

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),
(Affiliated to Directorate of Technical Education, Chennai – 25)
VIRUDHUNAGAR – 626 001.

SYLLABUS

DIPLOMA IN PLASTIC TECHNOLOGY

N1 – SCHEME



ACADEMIC BOARD
V.S.V.N.POLYTECHNIC COLLEGE (AUTONOMOUS),
VIRUDHUNAGAR -626 001.

DOTE Nominee

DOTE Nominee

Expert from Industry

Representative of Alumni

Expert from Industry

ISTE Nominee

Submitted to the Cell Office,

The enclosed syllabus has been verified and submitted.

**CHAIRMAN
Board of Studies**

**PRINCIPAL & CHAIRMAN
Academic Board**

N1 - SCHEME

Regulations [MPEC SYSTEM]

(Implemented from 2019-2020)

Diploma Courses in Engineering / Technology/ Commerce

1. Autonomy and Multi Point Entry and Credit System:

As per G.O Ms 1136 dated 20.11.92 our Institution has been granted Autonomous status from the academic year 1994–95.

The Students admitted for the I Term Engineering at this Institution in Multi Point Entry Credit System (MPEC) will study under Autonomous pattern.

2. Condition for Admission:

Condition for admission to the Diploma Courses shall be required to have passed in the S.S.L.C. Examination of the Board of Secondary Education, Tamil Nadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in Tamil Nadu.

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examination recognized as equivalent to the above by the Board of Secondary Education, Tamil Nadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time.

3. Admission to Second year (Lateral Entry):

A pass in HSC (Academic) or (Vocational) Courses mentioned in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board with eligibility for University Courses of study or equivalent examination and should have studied the following subjects.

Sl. No.	Courses	H.Sc. Academic	H.Sc. Vocational	
		Subjects Studied	Subjects Studied	
			Related Subjects	Vocational Subjects
1.	All the Regular Diploma Courses	Physics, Chemistry & Mathematics/Biology (Botony and Zoology)	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical
2.	Diploma Course in Modern Office Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretary ship.

- For the diploma programmes related with Engineering/Technology, the related / alternate courses prescribed along with Practical may also be taken for arriving the eligibility.
- Programme will be allotted according to merit through counseling by the Principal as per communal reservation.
- *Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.*

4. Age Limit : No Age Limit

5. Medium of Instruction : English

6. Courses of Study and Curriculum Outline:

The Courses of study shall be in accordance with the curriculum prescribed by the Autonomous Academic Board from time to time, both in Theory and Practical. The curriculum outline is given in Annexure-I.

7. Description of the Programme:

The Programme for the Full Time Diploma in Engineering & Technology / MOP shall extend over a period of three academic years, consisting of six terms. Each Term will have 15 weeks duration of study.

The Curriculum for all the Six Terms of Diploma Programme have been revised and revised curriculum is applicable for the candidates admitted from 2019–2020 academic year onwards.

8. Requirements of Examination and Attendance:

The Examination shall be conducted at the end of each term by the Autonomous body affiliated to the State Board of Technical Education and Training, Tamilnadu.

A Candidate will be permitted to appear for the Autonomous End Examinations only if he/she secures minimum 80% of attendance in the term concerned.

If the candidate does not appear for at least one of the regular courses in the End Examination, he/she has to attend the same term in the next academic year.

9. Eligibility for the Award of Diploma:

No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed programme of study for a period of not less than **three academic years** in the Institution, when joined in First Year and **two academic years** if joined under Lateral Entry scheme in the second year and passed the prescribed examination. The minimum and maximum periods for completion of Diploma Programme are as given below.

Diploma Courses	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time (Lateral Entry)	2 Years	5 Years

10. Autonomous End Examinations:

Autonomous End Examinations in all Programme of all the terms under the scheme of examinations will be conducted at the end of each term both in theory and practical. The internal assessment marks for all the courses will be awarded on the basis of continuous internal assessment earned during the term concerned. For each course, 25 Marks are allotted for internal assessment and 75 Marks are allotted for End Examination.

11. Continuous Internal Assessment;
D) THEORY

The Continuous Internal assessment marks for a total of 25 Marks, which are to be distributed as follows:

Test	-	10 Marks
Assignment / Drawing Plate	-	10 Marks
Course Attendance	-	5 Marks

Total		25 Marks

(i) Test

10 Marks

Two Periodical Tests each of two hours duration for total of 50 Marks each and Model Examination for three hours duration for 75 Marks are to be conducted. The average of two periodical tests (PT) is to be taken for 5 Marks and Model Exam to be taken for another 5 marks. The periodical test mark and model exam marks are to be converted to five marks and awarded with the next higher integer if there is any fraction.

Total test marks (5 + 5) = 10 Marks

TEST	SYLLABUS	MAXIMUM MARKS	DURATION	WHEN TO CONDUCT
Periodical Test – I	I & II Unit	50	2 Hrs.	30 working days from Reopening
Periodical Test – II	III & IV Unit	50	2 Hrs.	30 working days from first periodical test
Model Exam	All Units	75	3 Hrs.	After last working day

(a) [i] **Question Paper Pattern for Periodical Test – I & Test – II (First Year)**

With No Choice

Part – A	4 Questions x 2 Marks	-	8 Marks
Part – B	4 Questions x 3 Marks	-	12 Marks
Part – C	6 Questions x 5 Marks	-	30 Marks

	Total		50 Marks

[ii] **Question Paper Pattern for Periodical Test – I & Test – II (Engineering)**

With No Choice:

Part – A	4 Questions x 2 Marks	-	8 Marks
Part – B	4 Questions x 3 Marks	-	12 Marks
Part – C	3 Questions x 10 Marks	-	30 Marks

	Total		50 Marks

[iii] Question Paper Pattern for Periodical Test – I & Test – II (Modern Office Practice)

With No Choice:

Part – A	4 Questions x 5 Marks	-	20 Marks
Part – B	2 Questions x 15 Marks	-	30 Marks

Total			50 Marks

(b) Question Paper Pattern for Model Exam: (First Year, Engineering & Modern Office Practice)

As per Syllabus Book

(ii) Assignment

10 Marks

For each course, three Assignments are to be given each for 10 Marks and the total marks scored should be converted to 10 Marks and awarded with the next higher integer if there is any fraction.

(iii) Course Attendance

5 Marks

Award of marks for course attendance to each Theory / Practical Course / Project Work and Seminar will be as per the range given below.

Attendance mark reference table

Range of Attendance (%)	Marks
80% - 83%	1
84% - 87%	2
88% - 91%	3
92% - 95%	4
96% - 100%	5

(iv) Total

The Attendance (5 Marks), Assignment (10 Marks) & Test Marks (10 Marks) should be added and the Continuous Internal assessment marks for a total of 25 Marks is arrived.

II) PRACTICAL / DRAWING

The internal assessment mark calculation for Practical courses is given as follows:-

a) Observation and Exercise	:	10 Marks
b) Model Practical Examination	:	10 Marks
c) Attendance	:	5 Marks

Total	:	25 Marks

- After completion of each exercise, record should be submitted in the subsequent practical classes and marks awarded for observation should be carried over to record.
- The mark should be awarded for 10 in each exercise.
- The students have to submit the duly signed Bonafide record note book / file during the End Practical Examinations.
- All the experiments indicated in the syllabus should be completed and the same be given for final End Examinations.

Note: All the marks awarded for Assignments, Tests and Attendance should be entered in the course file / log book of the staff, who is handling the course. This is applicable to both Theory and Practical courses.

For Drawing

For drawing courses, 20 Marks should be awarded for each drawing plate. The total of all drawing plate marks should be converted to 10 marks and awarded with the next higher integer if there is any fraction.

12. Project Work and Seminar:

The students of all the Diploma Programmes have to do a Project Work and Seminar as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamilnadu.

In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects in department, institution wise, region wise and state wise. The selection of Project Work should be taken up in V Term of study.

The Project may be reviewed twice during 4th and 10th week of VI Term.

a) Internal assessment marks for Project Work and Seminar:

Project Review I & II (VI Term) (5+5)	:	10 Marks
Seminar I & II (5+5)/2	:	5 Marks
Project report	:	5 Marks
Attendance (Award of marks same as course pattern)	:	5 Marks
TOTAL	:	----- 25 Marks -----

b) Mark Allocation for Project Work and Seminar in End Examination:

Viva Voce	:	25 Marks
Demonstration / Presentation	:	50 Marks
(The following Criteria components to be considered- Relevance of topic, Knowledge of methodology, Role of individual in the team, finding the Study etc.)		
TOTAL	:	----- 75 Marks -----

A neatly prepared **PROJECT REPORT** as per the format has to be submitted by individual student during the Project work End Examination.

Selection of seminar topics should be based on Professional Ethics, Environmental Engineering and Management.

Proper record is **to be maintained for the two project reviews & seminars** and it should be preserved for two terms.

13. Academic Audit:

All Test Papers and assignment note books after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit for two terms.

14. Criteria for pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed programme of study successfully and pass all the courses prescribed in the curriculum.
2. A candidate shall be declared to have passed the examination in a course if he/she secures not less than 40% in Theory courses and 50% in Practical courses out of the total prescribed maximum marks including both the Internal Assessment and the End Examination marks put together, subject to the condition that he/she has secured at least a **minimum of 30 Marks out of 75 Marks in the End Theory and a minimum of 35 Marks out of 75 Marks in the End Practical Examinations.**

15. Classification of successful candidates:

Classification of candidates who pass out the final examinations from April 2022 onwards (joined in first year 2019-2020) will be done as specified below.

First Class with Superlative Distinction

A Candidate will be declared to have passed in **First Class with Superlative Distinction** if he/she secures not less than 75% of the marks in all the courses and passes all the terms in the first appearance itself and passes all the courses within the stipulated minimum period of study without any break in study.

First Class with Distinction

A Candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate of marks in all the terms put together and passes all the above terms except the I & II Term in the first appearance itself and passes all the courses within the stipulated minimum period of study without any break in study.

First Class

A Candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all terms put together and passes all the courses within the stipulated minimum period of study without any break in study.

Second class

All other successful candidates will be declared to have passed in **Second Class**.

16. Duration of a period in the Class Time Table:

The duration of each period of instruction is one hour and the total period of instruction hours excluding interval and lunch break in a day should be uniformly maintained as seven hours corresponding to seven periods of instruction (Theory & Practical).

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PROGRAMME: PLASTIC TECHNOLOGY

ANNEXURE - I
LIST OF COURSES

I FOUNDATION COURSES

Course Code	Name of the course	Credits	Prerequisites
N1BE101	Communication English-I	2	-
N1BE102	Engineering Mathematics	5	-
N1BE103	Engineering Physics-I	3	-
N1BE104	Engineering Chemistry– I	3	-
N1BE105	Engineering Physics -I Practical	2	-
N1BE106	Engineering Chemistry -I Practical	2	-
N1BE107	Communication Skill Practical	3	-
N1BE108	Computer Application Practical	3	-
N1BE109	Communication English-II	2	N1BE101
N1BE110	Applied Mathematics	4	N1BE102
N1BE111	Engineering Physics –II	2	N1BE103
N1BE112	Engineering Chemistry-II	2	N1BE104
N1BE113	Engineering Physics -II Practical	2	N1BE105
N1BE114	Engineering Chemistry -II Practical	2	N1BE106
Total Credits		37	

II CORE COURSES

Course Code	Name of the course	Credits	Prerequisites
N1BE201	Engineering Graphics	5	-
N1BE202	Engineering Drawing	5	N1BE201
N1BE203	Workshop Practice	3	-
N1PT204	Basic Organic Chemistry	6	N1BE104 N1BE112
N1PT205	Manufacturing Processes	6	
N1PT206	Basic Electrical and Control Circuits	5	N1BE103 N1BE111
N1PT207	Basic Engineering	6	
N1PT208	Basic Electrical and Control Circuits Practical	3	N1PT206
N1PT209	Tool Room Special Machines Practical	3	N1PT205
N1PT210	Hydraulics and Pneumatics with HMI and SCADA Practical	3	N1PT207
N1PT211	Mould Elements using 3D Software Practical	3	N1BE202
Total Credits		48	

III APPLIED COURSES

Course Code	Course Name	Credits	Prerequisites
N1PT301	Polymer Science	5	N1PT204
N1PT302	Plastics Materials - I	6	N1PT301
N1PT303	Plastics Processing-I	6	N1PT302
N1PT304	Plastics Materials - II	5	N1PT302
N1PT305	Plastics Processing - II	5	N1PT303
N1PT306	Testing of Plastics	5	N1PT304
N1PT307	Polymer Science Practical	3	N1PT301
N1PT308	Plastics Processing Practical - I	3	N1PT303
N1PT309	Plastics Identification and Preparation Practical	3	N1PT302
N1PT310	Plastics Mould Making Practical I	3	N1PT209
N1PT311	Plastics Processing Practical - II	3	N1PT308
N1PT312	Plastics Testing Practical	4	N1PT306
N1PT313	Plastics Mould Making Practical II	3	N1PT310
N1PT314	Project work and Seminar	4	
Total Credits		58	

IV DIVERSIFIED COURSES

Course Code	Course Name	Credits	Prerequisites
N1PT401	Computer Aided Design and Manufacturing	4	N1PT205
N1PT402	Elective Theory I: 1. Plastics Product and Mould Design	4	
N1PT403	Elective Theory I: 2. Robotics		
N1PT404	Industrial Engineering and Management	4	
N1PT405	Elective Theory II: 1. Plastics Mould and Die Design	5	N1PT402
N1CO400	Elective Theory II: 2. Nano and solar engineering		
N1PT406	Elective Practical I: 1. Plastics Mould Design Drawing Practical-I	3	N1PT402
N1PT407	Elective Practical I: 2. Robotics Practical		
N1PT408	Elective Practical II: 1. Plastics Mould Design Practical-II	2	N1PT406
N1CO401	Elective Practical II: 2. Nano and solar engineering practical		
Total credits		22	

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PROGRAMME: PLASTIC TECHNOLOGY

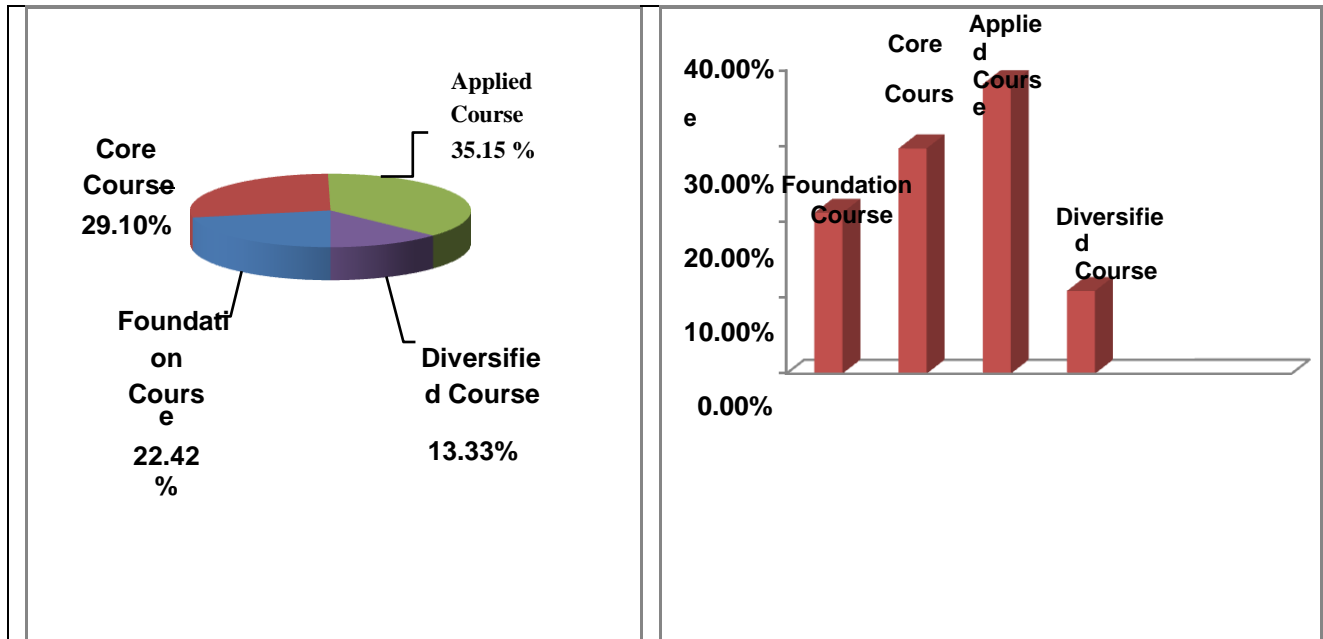
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TOTAL CREDITS FOR THE COURSES

Courses	Credits	Percentage (%)
FOUNDATION COURSE	37	22.42
CORE COURSE	48	29.10
APPLIED COURSE	58	35.15
DIVERSIFIED COURSE	22	13.33
TOTAL	165	100.00

No of Credits	
I Term	25
II Term	25
III Term	31
IV Term	30
V Term	27
VI Term	27
TOTAL	165

A summary of the new curricular structure for the Diploma in Plastic Technology is illustrated below:—



Distribution of Different Courses of the N1 Curriculum

COURSES OF PROGRAMME	1ST Term	2ND Term	3rd Term	4th Term	5th Term	6th Term	TOTAL (%)
FOUNDATION COURSES	20	17	—	—	—	—	37 (22.42%)
CORE COURSES	5	8	23	12	—	—	48 (29.10%)
APPLIED COURSES			8	18	16	16	58 (35.15%)
DIVERSIFIED COURSES	—	—	—	—	11	11	22 (13.33%)
TOTAL	25	25	31	30	27	27	165 (100.00%)

CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

**PROGRAMME: All Programmes of Diploma in Engineering and Technology except DMOPN1–
SCHEME**

I TERM

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hours	Examination Marks			Minimum For pass
			Theory	Drawing	Tutorial Practical			Internal Assessment marks	External Exam Marks	Marks	
N1BE101	Communication English-I	1	4	-	-	2	3	25	75	100	40
N1BE102	Engineering Mathematics	2	7	-	-	5	3	25	75	100	40
N1BE103	Engineering Physics-I	3	5	-	-	3	3	25	75	100	40
N1BE104	Engineering Chemistry– I	4	5	-	-	3	3	25	75	100	40
N1BE201	Engineering Graphics	5	-	6	-	5	3	25	75	100	40
N1BE105	Engineering Physics -I Practical	6	-	-	2	2	3	25	75	100	50
N1BE106	Engineering Chemistry -I Practical	7	-	-	2	2	3	25	75	100	50
N1BE107*	Communication Skill Practical*	8	-	-	3	3	3	25	75	100	50
N1BE108^	Computer Application Practical^										
	Library				1						
	Total		21	6	8	25		200	600	800	-

* For Circuit Programmes only

^ For Non-Circuit Programmes only

CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

PROGRAMME: All Programmes of Diploma in Engineering and Technology except DMOP

N1–SCHEME

II TERM

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hours	Examination Marks			Minimum For pass
			Theory	Drawing	Tutorial Practical			Internal Assessment marks	External Exam Marks	Marks	
N1BE109	Communication English-II	1	4	-	-	2	3	25	75	100	40
N1BE110	Applied Mathematics	2	6	-	-	4	3	25	75	100	40
N1BE111	Engineering Physics-II	3	4	-	-	2	3	25	75	100	40
N1BE112	Engineering Chemistry– II	4	4	-	-	2	3	25	75	100	40
N1BE202	Engineering Drawing	5	-	6	-	5	3	25	75	100	40
N1BE113	Engineering Physics -II Practical	6	-	-	2	2	3	25	75	100	50
N1BE114	Engineering Chemistry –II Practical	7	-	-	2	2	3	25	75	100	50
N1BE203	Workshop Practice	8	-	-	3	3	3	25	75	100	50
N1BE107 ^	Communication Skill Practical^	9	-	-	3	3	3	25	75	100	50
N1BE108 *	Computer Application Practical*										
	Library				1						
	Total		18	6	11	25		225	675	900	

* For Circuit Programmes only

^ For Non-Circuit Programmes only

CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

PROGRAMME: Diploma in Plastic Technology N1–

SCHEME

TERM

III

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hours	Examination Marks			Minimum For pass
			Theory	Drawing	Tutorial Practical			Internal Assessment marks	External Exam Marks	Marks	
N1PT204	Basic Organic Chemistry	1	6	-	-	6	3	25	75	100	40
N1PT205	Manufacturing Processes	2	6	-	-	6	3	25	75	100	40
N1PT301	Polymer Science	3	6	-	-	5	3	25	75	100	40
N1PT206	Basic Electrical and Control Circuits	4	5	-	-	5	3	25	75	100	40
N1PT307	Polymer Science Practical	5	-	-	4	3	3	25	75	100	40
N1PT208	Basic Electrical and Control Circuits Practical	6	-	-	4	3	3	25	75	100	50
N1PT209	Tool Room Special Machines Practical	7	-	-	4	3	3	25	75	100	50
	Total	-	23		12	31		175	525	700	-

CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

PROGRAMME: Diploma in Plastic Technology N1–

SCHEME

TERM

IV

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hours	Examination Marks			Minimum For pass
			Theory	Drawing	Tutorial Practical			Internal Assessment marks	External Exam Marks	Marks	
N1PT207	Basic Engineering	1	6	-	-	6	3	25	75	100	40
N1PT302	Plastics Materials - I	2	6	-	-	6	3	25	75	100	40
N1PT303	Plastics Processing-I	3	6	-	-	6	3	25	75	100	40
N1PT210	Hydraulics and Pneumatics with HMI and SCADA Practical	4	-	-	4	3	3	25	75	100	40
N1PT308	Plastics Processing Practical - I	5	-	-	4	3	3	25	75	100	40
N1PT309	Plastics Identification and Preparation Practical	6	-	-	4	3	3	25	75	100	50
N1PT211	Mould Elements using 3D Software Practical	7	-	-	5	3	3	25	75	100	50
	Total		18	-	17	30		175	525	700	-

CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

PROGRAMME: Diploma in Plastic Technology N1–

SCHEME

TERM

V

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hours	Examination Marks			Minimum For pass
			Theory	Drawing	Tutorial Practical			Internal Assessment marks	External Exam Marks	Marks	
N1PT304	Plastics Materials - II	1	5	-	-	5	3	25	75	100	40
N1PT305	Plastics Processing - II	2	5	-	-	5	3	25	75	100	40
N1PT401	Computer Aided Design and Manufacturing	3	5	-	-	4	3	25	75	100	40
N1PT402	Elective Theory I: 1. Plastics Product and Mould Design	4	5	-	-	4	3	25	75	100	40
N1PT403	2 .Robotics										
N1PT310	Plastics Mould Making Practical I	5	-	-	5	3	3	25	75	100	40
N1PT311	Plastics Processing Practical - II	6	-	-	4	3	3	25	75	100	50
N1PT406	Elective Practical I: 1. Plastics Mould Design Drawing Practical-I	7	-	-	6	3	8	25	75	100	50
N1PT407	2. Robotics Practical						3	25	75	100	50
	Total		20	-	15	27		175	525	700	-

CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

PROGRAMME: Diploma in Plastic Technology N1–

SCHEME

TERM

VI

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hours	Examination Marks			Minimum For pass
			Theory	Drawing	Tutorial Practical			Internal Assessment marks	External Exam Marks	Marks	
N1PT306	Testing of Plastics	1	5	-	-	5	3	25	75	100	40
N1PT404	Industrial Engineering and Management	2	5	-	-	4	3	25	75	100	40
N1PT405	Elective Theory II: 1. Plastics Mould and Die Design	3	5	-	-	5	3	25	75	100	40
N1CO400	2.Nano and solar engineering										
N1PT312	Plastics Testing Practical	4	-	-	6	4	3	25	75	100	40
N1PT313	Plastics Mould Making Practical II	5			6	3	3	25	75	100	50
N1PT408	Elective Practical II: 1. Plastics Mould Design Drawing Practical-II	6	-	-	4	2	8	25	75	100	50
N1CO401	2. Nano and solar engineering practical										
N1PT314	Project work and Seminar	7	-	-	4	4	3	25	75	100	50
	Total	-	15	-	20	27	-	175	525	700	-

VSVNPC

III TERM

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1PT204

Term : III

Course Name : BASIC ORGANIC CHEMISTRY

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
BASIC ORGANIC CHEMISTRY	6	90	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	CLASSIFICATION, NOMENCLATURE AND PURIFICATION OF ORGANIC COMPOUNDS	18
2	ISOMERISM AND TYPES OF ORGANIC REACTIONS	18
3	HYDROCARBONS, ALCOHOLS AND ETHER	18
4	CARBONYL COMPOUNDS AND AMINES	18
5	AROMATIC COMPOUNDS	18
	Total	90

RATIONALE:

Organic chemistry is that branch of chemistry that deals with the structure, properties, and reactions of compounds that contain carbon. It is a highly creative science. Chemists in general and organic chemists in particular can create new molecules never before proposed which, if carefully designed, may have important properties for the betterment of the human experience.

Beyond our bodies' DNA, peptides, proteins, and enzymes, organic compounds are all around us and in industries such as the rubber, plastics, fuel, pharmaceutical, cosmetics, and detergent, coatings, dyestuffs, and agrichemicals industries. Clearly, organic chemistry is critically important to our high standard of living.

There is tremendous excitement and challenge in synthesizing a molecule never before made synthetically or found in nature. Tailoring the properties of that molecule via chemical synthesis to produce beneficial effects to meet the needs of the present and future human existence is both challenging and rewarding.

OBJECTIVES:

On completion of the units of syllabus contents the students must be able to know about

- ❖ To learn about the IUPAC nomenclature of the organic compounds.
- ❖ To know about the different methods of purification of the organic compound.
- ❖ To understand the different types of isomerism. Free radical, initiators and inhibitors.
- ❖ To know about different types of fission of a covalent bond & reaction intermediates.
- ❖ To know about the methods of preparation properties and uses of ethylene, acetylene, methanol, ethanol, ethylene glycol, glycerol and diethyl ether.
- ❖ To study the different methods of preparation properties and uses of formaldehyde, acetaldehyde, acetone, acetic acid, acetyl chloride, methyl magnesium chloride and amines and to distinguish between 1°, 2° & 3° amines from their chemical properties.
- ❖ To learn the Hoffmann method of separation of primary, Secondary and tertiary amines.
- ❖ To learn about the fractional distillation of coal tar and the various fractions.
- ❖ To study about the methods of preparation of properties and uses of Benzene, nitrobenzene, aniline, Benzene diazonium chloride, phenol, benzaldehyde and benzoic acid.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	CLASSIFICATION, NOMENCLATURE AND PURIFICATION OF ORGANIC COMPOUNDS Classification of organic compounds - IUPAC nomenclature - Alkane, Alkene, Alkyne, alcohol (Monohydric, dihydric and trihydric), ether, aldehyde, ketone, carboxylic acid (mono and di), ester, isocyanide and amines (primary, secondary and tertiary). Purification of organic compounds - Principles of crystallization, sublimation, simple distillation, fractional distillation and column chromatography.	18
II	ISOMERISM AND TYPES OF ORGANIC REACTIONS Isomerism - structural isomerism - chain isomerism, position isomerism, functional isomerism, metamerism and tautomerism (Keto-enol tautomerism only). Stereoisomerism - optical isomerism (Lactic acid only)-Geometrical isomerism (Maleic acid and Fumaric acid only). Types of organic reactions - Substitution reactions (Mechanism not	18

	included) - Addition reaction - Addition in olefinic compounds - Markonikaff's Rule - Peroxide effect - Elimination reaction (Mechanism of E ₂ and E ₁ types are not included) - Isomerisation reaction - condensation reaction - Polymerisation - Addition Polymerisation (Preparation of Polyethylene and Poly Styrene by free radical mechanism only) - Condensation polymerization (Preparation of Polyester (Terelene) and Nylon- 6,6)	
III	HYDROCARBONS, ALCOHOLS AND ETHER General methods of preparation, properties and uses of ethylene, acetylene, Methanol (from water gas and by oxidation of CH ₄). Ethanol (from ethylene, molasses and starch), Ethylene glycol (from ethylene and ethylene diamine), Glycerol (from fats and oils and from propylene)	18
IV	CARBONYL COMPOUNDS AND AMINES General methods of preparation, properties and uses of Formaldehyde, Acetone, Acetic acid, and Amines (Primary secondary and tertiary amine). Separation of primary, secondary and tertiary amines by Hoffmann method - Difference between primary, Secondary and tertiary amines.	18
V	AROMATIC COMPOUNDS Coal tar - Fractional distillation of coal tar - Different products and their uses - Commercial preparation of benzene from (i) coal tar and (ii) Petroleum - Properties of benzene. General methods of preparation properties and uses of Nitrobenzene, Aniline and Phenol	18

Text Books:

1. B.S. Bahl and Arun Bahl - Text book of organic Chemistry
2. P.L. Soni and H.M. Chawla - Text book of organic Chemistry

Reference Books:

1. K.S. Tewari S.N. Mehrotra and N.K. Vishnoi - Text book of organic chemistry
2. B.K. Sharma, G.P. Pokhariyal and S.K.Sharma.- Organic Chemistry - Vol-I and II
3. S.P. Shukla and G.L. Trivedi - Modern Organic Chemistry
4. +1 and +2 Chemistry - Tamil Nadu Textbook Corporation.

MODEL QUESTION PAPER - I

Term : III

Time : 3 hrs

Programme : Diploma in Plastic Technology

Max. Marks : 75

Course : **Basic Organic Chemistry**

Course Code: N1PT204

[**N.B.**: (1) Answer any FIVE Questions in each PART – A and PART – B.

Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A

1. State the significance of IUPAC Nomenclature.
2. What is markonikoff's rule?
3. Write the preparation of Methanol from Water gas.
4. State the uses of Formaldehyde.
5. State the uses of Nitrobenzene.
6. What is Functional group? Give an example.
7. Write addition reaction with an example.
8. Write the preparation of Glycerol from Propylene.

PART – B

9. Write the IUPAC Names of the following organic compounds
i) Ethyl Alcohol ii) Acetaldehyde iii) Acetic Acid
10. Narrate Position Isomerism with an example.
11. Write any two chemical properties of Ethylene.
12. Write any two methods of preparation of Acetone.
13. Write the structure and physical properties of Aniline.
14. Explain the purification of organic compounds by Sublimation process
15. Write the preparation of Ethyl Alcohol from Starch
16. Write the preparation of Salicylic acid from Phenol

PART – C

17. (a) Discuss the classification of organic compounds with suitable example.
(OR)
(b) Explain the purification of organic compounds by Column Chromatography.
18. (a) Explain the optical isomerism exhibited by Lactic Acid.
(OR)
(b) Explain the preparation of Polystyrene by Free radical Mechanism.
19. (a) Discuss the preparation and properties of Acetylene.
(OR)
(b) Explain the preparation and uses of Ethylene Glycol.
20. (a) Explain the preparation, properties and uses of acetic acid
(OR)
(b) Discuss the separation of Primary, Secondary and Tertiary Amines.
21. (a) Explain the fractional distillation of Coal Tar.
(OR)
(b) Discuss the properties and uses of aniline

MODEL QUESTION PAPER -II

Term : III

Time : 3 hrs

Programme : Diploma in Plastic Technology

Max. Marks : 75

Course : **Basic Organic Chemistry**

Course Code: N1PT204

[**N.B.**: (1) Answer any FIVE Questions in each PART – A and PART – B.

Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A

1. What are open chain compounds?
2. What is peroxide effect?
3. How Methanol is prepared from methane?
4. Write the uses of acetic acid?
5. State the uses of Nitrobenzene.
6. Write the functional group of alcohol?
7. Give an example for elimination reaction.
8. How Glycerol is prepared from oil or fat?

PART – B

9. Write the IUPAC Names of the following organic compounds
i) CH_3OH ii) Formaldehyde iii) Vinegar
10. What is Position Isomerism?
11. Give the uses of Ethylene.
12. Write any two methods of preparation of Acetone.
13. Mention the physical properties of Aniline.
14. Explain Sublimation process
15. How Ethyl Alcohol is prepared from ethylene
16. What are the uses of Phenol?

PART – C

17. (a) Discuss how organic compounds are purified by fractional distillation method.

(OR)

(b) Explain Column Chromatography.

18. (a) Explain geometrical isomerism.

(OR)

(b) Explain substitution reaction with an example.

19. (a) Discuss the preparation and properties ethanol.

(OR)

(b) Explain the preparation and uses of Glycerol.

20. (a) Explain the preparation, properties and uses of formaldehyde.

(OR)

(b) Discuss the separation of amines by Hoffmann method.

21. (a) Explain the preparation of benzene from petroleum. Mention its uses.

(OR)

(b) Discuss the preparation, properties and uses of aniline

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1PT205

Term : III

Course Name : MANUFACTURING PROCESSES

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
MANUFACTURING PROCESSES	6	90	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	LATHE AND DRILLING MACHINES	18
2	PLANER, SHAPER AND SLOTTER MACHINES	18
3	MILLING MACHINES	18
4	GRINDING MACHINES	18
5	METROLOGY, CUTTING TOOL MATERIALS AND HEAT TREATMENT	18
	Total	90

RATIONALE:

Manufacturing, the major and the most important aspect in industries needs utmost care and attention. Knowledge about various processes and allied areas will be of great use to the

personnel involved in production. This will provide the students an opportunity to skill themselves for the industrial scenario. The topics included aim to inculcate in the students the skills of Lathe, Drilling, Reciprocating Machines, milling, grinding and other machining processes which are very much essential for a technician to at promptly and measuring instruments with precision

OBJECTIVES:

- Study about principle, construction, operation and accessories of lathe and drilling machine
- Study about principle, construction, operation and accessories of reciprocating machines.
- Study the principle, construction, operation and types of tools of milling machines
- Study on principle ,construction, operation, and types of grinding machines
- Study about different measuring instruments, cutting tool materials and heat treatment process

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	LATHE AND DRILLING MACHINES Lathe: Types of lathes - Specification-principle of operation, Work holding devices - Face plate -3 jaws chuck - 4 jaw chucks - Catch plate and carrier - Types of centers. Machining operations done on lathe, methods of taper turning, thread cutting. Drilling: Types of drilling machines, Specifications, Methods of holding drill bits - Drill chucks - Socket and sleeve, Drilling operations - drilling - reaming - counter sinking - counter boring - spot facing - tapping. Boring – Definition – Jig boring machine	18
II	PLANER, SHAPER AND SLOTTER MACHINES Planer: Principle of operations - Types of planers - Description of Double housing planer only - Specifications - Work holding devices - operation done by planer. Shaper: Principle of operation - Types of shapers – Description of Standard shaper only Specification - Work holding devices –Operation done by Shaper. Slotter: Principle of operation - Types of slotters - Specifications - Work holding devices - Operation done by Slotter.	18
III	MILLING MACHINES Milling: Principles of operation - Types of milling machines - Column and knee type- plain milling machine-Universal milling machine and Vertical milling machine. Specification of milling machines, Milling process - Conventional milling and climb milling, Work holding devices, Tool holding devices-Standard Arbor - Stub arbor-Adapter,	18

	Spring collet, Milling cutters - Plain - slab- slitting saw- side-Angle-End - T-slot, wood - ruff key, Fly cutter and Form milling cutters. Milling operations- straddle and gang milling - Vertical milling attachment	
IV	<p>GRINDING MACHINES</p> <p>Grinding: Principle of operations - Classification of Grinding machines, Specifications, Floor stand grinders- Bench grinders - Precision grinders - Cylindrical grinder - Plain and universal grinder - Center less grinder, Internal grinder-Chucking type - Planetary type - Centreless type, Surface grinder- Reciprocating table with horizontal spindle - Grinding wheels - Natural and artificial abrasives - Types of bonds - Grit - Grade - Structure of wheels, Wheel shapes and sizes, Standard marking system for grinding wheels, Selection of grinding machines, Glazing and Loading of wheels, Dressing and Truing of Wheels, Balancing of grinding wheels , Mounting of grinding wheels</p>	18
V	<p>METROLOGY, CUTTING TOOL MATERIALS AND HEAT TREATMENT</p> <p>Metrology : Definition - Vernier calipers - Vernier Height gauge - Micrometers - Depth micrometers - Applications, Bevel protractor, Gauges - Limit gauges - Plug gauges - Ring gauges - Snap gauges,(Definitions only) Slip gauges, Sine bar. Comparators - Types - Mechanical Comparator only.</p> <p>Cutting tool materials: Characteristics, Types of tool materials - Carbon steels, Medium alloy steels, High-Speed Steels. Types of cutting tools - Single point cutting tools and Multi point cutting tools, Single point cutting tool Nomenclature, Tool Life - Cutting Fluids - Types - Purpose - Properties.</p> <p>Heat Treatment: Iron carbon equilibrium diagram, Heat Treatment - Purpose - Procedures.</p> <p>Heat treatment process - Annealing - Full annealing - Process annealing - Stress relief annealing - Normalizing, Hardening, Tempering and case Hardening (Definition only) - Quenching medium- Properties-types</p>	18

Text Books :

- 1) Elements of workshop Technology Volume I & II – Hajra Chowdry & Bhattacharaya - Iith Edition - Media Promoters & Publishers Pvt. Ltd., Seewai Building `B`, 20-G, Noshir Bharucha Marg, Mumbai 400 007 – 2007.
- 2) Introduction of basic manufacturing processes and workshop technology – Rajendersingh – New age International (P) Ltd. Publishers, 4835/24, Ansari Road, Daryaganj, New Delhi - 110002

Reference Books :

- 1) Manufacturing process, Myro N Begman, , Edn. 5, Tata McGraw Hill Publishing Co. Ltd., 7, West Patel Nagar, New Delhi 110 008.
- 2) Workshop Technology- WAJ Chapman - Volume I, II, & III – Vima Books Pvt. Ltd., 4262/3, Ansari Road, Daryaganj, New Delhi 110 002.
- 3) Workshop Technology – Raghuwanshi - Khanna Publishers. Jain & Gupta,
- 4) Production Technology, Edn. XII, Khanna Publishers, 2-B, North Market, NAI Sarak, New Delhi 110 006 - 2006
- 5) Production Technology - P. C. SHARMA - Edn. X - S.Chand & Co. Ltd., Ram Nagar, New Delhi 110 055 - 2006
- 6) Production Technology – HMT - Edn. 18 - published by Tata McGraw Hill publishing Co. Ltd., 7 West Patel nagar, New Delhi 110 008. – 2001

MODEL QUESTION PAPER - I

Term : III

Time : 3 hrs

Programme : Diploma in Plastic Technology

Max. Marks : 75

Course : **Manufacturing Processes**

Course Code: **N1PT205**

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.

Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A

1. Write the types of lathe center.
2. What are the work holding devices used in planer machine.
3. Write down the operation of milling machine.
4. Define glazing.
5. Define metrology.
6. What is spot facing?
7. What is up milling?
8. What is tool life?

PART – B

9. Difference between three jaw chuck and four jaw chuck.
10. What are the work holding devices used in slotter?
11. What are the work holding devices used in milling machine?
12. Discuss dressing and truing.
13. Draw Vernier height gauge.
14. Write short notes on cutting fluids.
15. Discuss balancing of grinding wheels.
16. Write the specification of drilling machines.

PART – C

17. (a) Explain the work holding devices used in lathe.

(Or)

(b) With a neat sketch, explain jig boring machine.

18. (a) Explain double housing planer with sketch.

(Or)

(b) Explain the machining operations done in slotter.

19. (a) Explain column and knee type milling machine.

(Or)

(b) Discuss tool holding devices used in milling machine

20. (a) Explain surface grinding machine with sketch

(Or)

(b) Discuss the marking of grinding wheel.

21. (a) Explain Mechanical comparator.

(Or)

(b) Draw single point cutting tool and discuss its nomenclature

MODEL QUESTION PAPER - II

Term : III

Time : 3 hrs

Programme : Diploma in Plastic Technology

Max. Marks : 75

Course : **Manufacturing Processes**

Course Code: **N1PT205**

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.

Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A

1. Write the types of lathe.
2. Write the definition of boring.
3. Write the specification of planers.
4. What are the work holding devices used in shaper machine?.
5. Define standard arbor.
6. What is the function of rough grinders?
7. Define glazing.
8. Define metrology.

PART – B

9. Write the principle of operation of lathe
10. Write the types of drilling machines.
11. Write the types of shapers.
12. Write the specification of milling machine.
13. Discuss about normalizing and hardening.
14. Write short notes on cutting fluids.
15. Discuss balancing of grinding wheels.
16. Write the types of drilling machines.

PART – C

17. (a) Explain the methods of taper turning and thread cutting.

(Or)

(b) With a neat sketch, explain jig boring machine.

18. (a) Explain the machining operations done in slotter.

(Or)

(b) What are the machining operation done in shaper.

19. (a) Explain column and knee type Vertical milling machine.

(Or)

(b) Discuss the milling operations in straddle and gang milling.

20. (a) Explain Reciprocating table horizontal spindle surface grinding machine.

(Or)

(b) Discuss about structure of wheels, wheel shapes and sizes.

21. (a) Discuss about iron carbon equilibrium diagram.

(Or)

(b) Explain about the limit gauges and plug gauges.

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N1 - SCHEME

(Implements from the Academic year 2019-2020 onwards)

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : NIPT301

Term : III

Course Name : POLYMER SCIENCE

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
POLYMER SCIENCE	6	90	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours (Hours)
I	CHEMISTRY OF POLYMERISATION	18
II	COPOLYMERISATION AND POLYMERISATION TECHNIQUES	18
III	POLYMER MOLECULAR WEIGHTS	18
IV	MICRO STRUCTURE OF POLYMER, POLYMER CRYSTALLISATION & GLASS TRANSITION TEMPERATURE	18
V	POLYMER REACTIONS AND POLYMER DISSOLUTION	18
	Total	90

RATIONALE:

It gives the student the knowledge of basic polymerization chemistry and their significance in polymer industries. With this information student can understand the structure of polymers and their effect on properties.

OBJECTIVE:

On completion of the units of syllabus contents the students must be able to know about

- ❖ Monomer, Polymer and Polymerisation
- ❖ Free radical, initiators and inhibitors
- ❖ Ionic polymerization, co-ordination polymerization and Ziegler natta catalysts
- ❖ Salient features of polymerisation reactions
- ❖ Copolymerisation and types of copolymers
- ❖ Surfactants - critical micelle concentration
- ❖ Significance of average molecular weights, Molecular weight distribution in polymers
- ❖ Relationship between viscosity and molecular weight
- ❖ Process of polymer dissolution
- ❖ Chemical and geometrical structures of polymer molecules
- ❖ Theory of Polymer crystallization and Significance of glass transition temperature
- ❖ Types of degradation and Applications of Rheological studies.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	CHEMISTRY OF POLYMERISATION History of polymer - Classification of polymers - Functionality of monomers - Chemistry of polymerisation - Chain polymerisation - Free Radical polymerisation - Initiator - Chain transfer agents - Inhibitors - Ionic polymerisation - Cationic polymerisation - Anionic polymerisation - Living polymer - coordination polymerization - Ziegler-Natta catalysts - Step polymerisation - Polycondensation polymerisation - Polyaddition polymerisation - Ring opening polymerization.	18
II	COPOLYMERISATION & POLYMERISATION TECHNIQUES Copolymerisation - Free Radical copolymerisation - copolycondensation. Polymerisation techniques - Bulk polymerisation - Solution polymerisation - Suspension polymerisation - Emulsion polymerisation - critical micelle concentration - Salient features of different polymerisation techniques.	18
III	POLYMER MOLECULAR WEIGHTS Average molecular weight concept - Number average molecular weight - Weight average Molecular weight – Molecular weight and degree of polymerisation - Practical significance of polymer molecular weight. Method of determination of molecular weight: i) Number average molecular weight: (M_n) - Gel permeation	18

	<p>chromatography technique</p> <p>ii) Weight Average Molecular weight: (M_w) - Ultra centrifugation</p> <p>iii) Viscosity average molecular weight: (M_v) - Viscometry.</p>	
IV	<p>MICRO STRUCTURE OF POLYMER, POLYMER CRYSTALLISATION & GLASS TRANSITION TEMPERATURE</p> <p>Microstructure based on the geometrical structure - linear, branched and cross-linked polymers - random, alternating, block and graft copolymers - Stereo regular polymers - optical isomerism and geometrical isomerism in polymer molecules - Degree of crystallinity - Effect of crystallinity on the properties of polymers - Glass transition temperature - factors influencing the glass transition temperature - Importance of glass transition temperature - Determination of glass transition temperature by Dilatometric method.</p>	18
V	<p>POLYMER REACTIONS AND POLYMER DISSOLUTION</p> <p>Polymer degradation - Types of degradation: Thermal degradation, Mechanical degradation, Oxidative degradation and Hydrolytic degradation.</p> <p>Polymer reaction - Hydrolysis - Acidolysis - Aminolysis - Hydrogenation - Cross linking reactions (Vulcanization and Cure reactions only).</p> <p>Polymer solutions: The process of polymer dissolution</p>	18

Text Books:

1. V.R.Gowariker, N.V.Viswanathan & Jayadev Sridhar - Polymer Science - New age international publishers - 1986.
2. Fred W.Billmeyer - Text Book of Polymer Science - Wiley Interscience - 1971.

Reference Books:

1. Anilkumar & S.K.Gupta -Fundamentals of Polymer Science - Tata McGraw Hill Pub. Co. 1978.
2. Odian.G - Principles of Polymerisation – McGraw-Hill, New York – 1970
3. Blackley & Halsted - Emulsion Polymerisations: Theory and Practice - McGraw-Hill, New York - 1975
4. I.Herman S.Haufman and Joseph J.Falce - Introduction to Polymer Science and Technology - Wiley Inter Science Publications- 1977.

MODEL QUESTION PAPER - I

Term : III
Programme : Diploma in Plastic Technology
Course : POLYMER SCIENCE

Time : 3Hrs
Max. Marks : 75
Code : N1PT301

- [N.B.: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Define the term monomer.
2. Write the types of polymerization techniques.
3. What is GPC?
4. Define copolymer.
5. Write the types of Degradation.
6. What is Viscometry?
7. Define Tg.
8. What do you mean by CMC?

PART – B

9. Define Chain transfer agent with example.
10. What is Auto acceleration?
11. Write the relationship between molecular weight and Degree of polymerization.
12. Explain effect of crystallinity properties on polymer.
13. Differentiate vulcanization and Cure reaction.
14. Write short notes on Ziegler Natta catalyst.
15. Describe Bulk polymerization techniques.
16. Draw a neat sketch of GPC with its working principle.

PART – C

- 17.(a) Discuss the Free radical polymerization with an example.
(OR)
(b) Explain anionic polymerization with an example.
18. (a) Salient features of various polymerization techniques.
(OR)
(b) Describe suspension polymerization technique.
19. (a) Explain the determine the ultra centrifugation technique.
(OR)
(b) Explain the determine to viscosity Average molecular weight.
20. (a) Write the factor affecting Tg
(OR)
(b) Explain the Micro based on Geometrical Structure
21. (a) Discuss in detail Oxidative Degradation of Polymers.
(OR)
(b) Write short notes on a) Aminolysis b) Hydrogenation.

MODEL QUESTION PAPER - II

Term : III
Programme : Diploma in Plastic Technology
Course : POLYMER SCIENCE

Time : 3Hrs
Max. Marks : 75
Course Code : N1PT301

- [N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

- 1) What is Initiator?. Give an example
- 2) State the advantages of Bulk Polymerisation Technique.
- 3) Write the practical significance of polymer Molecular Weight.
- 4) Define Tg. Write the Tg value of PE.
- 5) Write the factors cause polymer degradation.
- 6) What is Degree of Polymerisation?
- 7) Define CMC.
- 8) What is Acidolysis?

PART – B

- 9) What is Inhibitor? Give an example.
- 10) Write the advantages and disadvantages of Solution Polymerisation technique.
- 11) Give the relationship between Molecular Weight and Degree of Polymerisation.
- 12) Write the determination of Degree of Crystallinity of a polymer
- 13) What is Mastication? State its importance.
- 14) What is co-polymer? Give the types of co-polymer.
- 15) Derive the formula for Number Average Molecular Weight.
- 16) Write a note on geometrical isomerism exhibited by Polybutadiene.

PART – C

- 17) (a). Discuss the classification polymers with suitable example.
(OR)
(b). Explain Cationic Polymerisation in detail.
- 18) (a). Explain co-polycondensation with a suitable example
(OR)
(b). Discuss the salient features of various polymerisation techniques.
- 19) (a). Explain the determination of weight average molecular weight by Ultra centrifugation method
(OR)
(b). Discuss the determination of Viscosity average molecular weight by Viscometry.
- 20) (a). Explain the determination of Tg by Dilatometric method.
(OR)
(b). Discuss the effect of Crystallinity on properties of polymers.
- 21) (a). Discuss Oxidative degradation in detail.
(OR)
(b). Write notes on theory of Polymer dissolution

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1PT206
Term : III
Course Name : BASIC ELECTRICAL AND CONTROL CIRCUITS

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
BASIC ELECTRICAL AND CONTROL CIRCUITS	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	BASICS OF DC AND AC CIRCUITS	15
2	DC MACHINES AND TRANSFORMERS	15
3	AC MACHINES	15
4	ELECTRONICS CIRCUITS AND LOGIC GATES	15
5	PROGRAMMABLE LOGIC CONTROLLER	15
	Total	75

RATIONALE:

It gives the student the knowledge of basics of AC and DC circuits, DC generator, DC motor, Stepper motor, electronic circuits and logic gates also PLC and their construction & working principle and their applications in industries.

OBJECTIVES:

On completion of the units of syllabus contents the students must be able to know about

- ❖ Definitions of Voltage, Current, Resistance, Power, Energy and their units, basic laws like Ohms Law Kirchhoff's laws
- ❖ D.C. Circuits, equivalent resistance of series and parallel circuits
- ❖ Basic concept of RL, RC, RLC series circuit
- ❖ Parts and working of DC Generator, working principle of DC shunt motor and their uses. Construction and working of three point starter and stepper motor
- ❖ Principle of working of transformer and their uses.
- ❖ Various electronic circuits, logic gates their working and uses
- ❖ Various benefits of PL- system and its types of contacts, different steps involved in application circuits using a PLC

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	BASICS OF D.C AND A.C CIRCUITS: Definitions: Atom, charge and current, Direct and Alternating current, Voltage, Resistance, Power and Energy and their units. Basic Laws: Ohms Law, Kirchhoff's laws (Statement & Explanation) D.C. Circuits: Equivalent resistance of Series and parallel circuits - simple Problems. AC Fundamentals: sinusoidal waveform, Why sinusoidal waveform, fundamentals of AC voltage, and current-peak, instantaneous, average, RMS value of sine wave, frequency, time period-Definition- Impedance, Reactance-inductive and capacitive reactance, power in ac circuits-real, reactive and apparent, Power factor	15
II	DC MACHINES AND TRANSFORMERS: DC generator: Faradays Laws of Electromagnetic induction, Working of DC Generator - Parts of DC Generator DC motor: working principle of DC shunt motor- Uses. Starters- Necessity - Construction and Working of Three Point Starter. Stepper motor: Construction and working principle Transformer: Principle of Working- Transformation Ratio- Construction of Transformers- Uses	15

III	<p>AC MACHINES:</p> <p>Alternator: Principle of Working – Construction of Cylindrical rotor- Speed and Frequency relation.</p> <p>Synchronous Motor: Principle of Working – Synchronous speed – Starting –Uses of Synchronous motor.</p> <p>Three Phase Induction Motor: Principle of Working- Construction: Slip Ring and Squirrel cage Rotor-Applications of Induction Motor</p> <p>Single Phase Induction Motor: Capacitor Start and Induction Run Motor.</p>	15
IV	<p>ELECTRONICS CIRCUITS AND LOGIC GATES</p> <p>Electronic Devices: Theory, Characteristics and uses of –PN Junction Diode, Bipolar Junction transistor, Zener Diode, Silicon Controlled Rectifier.</p> <p>Electronic Circuits: Construction, working and uses of – Full wave Rectifier, Bridge Rectifier, Amplifier, Voltage Regulator.</p> <p>Transducers: Construction, working and uses of Thermostats, Photo Diode, Limit switch, reed switch</p> <p>Logic gates: Definitions, symbol and truth table of NOT, AND, OR, NAND, NOR, NOR, EX-OR Gates.</p>	15
V	<p>Programmable Logic Controllers:</p> <p>Definition- features and benefits of PLC- system and its elements – input and output elements- PLC memory system- PLC circuit verses hard wired circuit- types of contacts- normally open (NO) contact- normally closed (NC) contact- ladder logic symbol- AND logic, OR logic and NOT logic- truth table- steps involved in application circuits using a PLC – PLC scan input, programme scan and output scan.</p>	15

Text Book:

1. A Text Book on Electrical Technology by B.L.Theraja- S. Chand & Co
2. Electronic Devices by V.K.Metha- S. Chand & Co

Reference Book:

1. Digital principles and application- malvino
2. Process Control Instrumentation Technology by Curtis D. Johnson- John Wiley& Sons, Inc
3. PLC manual-siemens

MODEL QUESTION PAPER - I

Term : III
Programme : Diploma in Plastic Technology
Course : Basic Electrical and Control Circuits

Time : 3Hrs
Max. Marks : 75
Course Code : N1PT206

- [N.B.: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Define electric current and mention its unit.
2. Define frequency.
3. Mention the main parts of dc generator.
4. What is transformation ratio?
5. Mention the applications of three phase induction motor.
6. What are the uses of diode?
7. What is reed switch?
8. What is input module?

PART – B

9. Derive the equation for three resistors in parallel.
10. Why sinusoidal waveform is used in electric circuit?
11. Explain the necessity of starter for dc motor.
12. Draw the diagram of single phase capacitor start induction run motor.
13. Draw the circuit of full wave rectifier and its output waveform.
14. Draw the symbol and truth table of NOR gate.
15. What are the features of PLC?
16. Develop ladder diagram for simple on / off control.

PART – C

17. a) State and explain Kirchoff's laws

(OR)

b) Draw the sinusoidal waveform and explain the various related terms

18. a) Explain the working of dc generator.

(OR)

b) Draw the diagram of three point starter and explain.

19. a) Explain the working of alternator.

(OR)

b) Draw and explain cylindrical and slip ring rotor of three phase induction motor.

20. a) Explain the working of transistor and draw its characteristics.

(OR)

b) Explain the working of limit switch.

21. a) Draw the block diagram of PLC and explain the various elements in it.

(OR)

b) Explain the steps involved in application control circuit using PLC.

MODEL QUESTION PAPER - II

Term : III
Programme : Diploma in Plastic Technology
Course : Basic Electrical and Control Circuits

Time : 3Hrs
Max. Marks : 75
Course Code : N1PT206

- [N.B.: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Define energy and power. Mention their units.
2. What is peak value?
3. Mention the types of alternator.
4. Draw the symbol of SCR and name the terminals.
5. State the benefits of PLC.
6. Draw the symbol of zener diode
7. Define limit switch.
8. Draw the NOT ladder logic.

PART – B

9. What is reactive power? Mention its unit.
10. Why starter is necessary for DC motors.
11. List down the applications of synchronous motor.
12. Draw the input characteristics of Common Emitter Transistor.
13. Mention the memory types in PLC
14. What are the uses of PN junction diode?
15. State the difference between the PLC and Hard Wired Circuit.
16. Define a rectifier. Name its types.

PART – C.

16. a. i) Draw the sinusoidal waveform and explain the various related terms
ii) State and explain Kirchhoff's voltage law.

(OR)

- b. Three resistances of 3Ω , 6Ω and 9Ω are connected in series across 40V DC supply. Find the current and voltage drop across each resistance.

17. a. Explain the construction and working principle of three point starter with a neat diagram.

(OR)

- b. Explain the construction and working of Transformer.

18. a. Explain the working of Cylindrical Rotor Alternator with a neat sketch.

(OR)

- b. Explain the working of squirrel cage 3 phase induction motor.

- 20 a. Explain the V-I characteristics of a PN junction diode.

(OR)

- b. Draw the symbol and truth table of NAND, NOR, EX-NOR gates.

- 21 a. Draw the block diagram of PLC and explain each block.

(OR)

- b. Explain the process of Input scan, Output scan and Program scan

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1PT307

Term : III

Course Name : POLYMER SCIENCE PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
POLYMER SCIENCE PRACTICAL	4	60	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

OBJECTIVE :

In Diploma level engineering education skill development plays a vital role. These can be achieved by experience in handling various equipments. This is accomplished by doing engineering related experiments in practical classes.

LIST OF EXPERIMENTS

CYCLE - I

1. Determination of Specific gravity
2. Determination of Density
3. Determination of Melting point
4. Determination of Moisture Content
5. Determination of Ash content
6. Determination of Water Absorption
7. Reversion test using con. sulphuric Acid.
8. Determination of Ageing Properties (Thermal Ageing)

CYCLE – II

9. Determination of Shrinkage value of Films
10. Determination of Dimensional stability foams
11. Determination of Compression set - Foams
12. Determination of Gel time determination for PVC Plastisol
13. Determination of Polymer dissolution - Swelling
14. Determination of Chemical degradation
15. Determination of Hydrolytic Degradation.

LIST OF EQUIPMENTS (For batch of 30 Students)

1. Melting Point Apparatus-1no
2. Air Circulating Oven-1no
3. Mechanical Stirrer-1no
4. Analytical Balance-1no
5. Muffle Furnace-1no
6. Specific Gravity Bottle-1no
7. Thermometer-Sufficient quantity
8. Glassware-Sufficient quantity

END EXAMINATION

Note: All the exercises have to be completed. Two exercises will be given for examination by selecting one exercise from Cycle – I and one from Cycle – II.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination

ALLOCATION OF MARKS

Part A: Cycle - I	- 35 marks
Part B: Cycle - II	- 35 marks
Viva-voce	- 05 marks
Total	- 75 marks

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1PT208
Term : III
**Course Name : BASIC ELECTRICAL AND CONTROL
CIRCUITS PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
BASIC ELECTRICAL AND CONTROL CIRCUITS PRACTICAL	4	60	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

OBJECTIVE :

It gives the student the skill development on the basics of AC and DC circuits, DC generator, DC motor, Stepper motor, electronic circuits and logic gates also PLC by experience in handling various equipments. This is accomplished by doing the related experiments in practical classes.

LIST OF EXPERIMENTS:

	Topic	Hours
1	Determination of Unknown Resistance by ohms law.	4
2	Verification of Series and parallel circuit	4
3	Verification of kirchoff's current law	4
4	Verification of kirchoff's voltage law	4

5	Power measurement in a single phase circuit	4
6	Load test on a single phase transformer	4
7	Load test on a single phase induction Motor	4
8	Study of DC and AC machine Starters	4
9	Characteristics of PN junction diode	4
10	Characteristics of Transistor	4
11	Zener Diode Voltage Regulator	4
12	Construction of Bridge .	4
13	Characteristics of Photo Diode	4
14	IC voltage regulator (7805)	4
15	Verification of logic gates NOT, AND, OR	4
	Total	60

LIST OF EQUIPMENTS:

- ❖ Rheostat of various ranges
- ❖ RPS (0-12v, 0-30v)
- ❖ Ammeters (MC and MI) of various ranges
- ❖ Voltmeters (MC and MI) of various ranges
- ❖ Wattmeter – 300v/5A-2.5A/UPF
- ❖ Energy meter – 300v/5A
- ❖ CRO
- ❖ Diode, Transistor, Logic Gate ICs, Photodiode and Thermistor -10nos each (Consumable)
- ❖ Resistors, Capacitors various ranges
- ❖ Breadboards and connecting wires
- ❖ Multi meter

END EXAMINATION

Note:

All the exercises have to be completed.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination.

ALLOCATION OF MARKS

S.No.	Allocation of Mark	Marks
1.	Aim and Circuit Diagram	25
2.	Connection	15
3.	Tabulation and Reading	15
4.	Calculation and Result	15
5.	Vivo-Voce	5
	Total	75

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1PT209
Term : III
Course Name : TOOL ROOM SPECIAL MACHINES PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
TOOL ROOM SPECIAL MACHINES PRACTICAL	4	60	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

OBJECTIVES:

- Identify the parts of a lathe, Drilling, Grinding, Shaper, Slotter and Milling.
- Identify the work holding devices.
- Identify the various tools and its holding devices
- Set the tools for various operations.
- Perform the various operations.
- Prepare the record of work for the exercises

LIST OF EXPERIMENTS

1. Facing and Plain turning operation in Lathe
2. Step turning operation in Lathe.
3. Taper turning operation in Lathe.
4. Drilling and boring operation in lathe.

5. Knurling practice in lathe.
6. Machining multiple holes in drilling machine.
7. Squaring in shaper
8. Angle cutting in shaper
9. External Key way cutting in slotter.
10. Machining Circular Pocket in milling machine.
11. Polishing of surface using Surface grinder.
12. Grinding of external diameter of rod using cylindrical grinder.

LIST OF EQUIPMENTS (Per batch 30 students)

- | | |
|------------------------------------|-----------------------|
| 1. Lathe | - 3 Nos |
| 2. Drilling Machine | - 1 No |
| 3. Shaping machine | - 2 Nos |
| 4. Slotting machine | - 1 No |
| 5. Horizontal milling machine | - 1 No |
| 6. Vertical milling machine | - 1 No |
| 7. Surface grinding machine | - 1 No |
| 8. Cylindrical Grinding Machine | - 1 No |
| 9. Tools and measuring instruments | - Sufficient quantity |
| 10. Consumables | - Sufficient quantity |

END EXAMINATION

Note:

All the exercises have to be completed. One exercises will be given for End examination. All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during End examination.

ALLOCATION OF MARKS

PART-A	Job preparation /marking	20
	Setting and operation	25
	Procedure	15
	Dimension/ finish	10
PART-B	Viva voce	05
TOTAL		75

VSVNPC

IV TERM

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1PT207

Term : IV

Course Name : BASIC ENGINEERING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
BASIC ENGINEERING	6	90	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	MECHANICAL PROPERTIES OF METALS	18
2	ENGINEERING MECHANICS	18
3	FLUID MECHANICS	18
4	HYDRAULICS SYSTEMS	18
5	PNEUMATICS AND HEAT TRANSFER	18
	Total	90

RATIONALE:

Day by day, engineering and technology experience tremendous growth. Design plays a major role in developing engineering and technology. Strength of material is backbone for design. The strength of material deals generally with the behavior of objects, when they are subject to actions of forces. Evaluations derived from these basic fields provide the tools for investigation of mechanical structure. The Fluid mechanics and Fluid power is to study the behavior of fluids under the condition of rest and motion. This chapter deals with fluid flow measurement , hydraulic and pneumatic operation.

OBJECTIVES:

- To acquire knowledge in the properties of metal and know the stress – strain diagram of Mild Steel specimen
- To know the thin cylindrical shell , springs and various types of transmission of power
- To obtain knowledge in properties of fluids and flow of fluid
- To get knowledge in hydraulic elements and simple hydraulic circuits
- To attain knowledge in pneumatic elements and various modes of heat transfer

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	MECHANICAL PROPERTIES OF METALS Mechanical properties of metals (Definition only) - Elasticity, plasticity, stiffness, wear resistance, cast ability, weld ability, toughness- Ductility - Malleability - Brittleness - Hardness- Creep – fatigue. Definition for stress, Strain - Hooke's law-Stress strain and load extension curve for M.S specimen (Theory only) - Factor of safety – Ultimate strength – Young's modulus-Shear stress - Shear strain - Modulus of rigidity - Poisson ratio - Bulk modulus - Relation between elastic constants (formula only) - Simple problems in elastic constants.	18
II	ENGINEERING MECHANICS Hoop stress and longitudinal stress developed in thin cylindrical shell - simple problem for finding Hoop stress, longitudinal stress and thickness of plates of thin cylindrical shell – Simple problems to find Change in length, diameter and volume of thin cylindrical shell Springs – Types - Closed coil Helical spring - open coil Helical spring spring - Helical spring of circular section - safe load and deflection -	18

	Simple problems in closed coil helical spring. Transmission of motion - Belt drives- Flat and V types – Slipping of belts – Rope drives – Chain drive (Definitions only- NO PROBLEMS)– Gear drive – Spur, bevel, helical, worm and worm wheel (Definitions only- NO PROBLEMS).	
III	<p>FLUID MECHANICS</p> <p>Properties of fluids - Density, specific weight, specific gravity, specific volume, vapor pressure, viscosity - Cohesion - Adhesion – Capillarity- Surface tension (Definitions only) - Vacuum pressure - Gauge pressure and absolute pressure - Units of pressure - U tube monometer (no problems)- Bourdon’s pressure gauge.</p> <p>Flow of fluid - Equation of continuity of flow – Bernoulli’s theorem (no derivation) - Applications - Venturimeter (no derivation) - Simple problem to find quantity of discharge only. Orifice meter (no derivation – no problem) Flow through orifices - Co-efficient of velocity - Co-efficient of discharge - Co-efficient of contraction (Definitions only).</p>	18
IV	<p>HYDRAULICS SYSTEMS</p> <p>Elements of hydraulic system - Hydraulic symbols - Fluid power pumps - Vane pump - Piston pump - Gear pump- Pressure control valves- Pressure relief valve and pressure reducing valve, Flow control valves – Needle- globe valve, Directional control valves - Rotary and sliding - Open centre spool-Closed centre spool - Tandem centre, Fluid power Actuators - cylinder-Single acting-Double acting, Hydraulic motor - Accumulator, Intensifier- Hydraulic fluid properties - Additives, Seals and packing, Hydraulic circuits - Simple hydraulic circuits – forward movement of double acting cylinder – Speed control circuit of hydraulic motor, double acting cylinder (Meter in, Meter out only).</p>	18
V	<p>PNEUMATICS AND HEAT TRANSFER</p> <p>Single stage compressor – Multi stage compressor - Intercooler (No Problems) - Pneumatics – Applications - Pneumatic circuit elements – FRL unit – Valves- Classification of valves. Direction control valves – Three way solenoid operated DC valve - Non-return valve – Flow control valve – Quick exhaust valve – Shuttle valve- Pressure control valve- Twin pressure valve- Safety valve- Linear actuators- Single and double acting cylinder - Air motor.</p> <p>Modes of Heat transfer - Conduction- Fourier's law - Thermal conductivity-Conduction through single plane walls and composite plane wall-simple problem in single plane wall only. Convection – Newton’s Law of cooling Concept of heat transfer co-efficient (Definition only) - Radiation - Black body - Grey body - Stefan - Boltz Mann’s law (Definition only)- Heat exchangers (Definition only) - Thermal insulations - (Definitions only - no problems).</p>	18

Text books :

- 1) Strength of Materials, R. S. Khurmi, S.Chand & Co., Ram Nagar, New Delhi.
- 2) Strength of Materials, S. Ramamrutham, 15th Edn 2004, Dhanpat Rai Pub. Co., New Delhi
- 3) A Text Book of Hydraulics, Fluid Mechanics and Hydraulic Machines, R.S. Khurmi, - Edn.18, S.Chand & Co., Ram Nagar, New Delhi – 110 055, Ram Nagar, New Delhi
- 4) A Text Book of Fluid Mechanics and Hydraulic Machines – by, R. K Rajput and S.Chand & Co,Ram Nagar, New Delhi – 110 055.
- 5) Hydraulics,Andrew Parr (A Technician's and Engineer's Guide)
- 6) Fundamentals of pneumatic control Engineering -FESTO Manual
- 7) Thermal Engineering ,P.L Ballaney , 24th Edition ,Khanna Publishers,New Delhi.

Reference books :

- 1) Strength of Materials, R.K. Bansal,, Laxmi Publications Pvt. Ltd., New Delhi,3rd Edition, 2010.
- 2) Strength of materials, S.S.Rattan, Tata Mcgraw hill, New Delhi,2008, ISBN 9780070668959,
- 3) Strength of Materials, B K Sarkar, I Edition, 2003 Tata Mcgraw hill, NewDelhi.
- 4) Engineering mechanics, R.K. Bansal, Laxmi Publications Pvt. Ltd., New Delhi,
- 5) Hydraulic Machines, Jagadishlal, , Metropolitan Book Co. Pvt. Ltd., 1, Faiz Bazaar, New Delhi – 110 006
- 6) Fluid Mechanics and Hydraulic Machines,R. K. Bansal, Laxmi Publications Pvt.,Ltd,22,Golden House, Daryaganj, New Delhi – 110 002
- 7) Thermal Engg, R.K . Rajput , ,8th Edition, Laxmi publications Pvt Ltd , New Delhi
- 8) Applied Thermodynamics ,P.K. Nag, ,2nd Edition, TATA Mcgraw – Hill Publishing Co, New Delhi .
- 9) Thermal Engineering, R.S. Khurmi and J.K. Gupta, 18th Edition,S.Chand & Co,NewDelhi Automobile engineering vol- 1, vol – 2, Kirpal singh, Standard publishers distributors New Delhi
- 10) Thermal Engineering ,B.K. Sarkar , 3rd Edition , Dhanpat Rai & Sons New Delhi
- 11) Applied Thermodynamics, Domkundwar and C.PKothandaraman, 2nd Edition, Khanna publishers, New Delhi
- 12) Oil Hydraulics Manual - B. Lal
- 13) Vickers Hydraulics manual
- 14) Hydraulic and pneumatic power for production - Harry L. steward
- 15) Pneumatic System –S.K Majumdar

MODEL QUESTION PAPER - I

Term : III

Time : 3 hrs

Programme : Diploma in Plastic Technology

Max. Marks : 75

Course : **Basic Engineering**

Course Code: N1PT207

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.

Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A

1. Define elasticity.
2. List the types of stress acting in thin cylindrical shell
3. Write the equation to find deflection of the spring
4. Define coefficient of discharge of venturimeter
5. Draw the symbol of hydraulic motor and pressure relief valve
6. Draw the shuttle valve
7. List the modes of heat transfer
8. State Hooke's Law

PART – B

9. Write the relation between elastic constants
10. Define poisson's ratio
11. Write short notes on open and cross belt drive
12. Draw and give brief about U tube manometer
13. Define coefficient of contraction of orifice meter
14. What is an accumulator?
15. Define Fourier's Law
16. Derive the relation between f_c and f_l

PART – C

17. (a) A steel bar of 25mm diameter and a length of 1m is subjected to a pull of 25 KN. If $E = 2.1 \times 10^5 \text{ N/mm}^2$. Find the elongation of the bar and change in the volume of the bar.

(OR)

- (b) With a neat sketch explain stress strain curve for mild steel specimen

18. (a) Design a closely coiled helical spring of stiffness 20 N/mm deflection. The maximum shear stress in the spring metal is not to exceed 80 N/mm^2 under a load of 600 N. The diameter of the coil is 10 times the diameter of wire. Modulus of rigidity is 85 N/mm^2

(OR)

- (b) Explain any two gear drives with neat sketch

19. (a) Explain Bourdon's Pressure gauge with neat diagram

(OR)

- (b) With a neat sketch explain Venturimeter

20. (a) Explain the working principle External Gear Pump

(OR)

- (b) Explain the working principle Meter In circuit of Hydraulic motor.

21. (a) Explain FRL Unit.

(OR)

- (b) Explain different modes of Heat Transfer

MODEL QUESTION PAPER - II

Term : III Time : 3 hrs
Programme : Diploma in Plastic Technology Max. Marks : 75
Course : **Basic Engineering** Course Code: N1PT207

- [N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. State Hooke's Law
2. Define Creep
3. List the types of stress acting in thin cylindrical shell
4. What is slip in the belt?
5. Define Relative Density
- 6 Define vena contracta in orifice
7. Draw the symbol of hydraulic motor and 4/3 DCV Manually operated.
8. Explain Intercooler

PART – B

9. Define Poisson's ratio
10. Write the relation between elastic constants
11. A boiler 3m internal diameter is subjected to an internal pressure of 5 bar Find hoop stress and longitudinal stress if thickness of the boiler shell is 14 mm.
12. Compare open coiled helical spring and closed coiled helical spring
13. List the various Energy posses by flowing fluid particles
14. What are the different modes of Heat Transfer?
15. Write short notes on shuttle valve
16. List the three hydraulic Coefficients.

PART – C

17.(a). A steel rod 2m long and 20 mm diameter is subjected to an axial load of 45 kN. Find the change in dimensions of the rod by assuming young's modulus is $2 \times 10^5 \text{ N/mm}^2$ and $1/m = 0.3$

OR

(b). Explain stress strain diagram for mild steel specimen

18.(a). Calculate the increase in volume of a boiler shell 3 m long and 1.5 m diameter is subjected to an internal pressure of 2 N/mm^2 . The thickness is such that the maximum tensile stress is not to exceed 30 N/mm^2 . Take $E = 2.1 \times 10^5 \text{ N/mm}^2$. And $1/m = 0.28$. Also calculate the change in length and change in diameter

OR

(b). Explain any two types of belt drive with neat sketch

19.(a). Explain Bourdon's Pressure gauge with neat diagram

OR

(b). Explain flow through orifice

20.(a). Explain the working principle External Gear Pump

OR

(b). Explain speed control of double acting cylinder using Meter out circuit in Hydraulics

21.(a). With neat sketch explain single stage air compressor

OR

(b). Explain Black body, White body and Grey body

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1PT302

Term : IV

Course Name : PLASTICS MATERIALS - I

TEACHING AND SCHEME OF EXAMINATION

Course	Instruction		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS MATERIALS - I	6	90	Internal Assessment	Autonomous End Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	Hours
I	POLYOLEFINS AND STYRENICS PLASTICS	18
II	VINYL PLASTICS, ACRYLIC PLASTICS	18
III	POLYAMIDES. POLYCARBONATES & FLURO PLASTICS	18
IV	CELLULOSE PLASTICS, ACETAL RESIN & SATURATED POLYESTERS	18
V	THERMOPLASTIC ELASTOMERS	18
Total		90

RATIONALE:

It gives the student the knowledge of basic polymerization chemistry, properties and applications of commodity, engineering plastics and TPEs and their significance in polymer industries. With this information student can understand the structure of polymers and their effect on properties.

OBJECTIVES:

On completion of the units of syllabus contents the students must be able to know about

- Classification of plastics
- Abbreviations used and their expansions.
- Preparation, properties and applications of various commodity plastics like PE, PP and Styrenic Plastics.
- Preparation, properties and applications of various commodity plastics like

- PVC, PVA and PMMA.
- Preparation, properties and applications of various engineering plastics like
- PTFE, Nylons and PC.
- Preparation, properties and applications of various engineering plastics like and Acetal
- Preparation, properties and applications of various Thermoplastic Elastomers

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	<p>POLYOLEFINS AND STYRENICS PLASTICS</p> <p>Plastics - Classifications - Abbreviations.</p> <p>Polyethylene - types –Method of Manufacturing of Low Density Polyethylene by high pressure process, High Density Polyethylene by Ziegler process - structure properties and applications.</p> <p>Polypropylene - types – structure - Method of Manufacturing by Ziegler process - properties and applications.</p> <p>Polystyrene – structure - Method of Manufacturing by continuous bulk polymerisation process - properties and applications - Styrene copolymers: HIPS, SAN and ABS – their structure, properties and applications.</p>	18
II	<p>VINYL PLASTICS, ACRYLIC PLASTICS</p> <p>Polyvinyl chloride – Method of Manufacturing of PVC -structure - Types: soft and rigid PVC - properties and applications - VC copolymers - applications.</p> <p>Method of Manufacturing of Polyvinyl alcohol – structure – properties and applications.</p> <p>Acrylic plastics: Method of Manufacturing Polymethyl methacrylate (PMMA) by Suspension polymerisation - structure, properties and applications.</p>	18
III	<p>POLYAMIDES. POLYCARBONATES & FLURO PLASTICS</p> <p>Polyamides (Nylons) - Method of Manufacturing, Properties and applications of Polyamide 6, and Polyamide 6,6</p> <p>Method of Manufacturing of Polycarbonate - structure, properties and applications.</p> <p>Fluro plastics: PTFE – Method of Manufacturing, properties and applications.</p>	18
IV	<p>CELLULOSE PLASTICS, ACETAL RESIN & SATURATED POLYESTERS</p> <p>Cellulose plastics: Method of Manufacturing of cellulose nitrate –</p>	18

	<p>structure - properties and applications.</p> <p>Acetal resins - Method of Manufacturing, structure, properties and applications</p> <p>Method of Manufacturing of Polyethylene terephthalate (PET) and Poly butylene terephthalate (PBT) their structure, properties, and applications.</p>	
V	<p>THERMO PLASTIC ELASTOMERS</p> <p>Basic structure, Method of Manufacture, properties and applications – Thermoplastic styrene block copolymers, Polyester thermoplastic elastomers, Polyamide thermoplastic elastomers, Polyurethane thermoplastic elastomers.</p>	18

Text Books:

1. J.A. Brydson - Plastic Materials –7th Ed-Butterworths-Heinemann–London (1999)
2. D.C. Miles, J.H. Briston - Polymer Technology – Chemical Publishing Co.-New York (1972)
3. Robert V.Milby - Plastics Technology - McGraw Hill Book Co. - 1973.

Reference Books:

1. A.S.Athalye-Plastics Materials Handbook Vol I & II-Multi-tech Publishers (2002)
2. Gachter / Muller - Plastics Additives (4th ed) – Hanser Publishers (1996).
3. W.C.Wake - Fillers for Plastics – Iliffe, London (1971)
4. H.V.Boenig - Polyolefins: Structure and Properties – Elsevier (1986)
5. W.S.Penn - P V C Technology –Applied science, London (1991)

MODEL QUESTION PAPER - I

Term : IV
Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course : **PLASTICS MATERIALS - I**

Time : 3 Hours
Max. Marks : 75
Code : **N1PT302**

*[N.B: (1) Answer any FIVE Questions in in each PART – A and PART – B
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.*

(2) Answer division (a) or division (b) of each question in PART – C.

*(3) Each question in PART – A carries 2 Marks and 3 Marks in PART – B
and 10 Marks in PART – C.]*

PART – A

1. Define Plastics?
2. Differentiate soft PVC and rigid PVC.
3. Write the common name for PTFE.
4. Define Speciality plastics.
5. What is TPE?
6. Write the structure of PET.
7. What is acrylic plastic?
8. Expand PMMA and PEEK.

PART – B

9. Write the types of PP.
10. List the properties of PVA.
11. In PA 6,6 what is mean by that number 6,6?
12. Write short note on LCP.
13. Write the important applications of PU thermoplastic elastomer?
14. Write the structure of PPO.
- 15 Give the applications of Acetal resin.
16. Give the styrene copolymers

PART – C

17 (a) Explain the manufacturing of PP by Ziegler process.

(OR)

(b) Write the structure, properties and applications of Polystyrene.

18 (a) Discuss the manufacturing of Poly Vinyl Alcohol.

(OR)

(b) Write the properties and applications of PMMA.

19. (a) Explain the preparation of Nylon 6,6.

(OR)

(b) Discuss the properties and applications of PET

20. (a) Discuss the properties and Applications of PPS.

(OR)

(b) Explain the properties and applications of PEEK.

21. (a) Discuss the preparation and properties of Thermoplastic styrene block copolymers.

(OR)

(b) Explain the properties and applications of Polyamide thermoplastic elastomer.

MODEL QUESTION PAPER - II

Term : IV
Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course : **PLASTICS MATERIALS - I**

Time : 3 Hours
Max. Marks : 75
Code : **N1PT302**

**[N.B: (1) Answer any FIVE Questions in in each PART – A and PART – B
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.**

(2) Answer division (a) or division (b) of each question in PART – C.

**(3) Each question in PART – A carries 2 Marks and 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. What are Plastics?
2. What is flexible PVC?
3. Expand PTFE.
4. Define Engineering plastics.
5. Define TPE.
6. Write the structure of PBT.
7. Give the application of acrylic plastic?
8. Expand LDPE and PP.

PART – B

9. What are the types of PP.
10. List the applications of PVA.
11. In PA 6,6 what is mean by that number 6,6?
12. Write short note on LCP.
13. Write the important applications of PA thermoplastic elastomer?
14. Write the structure of PPS.
- 15 Give the applications of Teflon.
16. Give the styrene copolymers

PART – C

17. (a) Explain the manufacturing of HDPE by Ziegler process.

(OR)

(b) Write the structure, properties and applications of ABS.

18. (a) Discuss the manufacturing of PMMA.

(OR)

(b) write the properties and applications of PVAL.

19. (a) Explain the preparation of Nylon 6..

(OR)

(b) Discuss the properties and applications of PBT

20. (a) Discuss the properties and Applications of PPO.

(OR)

(b) Explain the properties and applications of PSU.

21. (a) Discuss the preparation and properties of Thermoplastic styrene block copolymers.

(OR)

(b) Explain the properties and applications of Poly ester thermoplastic elastomer.

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : NIPT303

Term : IV

Course Name : PLASTICS PROCESSING - I

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS PROCESSING - I	6	90	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
I	COMPRESSION AND TRANSFER MOULDING	18
II	INJECTION MOULDING	18
III	BLOW MOULDING & ROTATIONAL MOULDING AND CASTING	18
IV	EXTRUSION AND CALENDERING THERMOFORMING	18
V	THERMOFORMING AND FOAMS	18
	Total	90

RATIONALE:

Basic processing machines used in plastic industries to manufacture the products range from simple house wares to very specialized products for Automobile, Medical, Electrical, Electronic Telecommunications, Space craft, Defenses industrial segments.

It also consists study of changes in technical processing parameters regarding pressure and molding cycle time to produce moldings with minimum scrap in optimum molding cycling time.

The technical knowledge of the students are enriched by studying the each processing machine and ancillary equipments

OBJECTIVES:

On completion of the units of syllabus contents the students must be able to know about

- ❖ Principle of compression moulding process, transfer moulding process ,Types and moulding cycle
- ❖ Comparison of compression moulding process versus transfer moulding process.
- ❖ Principles and Specification of injection moulding process
- ❖ Principles of blow moulding process and the importance of parison programming
Advantages and limitations of blow moulding process
- ❖ Principle and Applications of extruder process like tubular blow film extrusion, sheet extrusion, wire and cable covering and co-extrusion.
- ❖ Principle and Applications of Calendring and Thermoforming
- ❖ Principle and Applications of Rotational moulding and Foam

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	COMPRESSION AND TRANSFER MOULDING Compression moulding: Introduction to compression moulding process – Compression moulding cycle- Bulk factor - Curing time - Flow properties - Preheating and performing- Types of compression moulding press-up and down- Types of mould – open flash-positive type-semi positive type- Mould heating - Methods and its advantages - Trouble shooting – Advantages and Limitation of compression moulding process. Transfer moulding: Basic principle of transfer moulding process – Transfer moulding cycle-Types of transfer moulding process - Pot type-Plunger type-top plunger –bottom plunger-Advantages and Limitations of transfer moulding process - Comparison of transfer moulding process with compression moulding process.	18

<p>II</p>	<p>INJECTION MOULDING</p> <p>Basic principles of injection moulding process and moulding materials- Types of injection moulding machine- plunger type-Single stage - Two stage- Screw type machines – reciprocating type-non reciprocating type.</p> <p>Plasticizing unit: Construction of plasticizing unit (injection unit) – Carriage movement-Screw- Design features of screw - Types of screw- general purpose screw-PVC screw- Barrel- types of barrel – standard barrel-venting barrel- Barrel and screw materials - Nozzle – Types of nozzle- standard – Reverse taper – Shut off nozzle– Non return valve – Ring type – Ball type.</p> <p>Clamping Unit: Clamping unit – Types of clamping system - Toggle clamping - Hydraulic clamping – merits and demerits- Platen-stationary-moving– Standard mould- tie bar. Calculation of clamping tonnage - Shot capacity – Injection rate - Plasticizing capacity. Specification of injection moulding machine.</p> <p>Processing parameter and its effect on molding: Processing parameters-Pressure-injection pressure-hold on pressure-back pressure-reaction pressure-Temperature- Melt temperature – Temperature controller –Time-injection-hold on-cooling- mould opening and closing time.</p>	<p>18</p>
<p>III</p>	<p>BLOWMOULDING,ROTATIONAL MOULDING AND CASTING</p> <p>Blow Moulding: Basic principles of blow moulding- process and materials – Types- Extrusion blow moulding process - Injection blow moulding process - Stretch blow moulding process- injection stretch – extrusion stretch.</p> <p>Production of parison- Parison wall thickness control- die centering- die shaping -Parison programming- Advantages and limitations of blow moulding process - Trouble shooting.</p> <p>Rotational moulding - Basic process and materials - Types of rotational moulding - Batch type machine process - Carousel type machine process - Straight line machine process - Applications of rotational moulding - Advantage and trouble shooting.</p> <p>Casting - Basic principle of casting - Shell casting - Continuous casting - Pressure casting - Centrifugal casting - Solvent casting</p> <p>.</p>	<p>18</p>
<p>IV</p>	<p>EXTRUSION AND CALENDERING</p> <p>Extrusion Moulding: Basic principle of extrusion process-Barrel-screw nomenclature - Design – Types of screw - L/D ratio-compression ratio- Screen pack-Breaker plate. Types of extruders - Single screw extruder -Twin screw extruder – applications.</p> <p>Application of extrusion process: Production unit of Pipe - Sizing unit-Winding and cutting unit – Tubular blown film extrusion-Cast</p>	<p>18</p>

	<p>film – Extrusion coating - lamination - Sheet extrusion - Wire and cable covering - Co-extrusion (basic concepts only) - Trouble shooting .</p> <p>Calendering: Basic principles of calendering process and materials - Types of canlenders - Super imposed calendar -- 5 roll calender - 4 roll calender- Offset calendar- 3 roll and 4 roll calender - Z type calendar- 3 roll and 4 roll calender - Inverted L type calendar.</p> <p>Nomenclature of calendering machine-Temperature control of calender rolls - Cored rolls - Peripherally drilled rolls - Manufacturing of PVC calendered sheets - controlling of Sheets thickness-Gauge control-crowning effect - Crowning effect –Wall thickness controlling methods-Contour grinding - Cross axis bending-roll bending - Application and limitation of calendering process.</p>	
V	<p>THERMOFORMING AND FOAMS</p> <p>Thermoforming: Basic principle of thermoforming - Thermoforming materials - Mould and mould materials-Heating sources - Radiant - Contact heating - Draw ratio of sheet. Thermoforming techniques- Vacuum forming - Plug assist forming - Drape forming - Bubble or blister forming - Snap back forming-Advantages and limitations of thermoforming - Trouble shooting</p> <p>Foam - Introduction to plastic foaming process - Structural foam moulding – Foaming process - Expandable polystyrene foam - PVC foam - Polyethylene</p>	18

TEXT BOOKS

1. Plastic Technology - William. J. Patton
2. Polymer Processing - D.H. Marton., Jones
3. Injection Moulding - A.S. Athalye
4. Practical Injection Moulding of Plastics - Walter Mink

REFERENCES:

5. Plastic Technology - William. J. Patton
6. Polymer Processing - D.H. Marton., Jones
7. Injection Moulding - A.S. Athalye
8. Practical Injection Moulding of Plastics - Walter Mink
9. Injection Moulding - Irvin Rubin
10. Injection Moulding - Rosato
11. Plastic Processing Technology - Edward. A. Maccio
12. Blow Moulding Handbook – Rosato
13. Calendering of Plastics - Griffia., R.A. Elden

MODEL QUESTION PAPER - I

Term : IV
Programme : Diploma in Plastic Technology
Course : **PLASTIC PROCESSING - I**

Time : 3Hrs
Max. Marks : 75
Code : **N1PT303**

- [N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Define Bulk factor
2. Write the types of Screws used in Injection moulding
3. Write the types of blow moulding process
4. Give the basic process of Rotational moulding process
5. List the types of thermoforming
6. What is Parison?
7. What is draw down ratio?
8. What do you mean by Shot capacity?

PART – B

9. Write a short note on Compression moulds with neat diagram
10. Name the nozzles used in injection moulding process. Explain any one
11. Write a short note on Parison programme
12. Write the application of an Extruder
13. Give the uses of Foam
14. Write a note on shell casting?
15. What do you mean by Breaker plate?.
16. What do you mean by Moulding cycle time

PART – C

17. (a) Compare compression and transfer moulding process
(OR)
(b) Explain plunger type transfer moulding process.
18. (a) Draw the neat sketch and explain the Injection moulding machine.
(OR)
(b) Explain hydraulic clamping mechanism with neat sketch.
19. (a) Explain the process of Extrusion blow moulding with neat sketch.
(OR)
(b) Explain the stretch blow moulding process
20. (a) Explain the process of Blown Film Extrusion with neat sketch.
(OR)
(b) Explain the method of manufacturing of PVC sheet using calendaring
21. (a) Describe in brief the drape forming
(OR)
(b) Discuss about manufacturing of Expandable Polystyrene Foam

MODEL QUESTION PAPER - II

Term : IV
Programme : Diploma in Plastic Technology
Course : **PLASTIC PROCESSING - I**

Time : 3Hrs
Max. Marks : 75
Course Code : **N1PT303**

- [N.B.: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Define Bulk factor
2. Define Shot capacity
3. What you mean by Parison?
4. Write the application extruder
5. Give the uses of foam
6. Write the types Transfer moulding process?
7. How the Clamping tonnage is calculated?
8. Give the types of Calendaring machine

PART – B

9. Why Preheating and Performing is necessary in compression moulding process?
10. Write a note on Reverse taper Nozzle
11. What do you mean by Parison control
12. Give the Application of Rotational moulding
13. Write short notes on Crowing effect
14. Write a note on Braker plate
15. Explain Plug assist forming
16. Write a short note on Shell casting

PART – C

17. (a) Explain the construction working principle of Compression moulding machine with neat diagram.

(OR)

(b) Write the Comparison between Compression moulding and Transfer moulding

18. (a) Discuss the Reciprocating Injection moulding machine process with neat diagram

(OR)

(b) Write the Specification and Processing parameters of Injection molding machine

19. (a) Explain the Extrusion Blow moulding process with neat diagram

(OR)

(b) Explain Rotational moulding process with neat diagram

20 (a) Describe the construction of PVC Pipe production

(OR)

(b) Explain the manufacturing of PVC sheet by calendaring process

21 (a). Discuss about vacuum forming process

(OR)

(b) Explain production of PVC foam with neat diagram

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1PT210
Term : IV
Course Name : HYDRAULICS AND PNEUMATICS WITH HMI AND SCADA PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
HYDRAULICS AND PNEUMATICS WITH HMI AND SCADA PRACTICAL	4	60	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

OBJECTIVES:

- Design and operate pneumatic circuits.
- Design and operate hydraulic circuits.
- Use HMI and SCADA system and its elements for process control.
- Familiarize the working of function blocks in HMI and SCADA
- Record of work to be prepared

EXERCISES:

Pneumatics Lab.

1. Direct operation of single acting cylinder.
2. Direct operation of double acting cylinder
3. Operation of double acting cylinder with quick exhaust valve.
4. Speed control of double acting cylinder using metering-in circuits.
5. Speed control of double acting cylinder using metering-out circuits.
6. Automatic operation of double acting cylinder in single cycle - using limit switch.
7. Operation of Double acting cylinder using HMI
8. Control of Double acting cylinder using SCADA

Hydraulics Lab.

9. Direct operation of double acting cylinder.
10. Direct operation of hydraulic motor.
11. Speed control of double acting cylinder metering-in control.
12. Speed control of double acting cylinder metering-out control.

LIST OF EQUIPMENTS

1	Pneumatic Trainer Kit	- 1No
(All Cylinders, Control Valves, Limit switches and other accessories)		
2	Hydraulics Trainer Kit	- 1No.
(All Cylinders, Control Valves and other accessories)		

END EXAMINATION

Note: All the exercises have to be completed. Two exercises will be given for examination by selecting one exercise from Pneumatics Lab. And one from Hydraulics lab.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination

ALLOCATION OF MARKS

Part A: Pneumatics by lot	- 35 marks
Part B: Hydraulics by lot	- 35 marks
Viva-voce	- 05 marks
Total	- 75 marks

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1PT308
Term : IV
Course Name : PLASTICS PROCESSING PRACTICAL -I

OBJECTIVES:

All the experiments should be completed and given for the end term practical examination.

- ❖ The external examiners are requested to ensure that a single experimental question should not be given to more than eight students while admitted a batch of 30 students during Autonomous Examinations.

LIST OF EXPERIMENTS

Operation of the following processing machines

1. Operation on Hand Injection Molding Machine (1\2 Oz)
2. Operation on Hand Injection Molding Machine (1)
3. Operation on Hand Blow Molding Machine (1)
4. Operation on Semiautomatic Injection molding Machine (fully Hydraulic)
5. Operation on Semiautomatic Injection molding Machine (semi Hydraulic)
6. Operation on Semiautomatic Injection molding Machine (Semi Pneumatic)
7. Operation on Automatic Injection Molding Machine.
8. Operation on Roto Injection Molding Machine.
9. Operation on Vacuum Loader.
10. Operation on Hopper Dryer, Air Circulating Oven and Color Mixer
11. Operation on Scrap grinder.
12. Operation on Mould temperature controller and Chiller.

LIST OF EQUIPMENTS (Per batch 30 students)

1. Hand Injection Molding Machine (1 Oz) - **01 No.**
2. Hand Blow Molding Machine (1 Oz) - **01 No.**
3. Semiautomatic Injection molding Machine (fully Hydraulic) - **01 No.**
4. Semiautomatic Injection molding Machine (semi Hydraulic) - **01 No.**
5. Automatic Injection Molding Machine- **01 No.**
6. Roto Injection Molding Machine. - **01 No.**
7. Compression moulding machine- **02 No**
8. Scrap grinder - **02 No.**
9. Vacuum Loader - **01 No.**
10. Color Mixer- **01 No.**

END EXAMINATION

Note: All the exercises have to be completed.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination

ALLOCATION OF MARKS

PART-A PLASTIC PROCESSING MACHINES (70 Marks)

PART-A	Aim	20 Marks
	Tools Used	
	Working Principle	
	Machine and mould Drawing	40 Marks
	Procedure	
	Good Components produced	
	Calculation and Trouble Shooting	10 Marks

PART-B: VIVA VOCE

(5 Marks)

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N1 - SCHEME

Programme : PLASTIC TECHNOLOGY
Course code : N1PT309
Term : IV
Course Name : PLASTICS IDENTIFICATION AND PREPARATION PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS IDENTIFICATION AND PREPARATION PRACTICAL	4	60	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

OBJECTIVES:

All the experiments should be completed and given for the end term practical examination.

- ❖ The external examiners are requested to ensure that a single experimental question should not be given to more than eight students while admitted a batch of 30 students during Autonomous Examinations.

LIST OF EXPERIMENTS

I) IDENTIFICATION OF PLASTICS

1. Study on various preliminary tests
2. Identification of Polyolefin (PE and PP)
3. Identification of Vinyl plastics (PVC, PVAL)
4. Identification of Styrene based plastics (HIPS, ABS, SAN, GPPS)
5. Identification of Acrylic plastics
6. Identification of Fluoro Polymers
7. Identification of Polyamides and PC
8. Identification of Cellulose plastics, acetal resin & saturated polyester
9. Identification of Specialty plastics
10. Identification of Thermo set plastic materials

II) PREPARATION OF THE PLASTIC MATERIALS:

13. Preparation of Urea formaldehyde
14. Preparation of Melamine Phenol formaldehyde
15. Preparation of Resorcinol formaldehyde.
16. Preparation of Nylon 6,6
17. Preparation of PVC Plastisol

LIST OF EQUIPMENTS (Per batch of 30 students)

1. Plastic Identification bench -1 No's
2. China dish, bowl and glass wares as required
3. Consumables as required.

END EXAMINATION

Note: All the exercises have to be completed. Two exercises will be given for examination by selecting one exercise from Identification of Plastics and one from Preparation lab.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination

ALLOCATION OF MARKS

Part A: Identification of Plastics	- 35 marks
Part B: Material Preparation	- 35 marks
Viva-voce	- 05 marks
Total	- 75 marks

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1PT211
Term : IV
Course Name : MOULD ELEMENTS USING 3D SOFTWARE PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
MOULD ELEMENTS USING 3D SOFTWARE PRACTICAL	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

OBJECTIVES:

On completion of the exercises, the students must be able to

- Practice on 3D software commands.
- Draw assembled drawings using 3D software.
- Prepare the record of work for the exercises

Introduction to Limit, Fit and Tolerance for Mould Elements (Not for Exercises and End Examinations)

LIST OF EXERCISES:

1. Assembly of Guide pillar with Guide bush.
2. Assembly of Sprue Bush with register ring.
3. Assembly of Register Ring with injection side back plate.
4. Assembly of Ejector Grid.
5. Assembly of Core with Core retainer plate
6. Assembly of cavity with cavity retainer plate

LIST OF EQUIPMENTS (Per batch 30 students) :

1. Personal Computer : 30 nos.
2. Software Required : Any 3D software (Auto CAD / PRO-E / Solid works)
3. Laser Printer : 1 No.
4. Consumables : Sufficient quantity

END EXAMINATION

Note:

All the exercises have to be completed. One exercises will be given for End examination. All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during End examination.

ALLOCATION OF MARKS

PART-A	Assembly	50
	Procedure	10
	Printout	10
PART-B	Viva voce	05
TOTAL		75

VSVNPC

V TERM

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : NIPT304

Term : V

Course Name : PLASTICS MATERIALS - II

TEACHING AND SCHEME OF EXAMINATION

Course	Instruction		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS MATERIALS - II	5	75	Internal Assessment	Autonomous End Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	Hours
I	PLASTICS BLENDS & ALLOYS	15
II	COMPOUNDING OF PLASTICS	15
III	THERMOSETTING RESINS - I	15
IV	THERMOSETTING RESINS - II	15
V	INTRODUCTION TO POLYMER NANO TECHNOLOGY	15
Total		75

RATIONALE:

It gives the student the knowledge on Blends and Alloys and also imparts knowledge of basic polymerization chemistry, properties and applications of spatiality & high performance plastics and thermosetting plastics. Students are also exposed to polymer nano technology and composites.

OBJECTIVES:

On completion of the units of syllabus contents the students must be able to know about

- Preparation, properties and applications of various Blends and Alloys.
- Preparation, properties and applications of various specialty Plastics
- Preparation, properties and applications of various Thermosetting Plastics
- Polymer nano technology and nano composites.

DETAILED SYLLABUS**Contents: Theory**

Unit	Name of the Topic	Hours
I	<p>PLASTICS BLENDS & ALLOYS</p> <p>Introduction to polymer blends and alloys – difference between blends and alloys – classification of polymer blends – compatible and incompatible blends – important properties and applications of industrial poly blends like PPO/PS(NORYL), POM/Elastomer(DELRIN)</p>	15
II	<p>COMPOUNDING OF PLASTICS</p> <p>Compounding - Principles of compounding - Compounding ingredients and their functions: Fillers - Plasticisers - Colorants (Dyes and Pigments) - Lubricants - Stabilizers - Processing aids - Flame retardants - Blowing agents - Anti - oxidants - UV stabilizers - Anti static agents and Impact modifiers.</p>	15
III	<p>THERMOSETTING RESINS - I</p> <p>Phenolic plastics - Novolaks - Resols - resin manufacture - Phenol formaldehyde moulding powder preparation – compounding ingredients - properties of Phenolic mouldings and applications.</p> <p>Amino plastics: Urea formaldehyde resins – theories of resinification - moulding powders - properties - applications - Melamine formaldehyde resins - resinification – moulding powders - properties and applications.</p> <p>Unsaturated Polyesters: laminating resins, raw materials – production of resins – curing systems (examples only) - properties and applications – polyesters moulding compositions (SMC & DMC only)</p>	15
IV	<p>THERMOSETTING RESINS - II</p> <p>Epoxy resins - preparation of resins from Bis-phenol A - structure and properties of cured resins – Applications.</p> <p>Polyurethanes: Flexible foams, rigid foams and semi rigid foams (properties and applications only)</p> <p>Silicones: Silicone resins – preparation – properties – applications</p>	15

V	<p>INTRODUCTION TO POLYMER NANO TECHNOLOGY</p> <p>Introduction to nano materials-Basics of nano scale science and technology-distinguish between nano particles and bulk materials (basic concepts only)</p> <p>Classification of nano materials-Classification of nano structured material-nano particles-nano fillers-nano clays - carbon nano tubes (CNT)-Single wall carbon nano tube (SWCNT)-multiwall carbon nano tube (MWCNT) (basic concepts only)</p> <p>Synthesis of nano Material-Bottom up synthesis-Top down Synthesis(basic concepts only)</p> <p>Applications of Nano science-Nano medicines – targeted drug delivery nano particles for in solar cell and battery. Basics of polymer nan composites (Basic Definitions only)</p>	15
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Text Books:

1. J.A. Brydson - Plastic Materials –7th Ed-Butterworths-Heinemann–London (1999)
2. Robert V.Milby - Plastics Technology - McGraw Hill Book Co. - 1973.
3. 1. M. Wilson, K. Kannangara, G Smith, M. Simmons, B. Raguse, Nanotechnology: Basic science and Emerging technologies, Overseas Press India Pvt Ltd, New Delhi, First Edition 2005.

Reference Books:

1. Gachter / Muller - Plastics Additives (4th ed) – Hanser Publishers (1996).
2. W.C.Wake - Fillers for Plastics – Iliffe, London (1971)
3. C.N.R.Rao, A.Muller, A.K.Cheetham (Eds), The chemistry of nanomaterials: Synthesis, properties and applications, Wiley VCH Verlag Gmbh&Co, Weinheim, 2004.

MODEL QUESTION PAPER - I

Term : V
Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course : **PLASTICS MATERIALS - II**

Time : 3 Hours
Max. Marks : 75
Code : **N1PT304**

- [N.B: (1) Answer any FIVE Questions in in each PART – A and PART – B
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question in PART – A carries 2 Marks and 3 Marks in PART – B
and 10 Marks in PART – C.]

PART – A

1. What are the needs of polymer blends?
2. Define compounding.
3. What are Amino Plastics?
4. Write the structure of Epoxy resin.
5. What is nano clay?
6. Write the classification of polymer blends.
7. Differentiate Novolaks and resol resin.
8. Write the types of PU foam.

PART – B

9. Differentiate polymer blends and alloys.
10. What is bleeding?
11. Expand SMC and DMC.
12. Write the applications of silicones.
13. What you mean by targeted drug delivery?
14. Write the functions of Plasticizer and give any 2 examples.
15. What are the raw materials used to prepare Unsaturated polyesters.
16. What do you mean by bottom up approach?

PART – C

- 17 (a) Explain the properties and applications of NORYL
(OR)
(b) Explain the properties and applications of DELRIN.
- 18 (a) Discuss the important properties of Fillers.
(OR)
(b)) Explain the following, (a) Flame Retardants (b) UV stabilizers
19. (a) Explain the preparation of Novolak resin.
(OR)
(b)) Discuss the properties and applications of MF moulding powder
20. (a) Discuss the preparation of Epoxy resin.
(OR)
(b) Explain the properties and applications of Flexible PU foam.
21. (a) Differentiate nano particles and bulk materials.
(OR)
(b) Explain in detail about CNT.

MODEL QUESTION PAPER – II

Term : V
Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course : **PLASTICS MATERIALS - II**

Time : 3 Hours
Max. Marks : 75
Code : **N1PT304**

- [N.B: (1) Answer any FIVE Questions in in each PART – A and PART – B
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question in PART – A carries 2 Marks and 3 Marks in PART – B
and 10 Marks in PART – C.]

PART – A

1. Define: polymer blends.
2. What is meant by compounding?
3. Give example for Amino Plastics.
4. Write the structure of unsaturated polyester resin.
5. What is nano clay?
6. What is compatible blends?
7. Differentiate Novolaks and resol resin.
8. Write the types of PU foam.

PART – B

9. Give difference between polymer blends and alloys.
10. What is blooming?
11. Expand SMC and DMC.
12. What are the applications of silicones?
13. Define: targeted drug delivery.
14. Write the functions of lubricant and give examples.
15. Give raw materials used to prepare epoxy resin.
16. What is top down approach?

PART – C

17 (a) Explain the properties and applications of Delrin

(OR)

(b) Explain the properties and applications of Noryl.

18 (a) Discuss the important properties of Plasticisers.

(OR)

(b)) Explain the following,

(a) Antioxidants

(b) Flame retardant

19. (a) Explain the preparation of UF resin.

(OR)

(b)) Discuss the properties and applications of PF moulding powder

20. (a) Discuss the preparation of unsaturated polyester resin.

(OR)

(b) Explain the properties and applications of rigid PU foam.

21. (a) Elaborate difference between nano particles and bulk materials.

(OR)

(b) Explain in detail about CNT.

**VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE
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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : NIPT305

Term : V

Course Name : PLASTICS PROCESSING - II

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS PROCESSING - II	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
I	ADVANCED PLASTIC PROCESSING	15
II	COMPOUNDING AND ANCILLARY EQUIPMENTS	15
III	POLYMER COMPOSITES AND LAMINATES	15
IV	PLASTICS RECYCLING	15
V	FINISHING, DECORATION & JOINING OF PLASTICS	15
	Total	75

RATIONALE:

Plastic processing –II, the subject deals with the almost all advanced processing techniques like Thin wall end products ,Thermo set injection .moulding, Gas assist injection moulding. Liquid injection mouldin Co-injection moulding- Liquid Injection Moulding- Injection Compression Moulding(Coining)- Multilevel feed injection moulding. Which helps the students to enrich technical knowledge towards the industrial calibration

Compounding of plastics materials with other additives and essential ingredients to meet the the performance and manufacturing requirement at the lowest cost with the requirement of ancillary equipment are well explained

.Composite materials are generally used for bridges, and structures such as boat hulls, swimming pool panels, race car bodies, shower stalls, bathtubs storage tanks, imitation and countertops.

Nearly all types of plastics can be recycled, however the extent to which they are recycled depends upon technical, economic and logistic factors. As a valuable and finite resource, the optimum recovery route for most plastic items at the „end-of-life“ is to be recycled, preferably back into a product that can then be recycled again and again and so on.

OBJECTIVES:

On completion of the units of syllabus contents the students must be able to know about

- ❖ Basic principles, process and application of Advanced proceeding methods
- ❖ Acquire knowledge about Compounding equipments Two roll mill, Ribbon blender ,Internal mixer and Ban bury mixer
- ❖ Study about Ancillary equipments, Types of Dryers, Dehumidifying dryer
- ❖ Process involved in Composites reinforced plastics and laminates
- ❖ Processing on Hand lay up, Spray lay up process ,Pultrusion and Filament winding
- ❖ Knowledge of Recycling. types of recycling ,Advantages of recycling and recycling of codes
- ❖ Concept on Recycling of PET bottle, Recycling of PVC bottle- Mechanical and Chemical recycling process
- ❖ Decoration of plastics - Preparation for decorating - Printing - Silk screen printing - Pad printing
- ❖ Enrich the knowledge on Welding of plastics ,Ultrasonic welding and Vibration welding

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	<p>ADVANCED PLASTIC PROCESSING</p> <p>Basic principles, process and application of thermoset injection moulding- Gas Assisted Moulding- Thin wall Moulding- Co-injection moulding- Liquid Injection Moulding- Injection Compression Moulding (Coining) - Multilevel feed injection moulding.</p>	15
II	<p>COMPOUNDING AND ANCILLARY EQUIPMENTS</p> <p>Compounding equipments - Two roll mill - Ribbon blender - Internal mixer - Banbury mixer - Twin screw extruder - Sigma mixer.</p> <p>Ancillary equipments - Drier - Definition of moisture content, Types of Dryers - Tray Dryer,— Hopper dryer – Hopper loader – Vacuum hopper loader - Granulator - 3 blade, 4 blade granulator - Mould temperature controller – Chilling plant – Colour blender - Magnetic grills.</p>	15
III	<p>POLYMER COMPOSITES AND LAMINATES</p> <p>Composites - Definition - reinforced plastics and laminates - Basic process - Types - High-pressure and low-pressure - Process parameters and the effects - Application of laminates Fiber- Fiber Forms - Hand lay-up and spray lay-up process- Vacuum bag and pressure bag moulding - Filament winding - Centrifugal casting –RTM – Matched die moulding – SMC, DMC - Pultrusion - SRIM – Applications</p>	15
IV	<p>PLASTICS RECYCLING</p> <p>Recycling-types of recycling -advantages of recycling - recycling of codes - Mechanical and chemical recycling - Sorting and separation techniques of mixed plastics-Wet Separation – float and Sink method – Froth Floatation method Hydrocyclone - Centrifugal sorting, Electrostatic sorting, sorting by selective dissolution. Size Reduction-Granulators; Densification process - Agglomerators- Pulverization process.</p> <p>Recycling of PET bottle- recycling of PVC bottle - Pyrolysis and incineration of plastic waste for energy recovery.</p>	15

V	<p>FINISHING, DECORATION & JOINING OF PLASTICS</p> <p>Finishing of plastics - Filling, grinding, buffing, drilling, turning, slitting.</p> <p>Decoration of plastics - Preparation for decorating - Printing - Silk screen printing - Pad printing Rotogravure printing and flexographic printing - Hot stamping - Foil inlay moulding - Vacuum metalizing - Electroplating - In mould labeling.</p> <p>Adhesives - Types of adhesives - Advantage of adhesive bonding - Elastomeric cement - Thermosetting adhesives - Characteristic of adhesives.</p> <p>Welding of plastics - Ultrasonic welding - Vibration welding - Heated tool welding - Spin welding - Hot wire and induction welding - Heat sealing - Thermal heat sealing - Dielectric sealing.</p>	15
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TEXT BOOKS:

1. Decorative of plastics - James – ES-Margolis
2. Plastic Technology - William J. Patton

REFERENCES:

1. Polymer Processing - D.H. Morton Jones
2. Plastic Processing Data Handbook - Dominick Rosato.

MODEL QUESTION PAPER - I

Term : V
Programme : Diploma in Plastic Technology
Course : **PLASTIC PROCESSING -II**

Time : 3Hrs
Max. Marks : 75
Code : **NIPT305**

- [N.B:** (1) Answer any **FIVE** Questions in each **PART – A** and **PART – B**.
Q.No. 8 in PART – A and **Q.No. 16 in PART – B** are compulsory.
(2) Answer division (a) or division (b) of each question in **PART – C**.
(3) Each question carries 2 Marks in **PART – A**, 3 Marks in **PART – B**
and 10 Marks in **PART – C**.]

PART – A

- 1.Name the types of advanced processing methods
- 2.Write equipments used for compounding
3. What is FRP?
- 4.What do you mean by Recycling?
- 5.What you mean by welding of plastics?
- 6.Explain the term hand lay up process
- 7.What you mean by Spin welding?
8. Which Gas is used in Gas Injection Moulding?

PART – B

9. Write the advantages of Thermo set injection moulding?
10. Write a note on Granulator
11. Explain the term Spray lay up process
12. What you mean by Chemical recycling?
13. What you mean by Silk screen printing
14. Write a note on Vacuum bag moulding?
15. Give the advantages of Adhesive bonding
16. What do you mean by Coining?

PART – C

17(a) Explain with neat sketch of Gas assisted injection moulding

(OR)

(b) Explain the Co- injection moulding process with neat sketch.

18.(a) Explain the operation of ban bury mixer

(OR)

(b) Draw and explain the working principle twin screw extruder

19. (a) Explain the working principle Pultrusion

(OR)

(b)) Draw and explain the working principle of Filament winding

20. (a) Draw and explain the working of float and sink method.

(OR)

(b) Discuss recycling of PET bottles.

21. (a) Draw and explain the working of Pad printing

(OR)

(b) Explain the working principle of Ultra sonic Welding with neat sketch

MODEL QUESTION PAPER - II

Term : V
Programme : Diploma in Plastic Technology
Course : **PLASTIC PROCESSING -II**

Time : 3Hrs
Max. Marks : 75
Course Code : **N1PT305**

[**N.B.** (1) Answer any **FIVE** Questions in each **PART – A** and **PART – B**.
Q.No. 8 in PART – A and **Q.No. 16 in PART – B** are compulsory.

(2) Answer division (a) or division (b) of each question in **PART – C**.

(3) Each question carries 2 Marks in **PART – A**, 3 Marks in **PART – B** and 10 Marks in **PART – C**.]

PART – A

1. Which gas is used in gas assist Injection moulding process? Why?
2. Define Compounding
3. Explain the term Hand layup process
4. What do you mean by chemical recycling?
5. What are the advantage of Adhesives?
6. Write any two Equipment used for compounding?
7. What is SMC and DMC?
8. Why size reduction is necessary?

PART – B

9. What is Co – Injection moulding process
10. Write a note on Magnetic grill
11. Explain Pressure bag moulding
12. Explain the term Gasification
13. Write a note on by Vibration welding?
14. Write note on Chilling plant
15. What is Matched Die Moulding?
16. What do you mean by Pyrolysis?

PART – C

17. a) Explain the construction, working and application of Thermoset Injection moulding process
(OR)
(b) Write the working principle of Gas assist Injection Moulding Process
18. (a) Explain in detail about Banbury mixer with neat diagram
(OR)
(b) Draw and Explain working of Twin screw extruder
19. (a) Describe in detail about Hand lay up process and spray up technique
(OR)
(b) Describe the construction and working of Filament Winding process
20. (a) Discuss the Float and Sink method
(OR)
(b) Explain the recycling PVC bottles.
21. (a) Discuss about Pad printing process with neat diagram
(OR)
(b) Explain the Flexographic printing with neat diagram

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : NIPT401
Term : V
Course Name : COMPUTER AIDED DESIGN AND MANUFACTURING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
COMPUTER AIDED DESIGN AND MANUFACTURING	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	CNC MACHINES	15
2	CNC PROGRAMMING AND COMPUTER AIDED DESIGN	15
3	COMPUTER AIDED MANUFACTURING AND CIM	15
4	GT-FMS-AGV-ROBOTICS-CMM	15
5	UNCONVENTIONAL MACHINING	15
	Total	75

RATIONALE:

As per the latest requirements in the Plastics Industries, this enables to learn the assistance of computer in the field of plastics part design and mould manufacturing areas. This help to learn the latest manufacturing concepts in the shop floor and mould manufacturing methods like CNC and CAM. They are able to know about the unconventional machining process used in mould manufacturing and CNC programming techniques. It helps to study about Computer integrated production planning and control, robots, FMS which used in plastics processing and mould manufacturing.

OBJECTIVES:

- Understand about the principle and construction of CNC machines and part programming.
- Understand the concept and requirement of the integration of the design and manufacturing.
- Acquire knowledge about the computer assistance in the design process and analysis.
- Understand the concepts of manufacturing with computer assistance in the shop floor.
- Understand the concept of Computer Integrated Manufacturing.
- Understand the principle of latest manufacturing methods like FMS, GT.
- Acquire the knowledge in the material handling equipment and robot.
- Study about the unconventional machining process like Ultrasonic machining, Electro chemical machining, Electric Discharge Machining, Wire Cut EDM, Plasma arc machining, Laser beam machining.

DETAILED SYLLABUS

CONTENT: THEORY

Unit	Name of the Topic	Hours
I	CNC MACHINES Numerical control - definition - components of NC systems - Development of NC - DNC – CNC and Adaptive control systems - Working principle of a CNC system. CNC machines - Advantage of CNC machines - Difference between NC and CNC. - Types of turning centre: horizontal, vertical - Types of machining centers: horizontal spindle, vertical spindle, universal machines - machine axis conventions, Maintenance of CNC machines. EDM - wire cut EDM construction, Application	15

<p style="text-align: center;">II</p>	<p style="text-align: center;">CNC PROGRAMMING AND COMPUTER AIDED DESIGN</p> <p>CNC Part Programming : Manual Part programming – Coordinate system – datum points, machine zero, work zero, tool zero Reference points – NC dimensioning- G codes and M codes - Linear interpolation and circular interpolation – CNC programming procedure – simple program for making circular core, circular cavity and rectangle mould plate with guide pillar hole.</p> <p>Computer Aided Design: Introduction – definition – shigleys design process – ohsuga model – CAD activities – Benefits of CAD – CAD software packages - Geometric modeling techniques: wire frame - surface. Solid modeling - graphics standards: Need, GKS. - IGES - DXF. Introduction to finite element methods - procedure of finite element analysis (brief description only).</p>	<p style="text-align: center;">15</p>
<p style="text-align: center;">III</p>	<p style="text-align: center;">COMPUTER AIDED MANUFACTURING AND CIM</p> <p>CAM- definition - Functions of CAM - benefits of CAM – introduction to process planning – computer assisted process planning (CAPP) - types of CAPP - variant type, generative type - advantages of CAPP</p> <p>Aggregate production planning - Master Production Schedule (MPS) - capacity planning - Materials Requirement Planning (MRP) - introduction to enterprises resources planning - Manufacturing Resources Planning (MRP-II) -just in time manufacturing philosophy.</p> <p>CIM: Introduction of CIM - Concept of CIM – Evolution of CIM – CIM wheel – benefits – integrated CAD / CAM</p>	<p style="text-align: center;">15</p>
<p style="text-align: center;">IV</p>	<p style="text-align: center;">GT-FMS-AGV-ROBOTICS-CMM</p> <p>Group technology – part family – classification and coding – coding structure – Optiz, MICLASS, code system – benefits of GT.</p> <p>FMS - introduction – components of an FMS system – workstations – planning of FMS – application and benefits of FMS.</p> <p>AGV – components – functions – benefits.</p> <p>Robot – definition – anatomy and classification - basic elements of a Robot – types – applications</p> <p>CMM-Coordinate measuring machines construction, working principles and specifications</p>	<p style="text-align: center;">15</p>

V	<p style="text-align: center;">UNCONVENTIONAL MACHINING</p> <p>Ultrasonic machining – Process - Application - Advantages and Limitations. Chemical machining – Process - Application - Advantages and Limitations. Electro chemical machining – Process - Application - Advantages and Limitations. Electro Chemical Grinding – Process - Application - Advantages and Limitations. Electric Discharge Machining – Process - Application - Advantages and Limitations. Plasma arc machining – Process - Application - Advantages and Limitations. Laser beam machining – Process - Application - Advantages and Limitations.</p>	15
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Text book

1. Mikell. P. Groover, „CAD / CAM : Prentice Hall of India Pvt. New Delhi 1993
2. P. Radhakrishnan, S. Subramanyan, „CAD / Cam / CIM“, New Age International Limited, Publishers.

References :

1. “Modern Machining process”, P.C. Pandey and H.S. Shan, Tata Mc Graw-Hill Publishing company Limited, New Delhi, 2007.
2. “Advanced Machining Process” , V.K. Jain, Allied Publishers PVT Limited 2007.
3. P. Radhakrishnan, „Computer numerical control machines“, new central Book agency, 1996.
4. G.E Thyer, Computer numerical control of machine tools, BH Newnes, 1991.
5. T.K. Kundra, P.N.Rao, N.K. Tiwari, Numerical control and computer aided Manufacturing, Tata McGraw – Hill, New Delhi, 1991.
6. S. Krar, CNC Technology and Programming, Mc Graw - Hill 1990.
7. Mikell P.Groover, Automation, Production Systems and Computer Integrated manufacturing, Prentice – Hall international Edition.
8. Barry Hawkes, The CAD/CAM Process, Pitman Publishing. David Gibbs, AN INTRODUCTION TO CNC MACHINING, Cassel

MODEL QUESTION PAPER – I

Term : V

Time : 3 hrs

Programme : Diploma in Plastic Technology

Max. Marks : 75

Course : **Computer Aided Design and Manufacturing**

Code : **NIPT401**

**[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. State the advantages of adoptive control.
2. Define CNC.
3. Write short notes on CAD activities.
4. Name types of CAPP.
5. What is AGV?
6. Write down the principle of Ultrasonic machining.
7. What are the components of NC system?
8. What is LASER?

PART – B

9. What is Principle of EDM wire cutting?
10. State the importance of IGES.
11. Name any three graphics standard.
12. What is Master production Schedule?
13. What is CIM?
14. Write short notes on Group technology.
15. Explain Flexible Manufacturing System.
16. List out the benefits of Unconventional Machining.

PART – C

17. A) Write down the components of NC system.

(OR)

B) Explain Wire cut EDM with neat diagram.

18) A) Explain the Shigley's design process.

(OR)

B) Write down any 5 G code and M code.

19. A) Write short notes on

i. Manufacturing resource planning (MRP-II)

ii. Enterprise Resources Planning (ERP).

(OR)

B) Explain concept of Variant type CAPP.

20) A) Explain CMM with neat sketch

(OR)

B) Discuss the basic components of ROBOT

21) A) Explain EDM with neat sketch

(OR)

B) Explain Laser beam machining and discuss its application and advantages

MODEL QUESTION PAPER – II

Term : V

Time : 3 hrs

Programme : Diploma in Plastic Technology

Max. Marks : 75

Course : **Computer Aided Design and Manufacturing**

Code : **NIPT401**

**[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

- 1) What is IGES?
- 2) What are the types of turning center?
- 3) Name any two graphics standard.
- 4) What is CIM?
- 5) Define the functions of AGV.
- 6) What are the limitations of EDM?
- 7) Write down the principle of Wire cut EDM.
- 8) State the principle of LASER.

PART – B

- 9) What is adoptive control system?
- 10) Distinguish between NC and DNC.
- 11) Write down any three “M” codes with its function.
- 12) Define MRP-I.
- 13) What are the components of FMS?
- 14) Write short notes on ERP.
- 15) State the applications of ROBOT.
- 16) What is plasma? How it helps to machine?

PART – C

17) (a) Explain the construction and working principle of Wire cut EDM.

(Or)

(b). Explain with neat sketch of vertical Machining center.

18) (a).Write simple program for Circular core.

(Or)

(b).Explain geometric modeling technique.

19) (a).Explain variant CAPP with neat sketch.

(Or)

(b).Explain JIT and MRP-II.

20) (a).Explain Components of ROBOT and its applications.

(Or)

(b).Explain CMM with neat sketch.

21) (a) Explain construction and working of ultrasonic Machining.

(Or)

(b) Explain with neat sketch of ECM.

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : NIPT402
Term V
Course Name : ELECTIVE THEORY – I
PLASTICS PRODUCT AND MOULD DESIGN

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS PRODUCT AND MOULD DESIGN	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	MOULD DESIGN FUNDAMENTALS	15
2	EJECTION SYSTEM & FEED SYSTEM	15
3	PARTING SURFACE & COOLING SYSTEM	15
4	MOULD TYPES	15
5	PRODUCT DESIGN	15
	Total	75

RATIONALE: With the rapid expansion of Industries such as Pharmaceutical industries, Food industries and Automobile industries the demand for all these, technologists also increases. This specialized subject makes students aware about design and manufacturing of moulds.

OBJECTIVES: On successful completion of the course, the student will be able to:

- ❖ Identify the various mould components and their design procedure for injection mould for a particular application.
- ❖ Acquire knowledge about various types of ejection system and feed system for injection mould.
- ❖ Understand the mould cooling circuit design for injection mould for a particular product.
- ❖ Know the various types of injection mould for a particular plastic moulding.
- ❖ Familiarize the plastic product design procedure for a particular application.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	<p>MOULD DESIGN FUNDAMENTALS</p> <p>Mould materials - Ferrous - Non ferrous mould - Steel requirements. General mould construction - Basic terminology and mould construction. <i>Cavity</i> and core - Integer cavity- Integer core – Insert cavity – Insert core – Methods of Fitting Inserts. Bolster – Types of bolsters. Guide pillar and Guide bush – Types of Guide pillar and Guide bushes- Standard Guide pillar and Guide bush – Spigotted Guide pillar and Guide bush - Pull-back type Guide pillar and Guide bush – Function of Guide pillars – Positioning of guide pillars. Sprue bush – Spherical seating Sprue bush – Flat seating Sprue bush. Register ring – Sprue bush mounted register ring – Front plate mounted register ring. Mould plate fastening.</p>	15
II	<p>EJECTION SYSTEM & FEED SYSTEM</p> <p>Design features of Ejection mechanism – Ejector grid - Types of Ejector grid - Ejector plate assembly - Actuation of Ejector plate assembly return system. Types of Ejection - Pin Ejection - Stepped Ejection pin - “D” shaped Ejection pin - Sleeve Ejection - Blade ejection - Valve Ejection - Air Ejection - Stripper plate Ejection - Actuation of stripper plates - Double Ejection. Sprue Pullers.</p> <p>Design of Feed system - Sprue - Runner - Runner cross section shape - Runner size - Runner Layout - Balancing of runners. Design of gate system - Gates – Positioning of gates – Balancing of gates - Types of</p>	15

	gate - Sprue gate - Edge gate - Overlap gate - Fan gate - Tab gate - Diaphragm gate - Ring gate - Film gate - Pin point gate - Submarine gate - Winkle gate.	
III	PARTING SURFACE & COOLING SYSTEM Parting surface – Flat parting surface – Non-Flat Parting surface - Stepped parting surface – Profiled parting surface – Angled parting surface - Complex edge forms. Design of cooling system - Cooling of Integer type cavity plate - “U” circuit - Rectangular circuit - “Z” circuit. Cooling of Integer type core plate - Angle hole system - Baffled straight hole system - Stepped circuit. Bolster Cooling. Cooling of Insert type cavity plate - Rectangular cavity insert - “U” circuit - Copper pipe system. Circular cavity Insert - Coolant annuals method – Coolant sleeve method. Cooling of Insert type core plate- Cooling shallow core inserts - Deep chamfer system - Baffled hole system - Bubbler system - Spiral plug system.	15
IV	MOULD TYPES Types of injection moulds - General arrangement of Two plate and Three plate moulds - Single-impession moulds - Multi-impession moulds - Single-daylight moulds - Multi-daylight moulds - Under feed moulds. Split mould – External undercut components – Splits – Sliding Splits – Guiding and Retention of Splits – Mould plate Designs – Split designs. Actuation techniques of split mould – Finger cam actuation – Dog leg cam actuation – Cam track actuation – Spring actuation – Hydraulic actuation. Standard Mould Systems -Advantages- Limitations.	15
V	PRODUCT DESIGN Need for plastics product design. Design process. General product design - Wall thickness – Parting lines - Parting line mismatch – Parting line Lip design – Location of Ejection pins – Aesthetic parts – Design of Flow and shape - Ribs - Bosses - Gussets - Radii - Fillets – Draft – Holes - Threaded holes – Drilled and Tapped holes - Coring – Venting - Tolerance. Undercuts - Internal – External. Types of thread fits – Moulded thread design – Tapped thread design. Inserts – Materials for Inserts – Shapes of Male and Female Inserts – Effect of Inserts on Mould strength- Location of inserts in the Part - Pressed Inserts – Metal stamping type Inserts – Plastic Inserts.	15

Text Book:

1. Injection mould design - R.G.W. Pye
2. Plastic mould engineering handbook - J. Harry Dubois & Waying I. Prible

Reference Book:

1. Injection mould design fundamentals - Glanvil Denton
2. Product Design - Ronald D. Beck

MODEL QUESTION PAPER - I

Term : V

Time : 3Hrs

Programme : Diploma in Plastic technology

Max.Marks : 75

Course : Plastics Product and Mould Design

Code : **N1PT402**

**[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. What is meant by Cavity?
2. Define the term “Ejector Grid”.
3. What is meant by “Stepped parting surface”?
4. Write the necessary of split mould.
5. Define the term “Gussets”.
6. Write the functions of “bolster”.
7. What is meant by “runner”?
8. Write the importance of cooling system in an injection mould.

PART – B

9. Explain the functions of Guide pillar and Guide bush.
10. Write short notes on “Sprue pullers”.
11. Explain the construction of baffled straight hole cooling system.
12. What do you understand about “under feed mould”?
13. Write the functions of “venting”.
14. Explain the construction of “multi-daylight mould”
15. Write short notes on “ribs”
16. Explain the importance of “register ring”.

PART – C

17. (a) Write short notes on (i) Spigotted Guide pillar and Guide bush (ii) Spherical seating sprue bush.

(OR)

(b) Write short notes on (i) Positioning of Guide pillars. (ii) Sprue bush mounted register ring.

18. (a) Explain the following (i) Ejector Grid (ii) Ejector plate assembly.

(OR)

(b) Explain the following (i) Edge gate (ii) Diaphragm gate.

19. (a) With neat sketch, explain the construction and working of principle profiled parting surface.

(OR)

(b) Explain any two methods for cooling of integer type core plate.

20. (a) Explain the Finger cam actuation of split mould with neat diagram.

(OR)

(b) Explain the Construction of three plate mould with neat diagram.

21. (a) Write notes on (i) Pressed threads (ii) Bosses

(OR)

(b) Write notes on (i) Undercuts (ii) Types of thread fits.

MODEL QUESTION PAPER - II

Term	: V	Time	: 3Hrs
Programme	: Diploma in Plastic technology	Max.Marks	: 75
Course	: Plastics Product and Mould Design	Code	: N1PT402

**[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

- 1) What is meant by Integer cavity?
- 2) What is meant by “Sprue”?
- 3) Define the term “Parting Surface”.
- 4) Define the term “Single day-light mould”
- 5) What is meant by “Parting line”.
- 6) Write the importance of insert cavity.
- 7) What is meant by “Splits”?
- 8) Define the term “draft”.

PART – B

- 9) What are the functions of guide pillars?
- 10) Explain the importance of positioning of gates.
- 11) Explain the roll of profiled parting surface in injection mould.
- 12) What do you understand about “under feed mould”?
- 13) Write short notes on “pressed inserts”.
- 14) Write the functions of bolster.
- 15) Write the advantages of standard mould systems.
- 16) Explain the importance of balancing of gates.

PART – C

17) (a). Explain the different types of Sprue bushes with neat diagram.

(OR)

(b). Explain the different types of types of guide pillar and guide bushes with neat diagram.

18) (a). Write short notes on (i) Runner cross sectional shape (ii) Balancing of runners.

(OR)

(b). Explain any three types of gates with neat diagram.

19) (a). Explain the different methods of cooling for Integer type cavity plates.

(OR)

(b). Explain the different methods of cooling for Integer type core plates.

20) (a). Explain the finger cam actuation of split mould with neat diagram.

(OR)

(b). Explain the dog leg cam actuation of split mould with neat diagram.

21) (a). Write short notes on (i) Ribs (ii) Bosses (iii) Gussets.

(OR)

(b). Explain the different types of holes produced in plastic products.

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VIRUDHUNAGAR – 626 001**

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1PT403
Term : V
Course Name : ELECTIVE THEORY – I ROBOTICS

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
ROBOTICS	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	FUNDAMENTALS OF HYDRAULICS	15
2	HYDRAULIC SYSTEMS	15
3	FUNDAMENTALS OF PNEUMATICS	15
4	PNEUMATIC SYSTEMS	15
5	FUNDAMENTALS OF ROBOT TECHNOLOGY	15
	Total	75

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	FUNDAMENTALS OF HYDRAULICS Introduction – Advantages and Disadvantages of Hydraulic system - Major properties and types of hydraulic fluids - construction and operation of hydraulic press and hydraulic jack - The construction and	15

	operation of weight loaded, spring loaded type accumulators - Gas filled accumulator - the advantages and disadvantages of each type - Construction of single acting intensifier.	
II	HYDRAULIC SYSTEMS Fluid power pumps – External and internal gear pump, Vane pump, Radial piston pump – ISO symbols for hydraulic components – Hydraulic actuators – Cylinders and motors – Valves – Pressure control valves, Flow control valves and direction control valves – types – including 4/2 DCV and 4/3 DCV – their location in the circuit.	15
III	FUNDAMENTALS OF PNEUMATICS Pneumatic Systems – elements – filter – regulator - lubricator unit - pressure control valves - pressure relief valves - pressure regulation valves - directional control valves - 3/2 DCV - 5/2 DCV – 5/3 DCV flow control valves – throttle valves –shuttle valves – quick exhaust valves –ISO symbols of pneumatic components	15
IV	PNEUMATIC SYSTEMS Pneumatic circuits – direct control of single acting cylinder – operation of double acting cylinder – operation of double acting cylinder with metering-in control – operation of double acting cylinder with metering-out control – use of shuttle valve in pneumatic circuits – use of quick exhaust valve in pneumatic circuits - automatic operation of double acting cylinder single cycle – multiple cycle – merits and demerits of pneumatic system - applications.	15
V	FUNDAMENTALS OF ROBOT TECHNOLOGY Introduction – History of robot - Definitions-Robot Anatomy – Basic configuration of Robotics – Robot Components – Manipulator, End effector, Driving system, Controller and Sensors. Mechanical arm – Degrees of freedom – Links and joints – Types of joints – Joint notation scheme – Pitch, Yaw, Roll – Classification of robots – Work envelope, Work Volume – Effect of structure on Control ,Work envelop and Work volume. Introduction to ABB robot.	15

Text Books:

1. Hydraulics and Hydraulic machines - R.S. Khurmi
2. Hydraulics and fluid mechanism - Dr. Jagdishlal

Reference Books:

3. Oil Hydraulics Manual - B. Lal
4. Hydraulic and pneumatic power for production - Harry steward
5. Pneumatic System – Majumdar

MODEL QUESTION PAPER - I

Term : V

Time : 3Hrs

Programme : Diploma in Plastic technology

Max.Marks : 75

Course : **ROBOTICS**

Code : NIPT403

**[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. What is Hydraulic system?
2. What is Fluid Power pump?
3. What is FRL unit?
4. .What is Single acting cylinder?
5. .Define Robot.
6. Mention major properties of Hydraulic fluids.
7. What is meter-in control?
8. Mention Robot Components

PART – B

9. Mention major properties of Hydraulic fluids.
10. What is Fluid Power pump?
11. Write the uses of Pressure control valves.
12. Write the function of quick exhaust valve.
13. What is meter-in control?
14. Draw the ISO symbol for any one Pneumatic component.
15. List out Pressure relief valves.
16. What is mean by Work envelop?

PART – C

Answer all the questions

17. (a) Explain with neat sketch Hydraulic Jack.
(OR)
(b) Explain the types of Accumulator with neat sketch.
18. (a) Explain the External Gear Pump with neat sketch
(OR)
(b) Describe any 2 types of DCV.
19. (a) Explain the Any one type of Pressure Control Valve.
(OR)
(b) Draw the various ISO symbols of Pneumatic Components.
20. (a) Discuss the operation of Double acting Cylinder.
(OR)
(b) Discuss the merits and demerits of Pneumatic system.
21. (a) Explain the basic configuration of a robot with a neat sketch.
(OR)
(b) Describe the robot components.

MODEL QUESTION PAPER - II

Term : V Time : 3Hrs
Programme : Diploma in Plastic technology Max.Marks : 75
Course : **ROBOTICS** Code : **NIPT403**

**[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Mention major properties of Hydraulic fluids.
2. Define Accumulator.
3. What is meant by Single acting Intensifier?
4. Write the uses of Pressure control valves.
5. Mention any 2 types of DCV.
6. Write the applications of flow control valves.
7. Write the function of quick exhaust valve.
8. Draw the ISO symbol for any one Pneumatic component.

PART – B

9. List out Pressure relief valves.
10. Write the merits of Pneumatic system.
11. Write the important applications of Pneumatic system.
12. Classify the Robots.
13. What is mean by Work enveloping?
14. Write the significance of Accumalator.
15. What is the function of DCV Valves
16. Write the merits of Pneumatic system.

PART – C

17. (a) Explain with neat sketch Hydraulic Press.
(OR)
(b) Explain the construction of single acting Intensifier.
18. (a) Explain the Internal Gear Pump with neat sketch
(OR)
(b) Describe any 2 types of Direction control valves
19. (a) Explain the Any one type of Flow valve.
(OR)
(b) Draw the various ISO symbols of Pneumatic Components.
20. (a) Discuss the operation of Single Double acting Cylinder.
(OR)
(b) Discuss the merits and demerits of Pneumatic system.
- 21 (a) Explain the basic configuration of a robot with a neat sketch.
(OR)
(b) Write notes on ABB Robot.

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course Code : NIPT310
Term : V
Course Title : PLASTICS MOULD MAKING PRACTICAL-I

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per term: 15 weeks

Course	Instruction		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS MOULD MAKING PRACTICAL-I	5	75	Internal Assessment	Autonomous End Examination	Total	3 Hrs
			25	75	100	

OBJECTIVE:

- Study on machines available in plastic tool room.
- Study on measuring instruments available.
- Study about mould and its components
- Design mould for given component
- Design and drawing each mold element like sprue bush, retainer plate, guide pin, guide bush etc
- Selection of suitable machines for machining each.
- Machine one mould elements.
- Check for dimensions using measuring instruments.
- Machine all the mould elements.
- Assembling the elements.

LIST OF EXPERIMENTS

CYCLE: 1. MAKING OF HAND INJECTION MOULD

1. Machining of insert core plate
2. Machining of insert cavity plate
3. Machining of core/cavity retainer plate.

CYCLE:2. MAKING OF HAND COMPRESSION MOULD

4. Machining of integer core plate
5. Machining of integer cavity plate
6. Machining of Guide Pillar.
7. Machining of Guide Bush.

CYCLE: 3.MOULD ELEMENTS ASSEMBLY

8. Machining of Sprue Bush.
9. Machining of Register Ring.
10. Engraving of Letters and Numbers on mould plates (Forward & Reverse).
11. Assembly of HAND INJECTION MOULD AND COMPRESSION MOULD using the above mould components. **(Not for End Exam).**
12. Study on CNC Machines(Lathe and Milling) **(Not for End Exam)**

LIST OF EQUIPMENTS (Per batch 30 students)

- | | |
|---------------------------------|--------------|
| 1. Lathe | : 2 Nos |
| 2. Shaper | : 2 Nos |
| 3. Drilling machine | : 1 No |
| 4. Horizontal Milling machine | : 1 No |
| 5. Vertical Milling machine | : 1 No |
| 6. Surface Grinding machine | : 1 No |
| 7. Cylindrical Grinding machine | : 1 No |
| 8. Slotter | : 1 No |
| 9. Pantograph Engraving machine | : 1 No |
| 10. Measuring instruments | : Sufficient |

END EXAMINATION

NOTE:

Examiner should set the question paper to cover the complete syllabus. Examiner has to ask the student to answer any one question from the lot of 10 experiments (From experiments 1 to 10). Examiner has to set the no. of questions minimum 10 even one batch of students contains less than 10.

Record note book should be submitted during examination

ALLOCATION OF MARKS

Part- A

Mould Making : 70 Marks

Part- B

Viva voce : 05 Marks

TOTAL

: 75 Marks

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : NIPT311
Term : V
Course Name : PLASTICS PROCESSING PRACTICAL –II

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per term: 15 weeks

Course	Instruction		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS PROCESSING PRACTICAL –II	4	60	Internal Assessment	Autonomous End Examination	Total	3 Hrs
			25	75	100	

OBJECTIVES:

All the experiments should be completed and given for the end term practical examination.

- ❖ The external examiners are requested to ensure that a single experimental question should not be given to more than eight students while admitted a batch of 30 students during Autonomous Examinations.

LIST OF EXPERIMENTS

1. Operation on Automatic Blow Molding Machines.
2. Operation on Automatic Vacuum forming machines
3. Operation on Automatic Pressure forming Machines.
4. Operation on Automatic Pipe extruder.
5. Operation on Automatic Blown Film Extrusion Machines.
6. Operation on Automatic Pad printing machines
7. Operation on Ultrasonic welding
8. Operation on FRP hand layup process.
9. Operation on Reprocessing Unit
10. Operation on Compression moulding machine

LIST OF EQUIPMENTS (Per batch 30 students)

1. Automatic Blow Molding Machine - **01 No.**
2. Automatic Blown Film Extrusion Machines-**01 No.**
3. Automatic Vacuum forming machines- **01 No.**
4. Automatic Pressure forming Machines- **01 No.**
5. Automatic Pipe extruder- **01 No.**
6. Automatic Pad printing machines- **01 No.**
7. Ultrasonic welding- **01 No.**
8. Compression moulding machine- **01 No**
9. Automatic mould- **03 Nos.**
10. Sample sheet metal mould for making FRP products -**02 Nos**

END EXAMINATION

Note: All the exercises have to be completed..

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination

ALLOCATION OF MARKS

PART- A:

(70 Marks)

PART-A	Aim	20 Marks
	Tools Used	
	Working Principle	
	Machine and mould Drawing	40 Marks
	Procedure	
	Good Components produced	10 Marks
	Calculation and Trouble Shooting	

PART-B: VIVA VOCE

(5 Marks)

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N1 - SCHEME

(Implements from the Academic year 2019-2020 onwards)

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1PT406
Term : V
Course Name : ELECTIVE PRACTICAL – 1
PLASTICS MOULD DESIGN DRAWING PRACTICAL - I

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS MOULD DESIGN DRAWING PRACTICAL - I	6	90	Internal Assessment	End Examination	Total	8 Hrs.
			25	75	100	

OBJECTIVES: *On successful completion of the course, the student will be able to:*

- ❖ Understand the single cavity injection mould design for a particular application.
- ❖ Ability to design of multi cavity injection mould.
- ❖ Know the design procedure of under feed mould for a particular product.
- ❖ Familiarize the design method of split mould for a external undercut product.

LIST OF EXPERIMENTS

1. Mould basic components drawing: Guide pillar and Guide bush.
2. Mould basic components drawing: Sprue Bush.
3. Mould basic components drawing: Register Ring.
4. Mould basic components drawing: Screws and Dowels.
5. Mould basic components drawing: Ejection assembly.
6. Hand Injection mould for given product.
7. Design of Two-plate single cavity injection mould.
8. Design of Two-plate multi cavity injection mould with ejection system.
9. Design of mould for the Given product No: 1
10. Design of Three plate / Under feed mould.
11. Design of Spilt mould with actuation system.
12. Design of mould for the Given product No: 2

LIST OF EQUIPMENTS (Per batch 30 students)

1. UNIVESAL DRAFTING MACHINE – 30 No"s

END EXAMINATION

Note to the examiner:

1. Duration of examination is 8 hours.
2. Examiner should set the question paper covering only from experiment 7 to 12.
3. Students should choose any one of the above experiments from 7 to 12 as a lot and answer as per the requirements of the question paper.

ALLOCATION OF MARKS

Part A

Mould design calculation :10 Marks

Part B

Elevation (or) Sectional elevation :25 Marks

Part C

Plan I :15 Marks

Part D

Plan II (or) Inverted Plan :15 Marks

Part E

Title Block & Bill of Materials :05 Marks

Part F

Viva voce :05 Marks

TOTAL :75 Marks

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course Code : NIPT407
Term : VI
Course Title : ELECTIVE PRACTICAL – 1 ROBOTICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per term: 15 weeks

Course	Instruction		Examination			Duration
	Hours / Week	Hours / Term	Marks			
ROBOTICS PRACTICAL	6	90	Internal Assessment	Autonomous End Examination	Total	3 Hrs
			25	75	100	

OBJECTIVES:

- All the experiments should be completed and given for the end term practical examination.
- ❖ The external examiners are requested to ensure that a single experimental question should not be given to more than eight students while admitted a batch of 30 students during Autonomous Examinations.

DETAILED SYLLABUS

LIST OF EXPERIMENTS

1. Jogging Robot online and offline.
2. Position recording using Cartesian coordinate system and Polar coordinate system
3. Pick and place the round & square object – No. of objects to be specified
4. Machining loading and unloading with time delay using online program
5. Determination of robot work volume
6. Online program using teach target
7. Offline program using teach target
8. Writing intermittent program using wait command
9. Writing program using digital outputs
10. Writing program using digital inputs

LIST OF EQUIPMENTS (Per batch 30 students)

1. ABB Robot – 1 No With accessories

END EXAMINATION

Note: All the exercises have to be completed. Two exercises will be given for examination by selecting one exercise from Pneumatics Lab. And one from Hydraulics lab.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination

ALLOCATION OF MARKS

Part A :	70 Marks
Any one experiment from the above. The students can choose as a lot	
Part B: Viva voce	5 Marks
TOTAL	75 Marks

VSVNPC

VI TERM

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1PT306

Term : VI

Course Name : TESTING OF PLASTICS

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
TESTING OF PLASTICS	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
I	IDENTIFICATION OF PLASTICS	15
II	TEST SPECIMEN PREPARATION AND TESTING OF MECHANICAL PROPERTIES OF PLASTICS	15
III	THERMAL, FLAMMABILITY AND OPTICAL PROPERTIES OF PLASTICS	15
IV	ELECTRICAL, WEATHERING AND CHEMICAL PROPERTIES OF	15
V	PRODUCT TESTING	15
	Total	75

RATIONALE:

In this subject the basic methods by plastics identification are detailed to make the students to be knowledgeable in various methods of identification. This subject also covers different properties of polymers namely mechanical properties, thermal properties, optical properties, Electrical properties and chemical properties also the methods by which these properties can be determined.

This subject also deals with different tests that can be performed to products like pipes, containers, foams, hoses, belts and laminates.

This subject will definitely help the students to operate various testing equipments.

OBJECTIVES:

On completion of the units of syllabus contents the students must be able to know about

- Identification of plastics by Simple physical preliminary tests and by detection of elements present in the plastics.
- Confirmation of plastics by chemical analysis.
- Significance and method of determination Analytical tests like Specific gravity, Density, Water absorption, Moisture analysis, Melting point and Solubility.
- Specifications, standards and their importance.
- Principle, test procedure, standards used, significance and the factors affecting the various mechanical properties of plastics like Short-term mechanical properties, Long-term mechanical properties and Mechanical properties of surfaces.
- Principle, test procedure, standards used, significance and the factors affecting the various thermal properties and flammability tests.
- Principle, test procedure, standards used, significance and the factors affecting the Optical properties of plastics.
- Electrical properties, weathering properties, Chemical properties their Principle, test procedure, standards used, significance and the factors affecting the tests.
- Significance of product testing.

Product Testing methods and their importance of Pipe testing, plastic packages, Laminates / Multilayer films, Blow moulded containers and cellular materials

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	<p>IDENTIFICATION OF PLASTICS</p> <p>Identification of plastics - Simple physical preliminary tests like visual examination, heating and softening behavior, floatation test, cutting with knife, scratching with nail, bending, tearing and dropping sound test. Burning tests - Nature of flame, odour, speed of burning, smoke and other characteristics - Detection of elements by Copper wire test (Beilstein test) and Sodium fusion extract test – Confirmation of plastics by chemical analysis.</p> <p>Analytical tests: Specific gravity - Density - Water absorption - Moisture analysis - Melting point - Significance and method of determination.</p>	(15 Hours)
II	<p>TEST SPECIMEN PREPARATION AND TESTING OF MECHANICAL PROPERTIES OF PLASTICS</p> <p>Importance of testing - Test specimen preparation of plastics - Equipments used for preparation - Standards (Brief idea only) - Conditioning procedure.</p> <p><u>Mechanical Properties:</u></p> <p>Short-term mechanical properties:</p> <ol style="list-style-type: none"> 1. Tensile strength - Stress curve - Equipment and procedure –Factors affecting tensile Strength. 2. Impact strength (Izod, Charpy and falling weight impact tests only) <p>Long-term mechanical properties:</p> <ol style="list-style-type: none"> 1. Creep - Equipment and procedure - Factors affecting creep. <p>Mechanical properties of surfaces:</p> <ol style="list-style-type: none"> 1. Measurement of Hardness (Rock well only) - Factors affecting Hardness. 2. Abrasion - Taber abrasion - equipment and procedure. 	(15 Hours)
III	<p>THERMAL, FLAMMABILITY AND OPTICAL PROPERTIES OF PLASTICS</p> <p>Thermal properties: Co efficient of thermal expansion - Determination of temperature of deflection under load -Heat distortion Temperature (HDT) - Vicat Softening Point (VSP) - Melt Flow Index (MFI) - Significance and method of determination</p> <p>Flammability tests: Flammability test for flexible plastics - Flammability test for self-supporting plastics - Oxygen Index Test -</p>	(15 Hours)

	<p>Critical Oxygen Index -Method of determination of critical Oxygen Index (COI) value only</p> <p>Optical properties: Luminous Transmittance - Haze – Gloss - Definitions and method of determination.</p>	
IV	<p>ELECTRICAL, WEATHERING AND CHEMICAL PROPERTIES OF PLASTICS</p> <p>Electrical properties: Introduction - Requirements of an insulator - Di-electric strength - Measurement of Di-electric strength - Factors affecting Di-electric strength. Di-electric constant and dissipation factor - Measurement of Di-electric constant-Arc resistance - Measurement of Arc resistance</p> <p>Weathering properties: Accelerated weathering test - Outdoor weathering test - Significance and measurement.</p> <p>Chemical properties: Immersion test - Stain resistance test - Solvent stress cracking resistance - Environmental Stress Cracking Resistance (ESCR) - Significance and method of determination.</p>	(15 Hours)
V	<p>PRODUCT TESTING</p> <p>Testing of plastic products - Significance of product testing. Pipe testing - PVC and HDPE Pipes - Test methods. Plastic packages -Rigid - Semi rigid and Flexible packages - General test methods. Laminates / Multilayer films - Parameters for acceptance. Testing of Blow moulded containers. Testing of cellular materials - Rigid foam test methods and flexible foam test methods.</p>	(15 Hours)

TEXT BOOK:

1. Vishu shah - Handbook of Plastic Testing Technology – Wiley Inter-science Publications - 1998

REFERENCES:

1. A.S. Athalye–Identification and testing of plastics - Multitech publishers - 1992.
2. How to identify plastics - CIPET Publication- 2003.
3. Paul Kluckow-Rubber and Plastics Testing – Chapman & Hall, London – 1963.
4. L.E.Nielsen -Mechanical properties of Plastics – Reinhold, New York – 1962.
5. J.H.Collins -Testing and Analysis of Plastics – Plastics Institute – 1955.
6. R. P. Brown - Handbook of plastic testing methods - 1971
7. M.E.Baird - Electrical Properties of polymeric materials – Plastics and Rubber Institute, London – 1973.

MODEL QUESTION PAPER - I

Term : VI
Programme : Diploma in Plastic Technology
Course : **TESTING OF PLASTICS**

Time : 3Hrs
Max. Marks : 75
Code : **N1PT306**

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.

Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A

1. What is the need for Identification?
2. Define Hardness.
3. Define MFI. Give its unit
4. Write the requirements of an Insulator.
5. Give the significance of Product Testing.
6. What is Floatation test?
7. Name the various Standards used in Testing.
8. What is Luminous Transmittance?

PART – B

9. Write the various parameters to be observed during Burning Test
10. Give the difference between Izod and Charpy Impact tests.
11. Define Co efficient of Thermal Expansion. Give its unit
12. Write the determination of ARC Resistance.
13. Narrate the various tests for Laminates.
14. Write a note on Pyrolysis test. Give its significance.
15. Define Creep. State the factors affecting test results.
16. Write the measurement of WVTR.

PART – C

- 17 (a). Explain the preliminary and confirmatory tests to identify (i) HDPE (ii) PC
(OR)
(b). Write the significance and explain any one method of determination of Moisture content
- 18 (a). Discuss in detail determination of Tensile properties
(OR)
(b). Discuss the determination of Abrasion Resistance.
- 19 (a). Define Heat Deflection Temperature and explain the method of determination
(OR)
(b). Discuss the determination of COI with a neat sketch
- 20 (a). Define Di-electric strength and explain the method of determination.
(OR)
(b). Explain the determination of ESCR.
- 21 (a) Explain the various tests performed to assess the quality of PVC Pipes.
(OR)
(b) Discuss the various tests for Blow moulded containers.

MODEL QUESTION PAPER - II

Term : VI
Programme : Diploma in Plastic Technology
Course : **TESTING OF PLASTICS**

Time : 3Hrs
Max. Marks : 75
Code : **N1PT306**

- [**N.B.**: (1) Answer any **FIVE** Questions in each **PART – A** and **PART – B**.
Q.No. 8 in **PART – A** and Q.No. 16 in **PART – B** are compulsory.
(2) Answer division (a) or division (b) of each question in **PART – C**.
(3) Each question carries 2 Marks in **PART – A**, 3 Marks in **PART – B**
and 10 Marks in **PART – C**.]

PART – A

1. What is the need for floatation test?
2. Define Abrasion resistance.
3. Define HDT. Give its unit
4. Write the requirements of an Insulator.
5. What is short term Hydraulic test?
6. Define Density. Give the significance of the test.
7. Name the various Standards used in Testing.
8. What is Gloss?

PART – B

9. Write the preparation of Sodium Fusion Extract.
10. Give the differences between Izod and Charpy impact tests.
11. Explain briefly the flammability tests for Flexible Plastics.
12. Write the determination of Arc Resistance
13. Name the various tests performed to assess the quality of Rigid foams
14. Define Melting point. Write the significance of the test.
15. Write the measurement of Gloss.

16. Write short notes on Stain resistance test.

PART – C

17 (a). Explain the preliminary and confirmatory tests to identify (i) PMMA (ii) PF

(OR)

(b). Write the significance and explain any one method of determination of Specific Gravity.

18 (a). Discuss in detail the determination of Creep.

(OR)

(b). Discuss the determination of Hardness.

19 (a). Define MFI and explain the method of determination

(OR)

(b). Discuss the determination of COI with a neat sketch

20 (a). Define Di-electric strength and explain the method of determination.

(OR)

(b). Explain the determination of ESCR.

21 (a) Explain the various tests performed to assess the quality of Blow moulded containers

(OR)

(b) Discuss the various tests for Flexible packages.

N1 - SCHEME

Programme : **DIPLOMA IN PLASTIC TECHNOLOGY**
Course Code : **N1PT404**
Term : **VI**
Course Title : **INDUSTRIAL ENGINEERING AND MANAGEMENT**

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per term: 15 weeks

Course	Instruction		Examination			Duration
	Hours / Week	Hours / Term	Marks			
INDUSTRIAL ENGINEERING AND MANAGEMENT	5	75	Internal Assessment	Autonomous End Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	Hours
I	PLANT ENGINEERING	15
II	WORK STUDY, METHOD STUDY AND WORK MEASUREMENT	15
III	PRODUCTION PLANNING AND QUALITY CONTROL	15
IV	PRINCIPLES OF MANAGEMENT AND PERSONNEL MANAGEMENT	15
V	FINANCIAL MANAGEMENT AND MATERIAL MANAGEMENT	15
	Total	75

RATIONALE:

In the Indian Economy, Plastics Industries and Enterprises always find prominent place. After globalization, the students should be trained not only in manufacturing processes but also in managing activities of plastic industries. The knowledge about plant, safety, work study techniques, personnel management and financial management will definitely mould the students as managers to suit the industries.

OBJECTIVES:

- To study different types of layout.
- To study safety aspects and its impacts on an organization.
- To study different work measurement techniques.
- To study production planning and control and its functions.
- To study basic and modern management techniques.
- To study the staff selection procedure and training of them.
- To study capital and resources of capital.
- To study inventory control system.
- To study about organization and its behavior.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	<p>PLANT ENGINEERING AND PLANT SAFETY</p> <p>Plant Engineering – Selection of site of industry – Plant layout –Principles of a good layout – types – process, product and fixed position –techniques to improve layout – Principles of material handling equipment – Plant maintenance – importance – Break down maintenance, preventive maintenance and scheduled maintenance.</p> <p>Plant Safety: Importance –accident-causes and cost of an accident-accident proneness-prevention of accidents-Industrial disputes-settlement of Industrial disputes-Collective bargaining, conciliation, Mediation, arbitration-Indian Factories Act 1948 and its provisions related to health, welfare and safety</p>	15
II	<p>WORK STUDY, METHOD STUDY AND WORK MEASUREMENT</p> <p>Work Study: Productivity – Standard of living – method of improving productivity – Objectives – Importance of good working conditions.</p> <p>Method Study: Definition – Objectives – Selection of a job for method study – Basic procedure for conduct of method study – Tools used – Operation process chart, Flow process chart, two handed process chart, Man machine chart, String diagram and flow diagram.</p> <p>Work Measurement: Definition – Basic procedure in making a time study – Employees rating factor – Application of time allowances – Rest, Personal, Process, Special and Policy allowances – Calculation of standard time – Problems – Basic concept of production study – Techniques of work measurement-Ratio delay study, Synthesis from standard data, analytical estimating and Pre determined Motion Time System (PMTS).</p>	15
III	<p>PRODUCTION PLANNING AND QUALITY CONTROL</p> <p>Production Planning and Control: Introduction – Major functions of production planning and control – Pre planning – Methods of forecasting – Routing and scheduling – Dispatching and controlling– Concept of Critical Path Method (CPM)-Description only. Production – types-Mass production, batch production and job order production- Characteristics – Economic Batch Quantity (EBQ) – Principles of product and process planning – make or buy decision</p> <p>Quality Control: Definition – Objectives – Types of inspection – First piece, Floor and centralized inspection – Advantages and disadvantages. Quality control – Statistical quality control – Types of measurements – Method of variables – Method of attributes – Uses of X, R, p and c charts – Operating Characteristics curve (O.C curve) – Sampling inspection – single and double sampling plan – Concept of ISO 9001:2008 Quality Management System Registration Certification procedure – Benefits of ISO to the organization</p>	15

IV	<p>PRINCIPLES, PERSONNEL MANAGEMENT AND ORGANIZATIONAL BEHAVIOR</p> <p>Principles of Management: Definition of management – Administration - Organization – F.W. Taylor’s and Henry Fayol’s Principles of Management – Functions of Manager – Types of Organization – Line, Staff, Taylor’s Pure functional types – Line and staff and committee type – Directing – Leadership - Styles of Leadership – Qualities of a good leader – Motivation – Positive and negative motivation –Modern management techniques- Just In Time – Total Quality Management (TQM) – Quality circle – Zero defect concept – 5S Concept-Management Information Systems-strategic management-SWOT analysis-Business Process Re-engineering(BPR)-enterprise resource planning(ERP)- Activity Based Management (ABM) – Global Perspective –principle and brief description. Principles and brief description.</p> <p>Personnel Management: Responsibility of human resource management – Selection procedure – Training of workers – Apprentice training – On the job training and vestibule school training – Job evaluation and merit rating – objectives and importance – wages and salary administration – Components of wages – Wage fixation – Type of wage payment – Halsey’s 50% plan, Rowan’s plan and Emerson’s efficiency plan – Problems.</p> <p>Organizational behavior: Definition – organization--Types of Organization – Line, Staff, Taylor’s Pure functional types – Line and staff and committee type – Organizational Approaches, individual behavior—causes—Environmental effect—Behavior and Performance, Perception-organizational implications.</p>	15
V	<p>FINANCIAL MANAGEMNT AND MATERIAL MANAGEMENT</p> <p>Financial Management: Fixed and working capital – Resources of capital – shares preference and equity shares – debentures – Type of debentures – Public deposits, Factory costing – direct cost – indirect cost – Factory overhead – Selling price of a product – Profit – Problems. Depreciation – Causes – Methods - Straight line, sinking fund and percentage on diminishing value method – Problems.</p> <p>Material management: Objectives of good stock control system – ABC analysis of inventory – Procurement and consumption cycle – Minimum Stock, Lead Time, Reorder Level-Economic order quantity problems – Supply Chain Management (SCM) – Introduction – Purchasing procedure – Store keeping – Bin card</p>	15

Text Books:

- 1) Industrial Engineering and Management, O.P. Khanna, Revised Edition Publications (P) Ltd – 2004, 67/4 Madras House, Daryaganj, New Delhi – 110002.
- 2) Engineering Economics and Management, T.R. Banga & S.C. Sharma, McGraw Hill Edition. 2– 2001, New Delhi.
- 3) Herald Koontz and Heinz Wehrich, 'Essentials of Management', McGraw Hill Publishing Company, Singapore International Edition. Latest

Reference Books:

- 1) Management, A global perspective, Heinz Wehrich, Harold Koontz, 10th Edition, McGraw Hill International Edition 1994.
- 2) Essentials of Management, 4th Edition, Joseph L. Massie, Prentice-Hall of India, New Delhi 2004
- 3) S.Chandran, Organizational Behaviours, Vikas Publishing House Pvt. Ltd. Latest
- 4) M.Govindarajan and S.Natarajan, Principles of Management, Prentice Hall of India Pvt. Ltd. New Delhi. Latest.

MODEL QUESTION PAPER-1

Term : VI Time : 3Hrs
Programme : Diploma in Plastic technology Max. Marks: 75
Course : **Industrial Engineering and Management** Code : **N1PT404**

- [N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Name type of maintenance.
2. Write the Basic procedure for method study?
3. What is ISO?
4. Note down the 5S concept
5. What is Depreciation?
6. Write the types of measurement.
7. State the advantages of Method study.
8. What is Collective bargaining?

PART – B

9. Explain any two factors to be considered while selecting Plant location.
10. State the objectives of Work Study.
11. State the Major functions of production planning and Control.
12. Write Short notes on 5S concept
13. What is Shares?
14. Write short notes on Accident proneness.
15. Draw the symbols involved in Operation Process Chart.
16. Differentiate Shares and Debentures.

PART – C

17. (a) What are the different types of plant layout? Explain any two with neat sketches.

(Or)

- (b) State the important Provisions of Factories Act 1948 governing safety & health of workers.

18. (a) With a neat sketch. Explain man type flow process chart.

(Or)

- (b) Write short notes on the following
(i) Ratio delay study (ii) Analytical estimation

19. (a) What is forecasting? Explain the different techniques of forecasting.

(Or)

- (b) Write short notes on
(i) Double sampling plan (ii) OC curve for a simple plan

20. (a) Explain the following
(i) Zero defect concept (ii) Style of leadership

(Or)

- (b) Explain type of organization.

21. (a) Explain by means of a block diagram how the selling price of a product is determined.

(Or)

- (b) Explain ABC analysis.

MODEL QUESTION PAPER-II

Term : VI
Programme : Diploma in Plastic technology
Course : **Industrial Engineering and Management**

Time : 3Hrs
Max. Marks : 75
Code : **NIPT404**

- [N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. What is a Process layout?
2. What do you mean by Process chart?
3. Define PPC.
4. What is routing?
5. What is motivation?
6. Define Debentures
7. Expand ISO.
8. What do you mean by Arbitration,

PART – B

9. Give any Provisions of safety
10. State the objectives of method study.
11. Define Quality control.
12. Define organization.
13. What is meant by lead time?
14. What is standard of living?
15. Give the uses of bincard.
16. Explain any one allowance.

PART – C

17. a) Explain different types of material handling equipments

(OR)

b) State important provisions of factories act 1948 governing welfare and safety

18. a) Discuss two handed process chart

(OR)

b) Discuss procedure for time study

19.

a) Explain major functions of PPC.

(OR)

b) Explain make or buy decision of product planning

20. a) Enumerate various functions of manager.

(OR)

b) Explain 5S concept.

21. a) Discuss how the selling product of a product is arrived?

(OR)

b) Discuss ABC analysis of inventory.

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : NIPT405

Term : VI

Course Name : ELECTIVE THEORY - II

1. PLASTICS MOULD AND DIE DESIGN

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
ELECTIVE THEORY - II PLASTICS MOULD AND DIE DESIGN	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	MOULD FOR SIDE CORE AND SIDE CAVITY, MOULD FOR INTERNAL	15
2	MOULD FOR THREADED COMPONENTS, HOT RUNNER MOULD	15
3	COMPRESSION AND TRANSFER MOULD DESIGN	15
4	EXTRUSION DIE DESIGN	15
5	BLOW MOULD DESIGN, MOULD MAINTENANCE AND SAFETY	15
	Total	75

RATIONALE: With the rapid expansion of Industries such as Pharmaceutical industries, Food industries and Automobile industries the demand for all these, technologists also increases. This specialized subject makes students aware about design and manufacturing of moulds.

OBJECTIVES: On successful completion of the course, the student will be able to:

- ❖ Identify the various injection mould for side core and side cavity for a particular application.
- ❖ Acquire knowledge about various injection mould for threaded components and injection mould for hot runner.
- ❖ Understand the mould design procedure for compression and transfer mould for a particular product.
- ❖ Know the various types of extrusion dies for a particular plastic product.
- ❖ Familiarize the blow mould design procedure for a particular application.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	<p>MOULD FOR SIDE CORE AND SIDE CAVITY, MOULD FOR INTERNAL UNDERCUTS</p> <p><i>MOULD FOR SIDE CORE AND SIDE CAVITY</i></p> <p>Side cores and Side cavities – Principle of Side core – Principle of side cavity. Internal side core (or Side cavity) assembly – Methods of actuation – Finger cam actuation – Dog leg actuation – Spring actuation. External side core (or Side cavity) assembly – Outrigger – Method of actuation – Spring actuation.</p> <p><i>MOULD FOR INTERNAL UNDERCUTS</i></p> <p>Moulding internal undercuts - Form pin – Form pin straight action – Form pin angled action. Split cores – Split cores straight action – Split cores angled action. Stripping external undercuts.</p>	15
II	<p>MOULD FOR THREADED COMPONENTS, HOT RUNNER MOULD</p> <p><i>MOULD FOR THREADED COMPONENTS:</i></p> <p>Moulds for threaded components – component design. Moulds for internally threaded components – Fixed threaded core design – Loose threaded core design – Collapsible core design – Unscrewing mould design – Axially fixed rotating core – Rotating core plus extractor plate – Withdrawing rotating core – Rotating cavity – Layout of impression. Moulds for Externally threaded components – Fixed threaded cavity design – Automating unscrewing – Stripping (Jumping) external</p>	15

	<p>threads – Threaded Splits.</p> <p>HOT RUNNER MOULD</p> <p>Hot runner mould – Advantages – Limitations – Applications. Hot runner unit – Manifold block – Rectangular - Circular. Secondary nozzles – Standard Secondary nozzle – Direct feed Secondary nozzle – Direct feed sliding type secondary nozzle. Internally heated secondary nozzles - Internally heated direct feed core rod type secondary nozzle- Internally heated direct feed sliding type secondary nozzle.</p>	
III	<p>COMPRESSION AND TRANSFER MOULD DESIGN</p> <p>COMPRESSION MOULD DESIGN:</p> <p>Types – Flash type moulds- Positive type moulds- Semi-Positive type moulds - Advantages - Limitations and applications. Design of mould components – Cavity - Punch - Guide bush - Guide pin - Ejector pin. Bulk factor - Flash allowances. Types of heaters.</p> <p>TRANSFER MOULD DESIGN:</p> <p>Types - Pot type moulds - Plunger type moulds. Mould considerations - Transfer plunger - Cull pick up - Parting line location - Gate location - Gating system - Balanced runner system. Simple calculation for Size of Transfer pot - Clamping pressure -Transfer pressure.</p>	15
IV	<p>EXTRUSION DIE DESIGN:</p> <p>General features of dies - Die geometry - Approach section - Land section. Designing of Solid dies - Integer Dies - Split Dies - Plate Dies. Designing of pipe die - In-line type - Offset type. Design of blown film dies - Side fed die - Centre fed die – Spiral feed. Design of sheet dies - Coat hanger type - " T " type die – Fishtail type. Design of profile die (one type only). Wire and Cable coating dies. Die materials for construction.</p>	15
V	<p>BLOW MOULD DESIGN, MOULD MAINTENANCE AND SAFETY</p> <p>Blow mould materials and constructions - Die and mandrel design - Die head - Side fed head - Spider or axial flow head - Accumulator head - Parison control – Parison Programming - Parting line - Pinch off design - Neck pinch off - Base pinch off - Flash pockets - Clamping tonnage calculation - Venting – Cooling.</p> <p>Mould Maintenance - Wear caused by Resin action – Abrasion – Corrosion. Corrosion caused coolant - Wear of tapers - Lubrication in moulds - Leader pins - Ball bearings – Bushings - Central lubrication. Safety – Safety on lifting plates - Safety on Eye bolts - Safety on Lift bars - Safety on mounting of mould in machine - Safety for operators.</p>	15

Text Book:

1. Injection mould design - R.G.W. Pye
2. Plastic mould engineering handbook - J. Harry Dubois & Waying I. Prible

Reference Book:

1. Injection mould design fundamentals - Glanvil Denton
2. PLASTIC MOULD DESIGN - R.H.Bebb (Compression & Transfer mould)
3. EXTRUSION DIE DESIGN - M.V. Joshi.
4. BLOW MOULDING HANDBOOK – Donald V.Rosato

MODEL QUESTION PAPER - I

Term	: VI	Time	: 3Hrs
Programme	: Diploma in Plastic Technology	Max.Marks	: 75
Course	: Plastics Mould and Die Design	Code	: N1PT405

- [N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Explain the principle of side core.
2. Write the advantages of hot runner mould.
3. What is meant by -flash allowances?!
4. Write the functions of -Land sectionl.
5. Define -flash pocketsl.
6. Write the role of -form pinl in internal undercut moulds.
7. What do you understand about -Layout of impressionl?!
8. What is meant by -Cull pick-upl?!

PART – B

9. Explain the working principle of -side cavityl
10. Write short notes on -Collapsible corel
11. Explain the functions of transfer plunger.
12. Explain the importance of -approach sectionl.
13. Write short notes on -Neck pinch offl
14. Write the general features of dies.
15. Write notes on -Corrosion caused by coolantl.
16. What do you understand about —secondary nozzlesl?!

PART – C

17. (a) Explain the finger cam actuation of internal side core assembly.
(Or)
(b) Explain the form pin actuation of internal undercut moulding.
18. (a) With neat diagram, Explain the construction of axially fixed rotating core.
(Or)
(b) With neat diagram, explain the construction of hot runner unit.
19. (a) Explain the construction and working principle of flash type compression moulds with neat diagram.
(Or)
(b) Explain the construction and working principle of pot type transfer moulds with neat diagram.
20. (a) Explain the designing of In-line type pipe die with neat diagram.
(Or)
(b) Explain the designing of blown film side fed die with neat diagram.
21. (a) Write notes on Parison programming.
(Or)
(b) Write notes on (i) Wear caused by resin action (ii) Safety on Lifting plates.

MODEL QUESTION PAPER - II

Term	: VI	Time	: 3Hrs
Programme	: Diploma in Plastic technology	Max.Marks	: 75
Course	: Plastics Mould and Die Design	Code	: N1PT405

- [N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. Explain the principle of side cavity.
2. Write the limitations of hot runner mould.
3. What is meant by -Transfer plungerl?
4. Write the functions of -Approach sectionl.
5. Define -Die geometry".
6. Write the role of -outrigger".
7. What do you understand about —Manifold blockl?
8. What is meant by -Cull pick-upl?

PART – B

9. Explain the working principle of -side corel
10. Write short notes on -Collapsible corel
11. Explain the functions of transfer pot.
12. Explain the importance of -Land sectionl.
13. Write short notes on -pinch offl
14. Write the general features of "cross head dies".
15. Write notes on -Corrosion caused by resin actionl.
16. Write the functions of secondary nozzles?

PART – C

17. (a) Explain the dog leg cam actuation of internal side core assembly.
(Or)
(b) Explain the form pin actuation of internal undercut moulding.
18. (a) With neat diagram, Explain the construction of fixed rotating core with extractor plate.
(Or)
(b) With neat diagram, explain the construction and working of –standard secondary nozzles.
19. (a) Explain the construction and working principle of positive type compression moulds with neat diagram.
(Or)
(b) Explain the construction and working principle of plunger type transfer moulds with neat diagram.
20. (a) Explain the designing of wire and cable coating die with neat diagram.
(Or)
(b) Explain the designing of centre feed blown film die with neat diagram.
21. (a) Write notes on –Parison controll.
(Or)
(b) Write notes on (i) Wear caused by resign action (ii) Safety on Lifting plates.

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(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1CO400

Term : VI

Course Name : ELECTIVE THEORY – II

2. NANO AND SOLAR ENGINEERING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
NANO AND SOLAR ENGINEERING	5	75	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	BASICS OF NANO SCIENCE AND CLASSES OF NANO SCIENCE	15
2	SYNTHESIS, CHARACTERIZATION & APPLICATION OF NANO MATERIAL	15
3	FUNDAMENTALS OF SOLAR CELL AND ITS PERFORMANCE	15
4	SOLAR CELL CLASSIFICATIONS AND ITS COMPONENTS	15
5	TYPES OF SOLAR SYSTEM AND DESIGN OF SOLAR HOME SYSTEM	15
	Total	75

RATIONALE:

Nano and Solar Engineering is an emerging field in engineering. The Nano technology has a wide field of application. The ideas on nano particle synthesis, characterization and applications upgrade the diploma technicians to shine in the emerging field of Nano technology.

Solar engineering concepts in the field of energy production, supply and installation of equipments creates lots of opportunities for diploma technicians. This elective Course creates an avenue to shine in the technological field.

OBJECTIVES:

- ❖ To understand 1D, 2D & 3D Nano structures.
- ❖ To synthesis the Nano particles.
- ❖ To understand the principles of microscopy and working of various microscopes.
- ❖ To provide training to the technicians capable of working and willing to work on solar energy systems.
- ❖ To understand Solar cell technology.
- ❖ To understand the various components in the solar power generation and distribution systems

NICO400 – NANO AND SOLAR ENGINEERING DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	BASICS OF NANO SCIENCE AND CLASSES OF NANO SCIENCE Nano technology – Difference between bulk and Nano scale materials – Properties at the Nano scale –Size dependent behavior. Quantum dots – Nano wells – Nano films and Nano wires – Bucky balls – Carbon Nano tubes – Single walled and Multi walled CNT.	15
II	SYNTHESIS, CHARACTERIZATION AND APPLICATION OF NANO MATERIAL Top-Down approach – Nanolithography – Ball Milling - Bottom-Up approach – CVD (Chemical Vapor Deposition). Sol-gel processing – Spin Coating Method, Dip Coating Method. Characterization of Nano Particles - SEM –XRD – UV Spectroscopy, PV Characteristics of Nano Thin Films using 4 probe methods. Hydrophobic nature of Nano Thin films.	15

	Application of Nano Technology - Electronics – Textiles – Solar technology – Construction Materials – Nano Technology in medical science – Drug Delivery system for Cancer Treatment.	
III	<p>FUNDAMENTALS OF SOLAR CELL AND ITS PERFORMANCE</p> <p>Energy Resources: Renewable energy sources scenario in India – Importance of renewable energy sources-Wind energy-Solar energy-Advantages of solar energy - Physics of the Sun - Solar spectrum - green house effect</p> <p>Concepts: Photovoltaic effect - Principle of direct solar energy conversion into electricity in a solar cell -Solar cell, p-n junction – structure - I-V characteristics - effect of irradiation and temperature - fill factor - maximum power point – losses - cell efficiency</p>	15
IV	<p>SOLAR CELL CLASSIFICATIONS AND ITS COMPONENTS</p> <p>Types of Solar cells - Solar Modules - Blocking Diode - By-pass Diode - Solar Array - Isolation Diode –</p> <p>Batteries in Solar PV Systems: Battery Types and Classifications, Construction of Lead – Acid battery, Lead-Acid Battery Chemistry, Modern Rechargeable Batteries, Methods of Battery Charging</p> <p>Charge controllers: Shunt regulator, Series regulator, Methods of Charging the Battery by CR. Inverters: Basic Principle of operation, Types of Inverters.</p>	15
V	<p>TYPES OF SOLAR SYSTEM AND DESIGN OF SOLAR HOME SYSTEM</p> <p>Classification: Stand alone PV system - Grid connected PV System - Hybrid solar PV system</p> <p>Design of Solar Home System (SHS) - Selection of Solar PV module - Selection of Battery - Selection of Charge Controller - Selection of DC/AC Inverter - Selection of DC/DC converter - Selection of switch - Selection of the wire size for solar home system</p>	15

Text Book:

1. -Nano Technology – N.Arumugam, SaraS Publication.
2. Pradeep.T, Fundamentals of Nanoscience and Nanotechnology, Mc GrawHill,2012.
3. Sukhatme .S.P, Nayak .J.K, –*Solar Energy*”, Tata McGraw Hill Education Private Limited, New Delhi, 2010.
4. Unit III to Unit V *Training Manual For Engineers on Solar PV System* published by Government of Nepal, Ministry of Environment, Science and Technology.
5. Solar photovoltaic systems technical training manual by Herbert A Wade UNESCO publishing.

Reference Book:

1. C.P.Poole, Jr. Frank J.Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.).
2. S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publishing Company).
3. K.K. Chattopadhyay and A.N. Banerjee, Introduction to Nanoscience & Technology (PHI Learning Private Limited).
4. (PHI Learning Private Limited).
5. Chetan Singh Solanki., *Solar Photovoltaic: “Fundamentals, Technologies and Application”*, PHI Learning Pvt., Ltd., 2009.
6. John R. Balfour, Michael L. Shaw, Sharlave Jarosek., *“Introduction to Photovoltaics”*, Jones & Bartlett Publishers, Burlington, 2011.

VSVNPC

MODEL QUESTION PAPER - I

Term : VI

Time : 3 Hours

Programme : **DIPLOMA IN PLASTIC TECHNOLOGY**

Max. Marks : 75

Course : **NANO AND SOLAR ENGINEERING**

Code : **N1CO400**

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.

Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A

1. What is Nano technology?
2. Write notes on fullerene.
3. What is top down approach?
4. What is SEM?
5. What is a renewable energy source?
6. What is photo voltaic effect?
7. Name the types of inverter.
8. What is a Hybrid PV system?

PART – B

9. Explain about nano wires.
10. Briefly explain spin coating method.
11. Write the applications of nano technology in medicine.
12. Explain I-V characteristics of PV cells
13. Write the advantages of solar energy.
14. Explain Blocking diode with block diagram.
15. Explain with Block diagram Stand alone PV System.
16. What are the factors to be consider while design a stand alone PV system?

PART – C

17. (a). i. Discuss the difference between nano and bulk materials.
ii. Write short notes on size dependant behavior of nano materials.

(OR)

(b). Explain Single walled and multi walled CNT.

18. (a). What is Top down approach? Explain any one method with neat sketch.

(OR)

(b). Explain about SEM with block diagram.

18. (a). Draw the different types of wind turbines and explain. Write the advantages and disadvantages of wind energy.

(OR)

(b). Explain the process of converting Solar energy into electric energy in a PV cell.

20. (a). Explain about the construction of a Lead acid battery.

(OR)

(b). Explain the various methods of charging a battery by CR.

21. (a). Explain with block diagram the Working of Grid connected PV system.

(OR)

(b). Explain the design procedure for Solar Home system.

MODEL QUESTION PAPER - II

Term : VI Time : 3 Hours
Programme : **DIPLOMA IN PLASTIC TECHNOLOGY** Max. Marks : 75
Course : **NANO AND SOLAR ENGINEERING** Code : **N1CO400**

**[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B.
Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B
and 10 Marks in PART – C.]**

PART – A

1. What is Nano material?
2. Write notes on bucky ball.
3. What is bottom up approach?
4. What is XRD?
5. What is a non renewable energy source?
6. What is about Voc in solar cell.
7. What is secondary cell?
8. What is a standalone PV system?

PART – B

9. Define Fullerene.
10. Define CNT.
11. What is CVD process?
12. Write the applications of nano technology.
13. Write the advantages of Wind energy.
14. Draw the IV characteristics of solar cell.
15. What is Bypass diode?
16. Write the formula for finding solar panel capacity.

PART – C

17. (a). i. Discuss the difference between nano and bulk materials.
ii. Write short notes on Quantum dots.

(OR)

- (b). Explain in detail about Carbon Nano Tube and its types.

18. (a). What is Bottom Up approach? Explain any one method with neat sketch.
(OR)

- (b). Explain about the applications of nano technology.

19. (a). Draw and explain the different types of wind turbines.
(OR)

- (b). Explain about P-N Junction in detail.

20. (a). Explain about Blocking diode and Bypass diode in detail.
(OR)

- (b). Explain the basic principle of operation of inverters.

21. (a). Explain briefly about the types of solar PV system.
(OR)

- (b). Design a Solar home system for the given AC load profile

Load profile of the SHS user

Particular	Quantity	Power (Watt)	Daily operation (Hours)	Remarks
Electric lamp	1	10	3	Living room
Electric lamp	1	7	3	Kitchen
Total		17		

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1PT312

Term : VI

Course Name : PLASTICS TESTING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS TESTING PRACTICAL	6	90	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

OBJECTIVES.

- ❖ All the experiments given in the list of experiments should be completed and given for the end term practical examination.
- ❖ In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory..
- ❖ The external examiners are requested to ensure that a single experimental question should not be given to more than five students while admitted a batch of 30 students during Autonomous Examinations.

LIST OF EXPERIMENTS

CYCLE – I (Mechanical & Thermal, Properties Tests)

1. Preparation of test samples using sample cutters and contour cutting machine
2. Determination of Tensile properties.
3. Determination of IZOD Impact strength.
4. Determination of Hardness using Rockwell Hardness testing machine.
5. Determination of Taber Abrasion Resistance.
6. Determination of Melt Flow Index (MFI).
7. Determination of Heat Distortion Temperature (HDT).
8. Determination of Vicat Softening Temperature (VSP).

CYCLE – II (Electrical, Optical Properties and Product Testing)

9. Determination of Break Down Voltage and Dielectric strength
10. Determination of Light transmittance and Opacity of Plastics samples
11. . Determination of GLOSS value of plastic samples
12. Determination of Impact strength of Plastic films falling weight impact strength apparatus
13. Short term and long term hydraulic tests for PVC pipes.
14. Determination of ESCR
15. Determination of Tearing strength of plastic films.
16. Determination of Water Vapour Transmission Rating (WVTR)

LIST OF EQUIPMENTS (Per batch 30 students)

1. Sample cutters and contour cutting machine – 1 No
2. UTM machine – 1 No.
3. IZOD cum CHARPY Impact strength tester – 1 No.
4. Rockwell Hardness testing machine – 1 No.
5. Taber Abrasion Resistance tester – 1 No.
6. Melt Flow Index (MFI) tester – 1 No.
7. Heat Distortion Temperature (HDT)- tester – 1 No.
8. Vicat Softening Temperature (VSP) tester – 1 No.
9. Break Down Voltage and Dielectric strength tester – 1 No.
10. Opacity tester – 1No.
11. Falling weight impact strength apparatus – 1 No.
12. GLOSS meter – 1 No.
13. Short term and long term hydraulic tester for PVC pipes – 1 No.
14. ESCR apparatus – 1 No.
15. Tearing strength of plastic films tester – 1 No.

END EXAMINATION

Note:

All the exercises have to be completed. Two exercises will be given for examination by selecting one exercise from Cycle – I and one from Cycle – II.

All the exercises should be given in the question paper and students are allowed to select by a lot. Record note book should be submitted during examination.

ALLOCATION OF MARKS

Part A: Cycle - I	-	35 marks
Part B: Cycle - II	-	35 marks
Part C: Viva-voce	-	05 marks
Total	-	75 marks

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : N1PT313

Term : VI

Course Name : PLASTICS MOULD MAKING PRACTICAL –II

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per term: 15 weeks

Course	Instruction		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS MOULD MAKING PRACTICAL-II	6	90	Internal Assessment	Autonomous End Examination	Total	3 Hrs
			25	75	100	

OBJECTIVE:

- Study on machines available in plastic tool room.
- Study on measuring instruments available.
- Study about mould and its components
- Design mould for given component
- Design and drawing each mold element like mandrel, die body, breaker plate, die bush and vaccum mould cavity and blow mould halves.
- Selection of suitable machines for machining each.
- Check for dimensions using measuring instruments.
- Machine all the mould elements.
- Assemble the elements.

LIST OF EXPERIMENTS

CYCLE: 1. MAKING OF BLOW MOULD

1. Machining of Mould Halves
2. Machining of Guide Pin

CYCLE: 2. MAKING OF EXTRUSION DIES

3. Machining of Die Mandrel.
4. Machining of Die body.
5. Machining of Breaker plate.
6. Machining of Die Bush.

CYCLE: 3. MAKING OF VACCUM FORMING MOULD

7. Machining of vaccum forming cavity plate
8. Machining of cavity catching plate
9. Machining of Air plate
10. Assembly of Blow Mould, Extrusion dies, Vaccum forming mould using the above mould components. **(Not for End Exam).**
11. Study of additive manufacturing (3D printing) **(Not for End Exam).**

Note1: Students can do the above experiments as a group (Maximum of 5 students)

LIST OF EQUIPMENTS (Per batch 30 students)

- | | |
|---------------------------------|--------------|
| 1. Lathe | : 2 Nos |
| 2. Shaper | : 2 Nos |
| 3. Drilling machine | : 1 No |
| 4. Horizontal Milling machine | : 1 No |
| 5. Vertical Milling machine | : 1 No |
| 6. Surface Grinding machine | : 1 No |
| 7. Cylindrical Grinding machine | : 1 No |
| 8. Slotter | : 1 No |
| 9. Pantograph Engraving machine | : 1 No |
| 10. Measuring instruments | : Sufficient |

END EXAMINATION

NOTE

Examiner should set the question paper to cover the complete syllabus. Examiner has to ask the student to answer any one question from the lot.

Record note book should be submitted during examination.

ALLOCATION OF MARKS

Part- A

Machining of components of a mould : 70 Marks

Part- B

Viva voce : 05 Marks

TOTAL

: **75 Marks**

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : NIPT408
Term VI
Course Name : ELECTIVE PRACTICAL – II
PLASTICS MOULD DESIGN DRAWING PRACTICAL - II

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PLASTICS MOULD DESIGN DRAWING PRACTICAL - II	4	60	Internal Assessment	End Examination	Total	8Hrs.
			25	75	100	

OBJECTIVES: *On successful completion of the course, the student will be able to:*

- ❖ Understand the side core and side cavity injection mould design for a particular application.
- ❖ Ability to design of hot runner mould.
- ❖ Know the design procedure of compression mould for a particular product.
- ❖ Familiarize the design of transfer mould for a particular product.

LIST OF EXPERIMENTS

1. Design of Side core (or) Side cavity mould.
2. Design of Hot runner mould.
3. Design of Flash type Compression mould.
4. Design of Positive type (or) Semi-Positive Compression mould.
5. Design of Pot Transfer mould.
6. Design of Plunger Transfer mould.
7. Design of Pipe Extrusion die.
8. Design of Blown Film Die.
9. Design of Simple Blow Head.

LIST OF EQUIPMENTS (Per batch 30 students)

1. UNIVESAL DRAFTING MACHINE – 30 No's

END EXAMINATION

Note:

1. Examiner should set the common question paper, covering only from experiment 1 to 6.
2. Students should choose any one of the above experiments and answer as per the requirements of the question paper.

ALLOCATION OF MARKS

Part A	Mould design calculation	:	10 Marks
Part B	Elevation (or) Sectional elevation	:	25 Marks
Part C	Plan I	:	15 Marks
Part D	Plan II (or) Inverted Plan	:	15 Marks
Part E	Title Block & Bill of Materials	:	05 Marks
Part F	Viva voce	:	05 Marks
TOTAL		:	75 Marks

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY
Course code : N1CO401
Term : VI
Course Name : NANO AND SOLAR ENGINEERING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
NANO AND SOLAR ENGINEERING PRACTICAL	4	60	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

OBJECTIVES:

- ❖ To learn about synthesis of Nano particles.
- ❖ To measure the characteristics of Nano coated material.
- ❖ To measure the solar radiation and understand the working and characteristics of a solar panel.
- ❖ To analyze the effect of PV Module power at various condition.
- ❖ To calculate power flow of standalone PV system for AC and DC load.

**NICO401 – NANO AND SOLAR ENGINEERING PRACTICAL
DETAILED SYLLABUS**

PART – A

LIST OF NANO LAB EXPERIMENTS

1. Preparation of Nano particles using Ball Mill.
2. Synthesis of Nano thin film on one side of substrate by Spin coating method.
3. Synthesis of Nano thin film on two sides of substrate by Dip coating method.
4. Measurement of Nano film thickness using Spectroscopic reflectometer.
5. Measurement of VI Characteristics of Nano film.
6. Comparison of Hydrophobic Characteristics of Natural and Synthetic Nano Materials.

PART – B

LIST OF SOLAR LAB EXPERIMENTS

7. Measurement of Solar Radiation using Solarimeter and Lux Meter.
8. I-V and P-V Characteristics of PV module with varying radiation.
9. I-V and P-V Characteristics of series connection of PV modules.
10. I-V and P-V Characteristics of parallel connection of PV modules.
11. Effect of variation in tilt angle on PV module power.
12. Effect of Shading on the output of Solar panel.
13. Working of diode as blocking diode.
14. Power flow calculation of standalone PV system of AC load with battery.
15. Power flow calculation of standalone PV system of DC load with battery.
16. Find the MPP manually by varying the resistive load across the PV panel.

PART – C

1. Study the operation of a windmill (*Not for examination*)

List of Equipments

Nano Engineering:

1	Muffle Furnace	1 No
2	Magnetic Stirrer	1 No
3	Ultra Sonicator	1 No
4	Spin Coating Machine	1 No
5	Dipping Machine	1 No
6	Spectroscopic Reflecto meter	1 No
7	Four Probe Method	1 No
8	Contact Angle Meter	1 No
9	Digital Weighing Machine	1 No
10	Double Distillation Water Still	1 No
11	Ball Mill	1 No

Solar Engineering:

1	Solar panel PV training system	6 Nos
2	Infra-red Thermometer	1 No
3	Luxmeter	2 Nos
4	Solar power meter	1 No
5	Solar Panel 100W(Mono – 1, Poly – 2)	3 Nos
6	Inverter (PWM, MPPT – each 1 No.)	2 Nos
7	Battery	1 No
8	Charge Controller 12V / 10A	2 Nos
9	DC Voltmeter (MECO make)	6 Nos
10	DC Ammeter (MECO make)	6 Nos
11	AC / DC Digital tong tester	2 Nos
12	Rheostat	1 No

END EXAMINATION:

All the exercise should be given in the question paper and students are allowed to select by lot. (Nano or Solar)

Details of allocation:-

Procedure	30 marks
Sketches/Circuit diagram	10 marks
Tabulation	10 marks
Calculation/graph	10 marks
Result	10 marks
Viva – voce	05marks
TOTAL	75 marks

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N1 - SCHEME

Programme : DIPLOMA IN PLASTIC TECHNOLOGY

Course code : NIPT314

Term VI

Course Name : PROJECT WORK AND SEMINAR

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			Duration
	Hours / Week	Hours / Term	Marks			
PROJECT WORK AND SEMINAR	4	60	Internal	End	Total	3 Hrs.
			Assessment	Examination		
			25	75	100	

OBJECTIVES:

- To develop the creative talents in the students.
- The project work should involve less cost, easy manufacturing technique and suitable to the real life situations.
- The project work should be useful to the mankind.
- To give the students a taste of real life problem solving and thus simulate industrial environment within the polytechnic.
- To develop those abilities that cannot be developed by normal class room situations such as group work, sharing responsibility, initiate, creativity etc

Project Seminar topics

- Human values
- Integrity
- Changing attitude
- Self-Confidence
- Spirituality
- Safety and risk
- Responsibility of engineers
- Types of responsibility
- Environmental Ethics
- Plastic waste disposal
- E-waste disposal
- Semi conductor waste disposal
- Industrial waste disposal
- Human rights
- Human rights of woman
- Status of woman in India
- National Human Right commission constitution
- Intellectual property Right

a) Internal assessment marks for Project Work:

Project Review I & II (VI Term) (5+5)	:	10 marks
Seminar I & II (5+5)/2	:	5 marks
Project report	:	5 marks
Attendance (Award of marks same as course pattern)	:	5 marks

TOTAL	:	25 marks

b) Mark Allocation for Project Work in End Examination:

Viva Voce	:	25 marks
Demonstration / Presentation	:	50 marks
(The following Criteria components to be considered- Relevance of topic, Knowledge of methodology, Role of individual in the team, finding the Study etc)		-----
TOTAL	:	75 marks

Note: -

- The selection of Project work should be carried out in V term itself.
- The Project committee's approval should be obtained prior to the executing of project.
- Periodical assessment should be carried out from V term.
- The students' batch size should not exceed 6 Nos.
- The students should maintain a logbook of the work carried out by them.
