cleaning & storing plates.</p>		

PYTHON / Others –TW

Subject Code 2000310	Term Work			No of Period in one session:			Credits 01
	No. of Periods Per Week			Full Marks			
	L	T	P/S	Internal (PA)	:	25	
	—	—	02	External (ESE)	:	07	

CONTENTS		Hrs.	Marks
UNIT – 01	Write a program to demonstrate basic data type in python.		
UNIT – 02	Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)		
UNIT – 03	Write a python program Using for loop, write a program that prints out the decimal equivalent of $1+\frac{1}{2}+\frac{1}{3} \dots \frac{1}{n}$		
UNIT – 04	Write a Python program to find first n prime numbers. Write a program to demonstrate list and tuple in python.		
UNIT – 05	Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number and prints a countdown from that number to zero.		
UNIT – 06	Write a Python Program to add matrices. Write a Python program to multiply matrices.		
UNIT – 07	Write a Python program to check if a string is palindrome or not.		
UNIT – 08	Write a Python program to Extract Unique values dictionary values		
UNIT – 09	Write a Python program to read file word by word Write a Python program to Get number of characters, words.		
UNIT – 10	Write a Python program for Linear Search		

