

Lesson Plan
Plastic Engineering
1st Semester

Lesson Plan- IPST		
Week	Name of Faculty- Sh. Rahul Singh(Theory) Discipline- Plastic Engg. Subject- IPST Sem. 1st Lesson plan duration-15 week	
1 ST	Lecture	Topic
	DAY	
1 ST	1	Unit – I: Introduction to Polymer Science
	2	Brief History of Polymers
	3	Physical State of Polymer Crystalline, Amorphous.
	4	Effect of Physical State on polymer properties
	5	Introduction to Rheology- Definition, properties and classification of fluids
2 ND	6	Newton’s Law of Viscosity, Types of Viscosity
	7	Effect of Temperature on Viscosity , Effect of Viscosity on Motion, Classification of flow
	8	Maxwell and voigt model of visco-elasticity, Classification of materials on the basis of visco-elasticity
	9	Unit –II: Molecular weight of Polymers
3 rd	10	Molecular weight distribution
	11	practical significance of Polymer Molecular weight
	12	Poly Dispersity Index (PDI)
4 TH	13	Molecular Weight and its determination
	14	by dilute solution viscometry
	15	end group analysis
	16	membrane osmometry
5 TH	17	vapourphase osmometry
	18	cryoscopy
	19	ebulliometry
	20	light scattering
6 TH		

	21	centrifugation
	22	Gel permeation chromatography
	23	Class Test-I
7 TH	24	Unit III– Physical State of Polymers
	25	Polymer solutions and solubility
	26	General Rules for Polymer solubility
	27	Solubility Parameters
8 TH	28	Properties of Dilute solutions
	29	Physical State of Polymer
	30	Crystalline, Amorphous and their relation to processing and applications.
	31	Unit – IV Thermal transitions in polymers
9 TH	32	Glass transition temperature, its importance
	33	Factors influencing Glass transition temperature (T _g)
	34	Techniques for its determination
	35	melting temperature
10 TH	36	Relationship of polymer properties with structure.
	37	Unit – V Polymer Rheology
	38	Chemical Modification - introduction of Co-polymerization
	39	Importance of copolymers, different types of copolymers, copolymer equation
11 TH	40	Reactivity ratios.
	41	Physical modification
	42	polymer blends and alloys, introduction to composites.
	43	Class test - II
12 TH	44	Unit –VI: Chemistry of Polymerization
	45	Chain growth Polymerization

	46	Free Radical Reaction
	47	Ionic Reaction
13 TH	48	Coordination Polymerization
	49	Step Growth Polymerisation
	50	Condensation Polymerization
	51	Ring Opening Polymerization.
14 TH	52	Co-polymerization
	53	Importance of copolymers, different types of copolymers
	54	copolymer equation, reactivity ratios
	55	Unit – VII: Techniques of Polymerization:
15 TH	56	Bulk, Solution,
	57	Suspension and Emulsion Polymerization
	58	their advantages and disadvantages
	59	Class Test-III
	60	Revision

Lesson Plan
Plastic Engineering
3rd Semester

LESSON PLAN

Name of Faculty: Sh. Sunil Kumar (Theory)/ Sh. Virender Nehra (Practical)

Discipline: Plastic Engineering

Semester: 3rd

Subject: PPT-I

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 3 PERIODS/ 4 PERIODS

Week	THEORY		PRACTICAL	
	Lecture	TOPIC	Practical	TOPIC
1 ST	1	Unit-I: Extruder and its components.	1	To draw the layout of plastic processing laboratory.
	2	General principles of operation		
	3	function of various parts, barrel, screw, screen pack,		
2 ND	4	breaker plate, adaptor.	2	Setting up of the extruder for production of pipe (Including die fitting and centering).
	5	die (attachment with extruder general geometry of die swell)		
	6	Cooling system, Haul off system, printing		
3 RD	7	Nip rolls, bubble casing	3	To identify various defects of pipes and suggest their remedies.
	8	winding equipment, cutting devices		
	9	stretching and orientation		
4 TH	10	Revise Syllabus Viva-Voice	4	To study process of Blown film Plant.
	11	Class Test-I		
	12	Unit -II: Extruder and importance of screw.		
5 TH	13	single screw and twin-screw extruder	5	To identify various defects of Blown films and suggest their remedies.
	14	vented barrel extruder		
	15	Screw and its construction, pitch, channel.		
6 TH	16	Introduction to land width, helix angle	6	To study corrugated sheet extrusion plant.
	17	screw diameter, root diameter, channel depth, land		
	18	types of screws used in extrusion		
7 TH	19	two stage venting screw.	7	To study corrugated pipe extrusion plant.
	20	Introduction to screw cooling,		
	21	L/D ratio and its significance.		

8 TH	22	Revise Syllabus Viva-Voice	8	Study of construction and working of wire and cable coating plant.
	23	Unit – III: Extrusion processes.		
	24	Blown film extrusion and pipes		
9 TH	25	extrusion of sheets	9	To identify various defects of wire and cable samples and suggest their remedies.
	26	simple and corrugated		
	27	wires and cables, filaments uses		
	28	Revise Syllabus Viva-Voice		
	29	Class Test-II		
	30	Unit –IV: Advance Extrusion processes:		
11 TH	31	Introduction to co extrusion		
	32	Multi-layer blown films, uses and application		
	33	coextruded sheets.		
12 TH	34	coextruded pipes		
	35	Its application, uses and properties.		
	36	Revise Syllabus Viva-Voice		
13 TH	37	Unit –V: Calendaring process		
	38	Introduction		
	39	Blending, scrap and cold trimming		
14 TH	40	Mills and strainers types of calendars		
	41	take-off stripper section, embosser		
	42	advantages of calendaring over extrusion		
15 TH	43	various calendaring defects and their remedies		Viva voce and final evaluation
	44	Revise Syllabus		
	45	Class Test-III		

LESSON PLAN

Name of Faculty: Sh. Rahul Singh (Theory)

Discipline: Plastic Engineering

Semester: 3RD

Subject: PMP-I

Lesson plan Duration: 15 WEEKS

Work Load (Lecture) per week: 3 PERIODS

Week	THEORY	
	Lect. Day	TOPIC
1 ST	1	Unit- I : Commodity Thermoplastics.
	2	Preparation (brief description)
	3	Its types and properties.
2 ND	4	Applications of the Followings: -
	5	Poly Ethylene's
	6	LDPE, LLDPE its types, properties and application.
3 RD	7	HDPE its types, properties and application.
	8	UHMWHDPE its types, properties.
	9	Poly Propylene (PP), Poly Vinyl Chloride (PVC)
4 TH	10	Its types, properties and application.
	11	Revise Syllabus
	12	Viva- Voice
5 TH	13	Unit- II : Engineering Thermoplastics:-
	14	Poly Carbonate General Purpose, its application
	15	Poly Styrene-General Purpose, its application
6 TH	16	High impact Poly styrene.
	17	Styrene Acrylonitrile, Polymethyl methacrylate.
	18	Acrylonitrile-butadiene-styrene, Polyamides.
7 TH	19	Cellulose plastics
	20	Thermoplastic polyester (PET, PBT)
	21	Revise Syllabus Viva- Voice
8 TH	22	Unit- III : Thermosetting Plastics: Properties and applications of the following
	23	Phenol formaldehyde
	24	Urea formaldehyde

9 TH	25	Melamine formaldehyde
	26	Poly urethanes
	27	Silicone resins, Epoxy resin, Unsaturated polyesters. Its types.
10 TH	28	Revise Syllabus
	29	Viva- Voice
	30	Class Test-II
11 TH	31	Unit- IV: Elastomers I
	32	Basic knowledge of preparation.
	33	And its types, properties and applications Natural rubber, Styrene butadiene rubber
12 TH	34	Chloroprene,
	35	Poly-isoprene,
	36	Revise Syllabus
13 TH	37	Viva- Voice
	38	Unit- V : Elastomers II
	39	Poly-butadiene
14 TH	40	Ethylene propylene
	41	diene monomer
	42	Nitrile butadiene rubber
15 TH	43	Silicone rubbers
	44	Revise Syllabus
	45	Viva- Voice

LESSON PLAN

Name of Faculty: Pankaj Garg / Virender Nehra (Practical)

Discipline: Plastic Engineering.

Semester: 3rd

Subject: Computer Aided Mould Design (CAMD) Lab

Lesson plan Duration: 15 WEEKS

Work Load (Practical) per week: 4 PERIODS

PRACTICAL		
PRAC TICAL WEEK	TOPIC	
1st	1	Introduction to AutoCAD: Starting up, practice on – how to create a new drawing file, setting drawing limits & saving a file
2nd	2	Drawing lines in different ways using absolute co-ordinates, user coordinates, WCS, UCS, drawing circles, drawing arcs, drawing ellipses. Drawing polygons, drawings splines, Drawing polylines, using window, zoom commands
3rd	3	Practice on Edit commands such as erase, copy, mirror, array, offset, rotate, oops, undo, redo, scale, stretch command
4th	4	Practice on trim, break, extend, chamfer, fillet, O snap command; Draw orthographic views of simple objects
5th	5	Practice on Text commands: editing text, text size, text styles, change properties commands
6th	6	Practice on Layer Commands: creating layer, freeze, layer on/off, lock & unlock layer, move from one layer to other.
7th	7	Viva of Syllabus covered

8th	8	Practice on Dimensioning, linear dimensioning, angular dimensioning radius/diameter dimensioning, snap command, aligned dimensioning; applying tolerance; Editing of dimensioning
9th	9	Practice on print commands. Export commands Practice on plot commands. Import commands
10th	10	Practice on making complete drawings of Stepped pulley and V-belt pulley using AUTOCAD (2D)
11th	11	Practice on 3D drawing: drawing cube, sphere, cylinder, cone; 3D modeling: Transformation, translation, scaling, rotation etc. Isometric drawing
12th	12	Introduction and practice on 3D Modeling using AutoCAD software including various commands like Extrude, Revolve, Blend, Helix, Sweep, Holes, Ribs & Bosses etc. and practice these commands making 3D design of different plastics.
13th	13	Analysis and Report Generation for calculating stresses on various designs and structures.
14th	14	Design of various components used in plastic industries like pulley etc.
15th	15	Final viva and evaluation

LESSON PLAN

Name of Faculty: Sh. Shiv Kumar (Theory)/(Practical)

Discipline: Plastic Engineering

Semester: 3rd

Subject: DDM-I

Lesson plan duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 2 PERIODS/ 4 PERIODS

Week	THEORY		PRACTICAL	
	Lecture DAY	TOPIC	Practical DAY	TOPIC
1 ST	1.	Unit-I: General Mould construction: Basic terminology.	1	To draw basic mould consisting of cavity and core plate.
	2.	Mould cores., Mould cavities.		
	3.	Bolster and its types, Ancillary item.		
2 ND	4.	Guide bush and Guide pillar.	2	To draw types of cavity and core inserts (Rectangular, circular)
	5.	Sprue bush, Register ring, its types.		
3 RD	6.	Mould plate fastening, attachment of mould to platen.	3	To draw guide pillar and guide bush (standard)
	7.	Classification of moulds.		
4 TH	8.	Integer mould, Insert mould.	4	To draw rectangular and circular frame type ejector grid.
	9.	Split and runner-less mould, two and three plate.		
5 TH	10.	Hot runner mould, introduction to materials. Brief introduction to materials.	5	To draw various types of ejector elements.
	11.	Material used for moulds and materials.		
6 TH	12.	Revise Syllabus and Viva Voice	6	To draw and illustrate balanced runner layouts.
	13.	Unit-II: Ejection System:		
7 TH			7	To draw Integer cavity plate cooling circuit (Z

	14.	Ejector Grid, its assembly.		and balanced Z)
8 TH	15.	Ejection Techniques, sprue pullers.	8	To draw Integer core cooling circuits (angled hole baffled straight hole, stepped)
	16.	Revise the Syllabus Viva-Voice		
9 TH	17.	Unit-III: Feed System: Runner	9	Design of Multi impression two plate Injection Mould
	18.	Sprue and its use, types of Runner		
10 TH	19.	Balancing and size of runners.	10	Design of Three Plate Injection Mould (multi-Impression)
	20.	Gates - Types of gates.		
11 TH	21.	Revise the Syllabus Viva-Voice	11	Design of Injection Mould for internal undercut components.
	22.	Unit-IV: Parting surface:		
12 TH	23.	Introduction to Parting surface its type	12	To design and draw a runner less mould.
	24.	Selection of parting surface.		
13 TH	25.	Revise the syllabus. Viva-voice.		
	26.	Unit-V: Cooling system:		
14 TH	27.	Mould Plates its type.		
	28.	Cooling insert bolster assembly.		
15 TH	29.	Types of cooling insert bolster.		Viva voce and final evaluation
	30.	Revise the Syllabus Viva- Voice		

LESSON PLAN

Name of Faculty: Sh. Sunil Kumar (Theory)/(Practical)

Discipline: Plastic Engineering

Semester: 3RD

Subject: BCE

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 3 PERIODS/ 4 PERIODS

Week	THEORY		PRACTICAL	
	Lecture DAY	TOPIC	Practical DAY	TOPIC
1 ST	1	Basics of Fluid Flow:	1	To perform an experiment on cyclone separator
	2	Bernoulli's Rota-meter, Rate of discharge Equation and its application in fluid flow,		
	3	venturi meter, Orifice Meter, pitot-tubes		
2 ND	4	velocity measurement.	2	To verify Bernoulli theorem.
	5	Reynolds's number and their use		
	6	friction losses during flow, pressure		
3 RD	7	concept of manometer – simple, differential, Continuity equation	3	To determine the Reynolds number and observe the pattern of laminar and turbulent flow.
	8	Revise Syllabus Viva-Voice		
	9	Heat Transfer: - Modes of heat transfer		
4 TH	10	Conduction across Single & Composite wall, Fourier law of conduction	4	To study the constructional features of reciprocating pump
	11	Convection -Heat transfer by natural & forced convection, LMTD		
	12	Individual and overall heat transfer coefficients, Heat exchanger		
5 TH	13	Double pipe, Shell and Tube Heat Exchanger.	5	To determine the discharge coefficient (C _d) for a Pitot tube.
	14	Revise Syllabus		
	15	Viva-Voice		
6 TH	16	Thermodynamics	6	To study the constructional features of reciprocating pump.
	17	total heat & specific heat		
	18	Homogenous and heterogeneous system		
7 TH	19	thermodynamic equilibrium, Equation of State	7	To study the constructional features centrifugal pump.

	20	Three Laws of Thermodynamics		
	21	Isometric, Isothermal process Isobaric & Adiabatic process		
8 TH	22	Concept of Gibbs free energy	8	To perform an experiment on a mixer for liquid-liquid mixing
	23	Phase change		
	24	Revise Syllabus Viva-Voice		
9 TH	25	Mechanical Operations	9	To carry out the sieve analysis of a product obtained from size reduction equipment such as ball mill, grinder etc.
	26	Size Reduction law		
	27	Crusher and grinder.		
10 TH	28	Its uses application.	10.	To determine overall heat transfer co-efficient in, a double pipe heat exchanger in Parallel and counter flow heat exchange modes
	29	Introduction to screening		
	30	Screening Equipment		
11 TH	31	Concept of Filtration.		
	32	principle of Filtration		
	33	Introduction to Filter press		
12 TH	34	Cyclones Separators		
	35	Revise Syllabus		
	36	Viva-Voice		
13 TH	37	Pumps and valves		
	38	Construction and working of the pumps.		
	39	Reciprocating pump its principle		
14 TH	40	Centrifugal pump its principle		Viva voce and final evaluation
	41	gear and screw pump		
	42	Ball valve, gate valve piston and butterfly		
15 th	43	solenoid valve		
	44	Revise Syllabus Viva-Voice		
	45	Class Test-III		

Lesson Plan
Plastic Engineering
5th Semester

LESSON PLAN

Name of Faculty: Ajay Kumar (Theory)/ Virender Nehra (Practical)

Discipline: Plastic Engineering

Semester: 5th

Subject: PLASTIC PROCESSING TECHNIQUES-III

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 4 PERIODS/ 4 PERIODS

Week	Working Day	Topic Covered	Practical DAY	TOPIC
1 ST	1	Basic principles of operations of injections	1	To study the specifications, construction and working principle of automatic injection molding machine.
	2	Moulding machinery/types of injection moulding machines,		
	3	Piston type Injection molding		
	4	Piston-piston type Injection molding		
2 ND	5	Piston-Screw type Injection molding		
	6	Reciprocating type Injection molding		
	7	Description with detailed construction.		
	8	Selection criteria for injection moulding machine		
3 RD	9	Process variables	2	To study the specifications, construction and working principle of CNC injection molding machine
	10	Time, Temperature and Pressure		
	11	Mechanical control system		
	12	Electrical control system		
4 TH	13	Electronic control system		
	14	Parts and functions		
	15	General specification of Injection Molding		
	16	Start-up procedure		
5 TH	17	Shutdown procedure	3	Practice of Die setting and produce components on automatic / CNC injection molding machine
	18	Cylinder nozzles		
	19	Interaction of moulding variable		
	20	Time, Temperature and Pressure		

6 TH	21	Optimization of cycle flow.		
	22	Optimization of cycle flow.		
	23	Defects in injection moulding products, their causes and remedies.		
	24	Defects in injection moulding products, their causes and remedies.		
7 TH	25	Defects in injection moulding products, their causes and remedies.	4	To determine mould shrinkage for the component produced by Injection moulding.
	26	Loading of Mould on Injection moulding machine		
	27	Unloading of Mould on Injection moulding machine		
	28	Injection moulding of thermosets.		
8 TH	29	Description with detailed construction.		
	30	Basic principles of blow moulding		
	31	Types of blow moulding		
	32	Extrusion blow moulding		
9 TH	33	Injection blow moulding	5	Practice of Die setting and production of component on hand operated blow molding machine, using at least 3 moulds.
	34	Blow moulding of irregular shapes		
	35	Production of parison by extrusion		
	36	Production of parison by injection		
10 TH	37	Parison wall thickness control		
	38	Parison blowing systems		
	39	Effect of process variables on product design and properties.		
	40	Parison programming		
11 TH	41	Mould venting		Viva voce evaluation
	42	Defects in blow moulding products, their causes and remedies.		
	43	Defects in blow moulding products, their causes and remedies.		
	44	Defects in blow moulding products, their causes and remedies..		

12 TH	45	Defects in blow moulding products, their causes and remedies.	6.	Practice of Die setting Production of components on automatic blow machine by setting the process parameters.
	46	Trouble shooting		
	47	Basic principle of rotational molding		
	48	Material selection		
13 TH	49	Estimation through trial analysis		
	50	Type of machine		
	51	Process variables		
	52	Charge size, wall thickness control		
14 TH	53	Heating and Cooling system	7.	To produce small components on vertical hydraulic injection moulding machine
	54	Process requirement for the moulding of water tank		
	55	Process requirement for the moulding of dust bin		
	56	Application of Rotational Moulding.		
15 TH	57	Ejection and Finishing		Viva voce and final evaluation
	58	Fault - Causes and Remedies		
	59	Fault - Causes and Remedies		
	60	Merits and Demerits of Rotational Moulding Process.		

LESSON PLAN

Name of Faculty: Sh. Shiv Kumar (Theory)/(Practical)

Discipline: Plastic Engineering

Semester: 5th

Subject: DDM-I

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 3 PERIODS/ 3 PERIODS

Week	THEORY		PRACTICAL	
	Lecture DAY	TOPIC	Practical DAY	TOPIC
1 ST	1	Unit 1: Introduction Introduction to Mould design	1	Procedure for Designing an Injection Mold: Primary positioning of inserts,
	2	Concept considerations		
	3	Materials and characteristics used for dies and moulds		
2 ND	4	Impressions Core and cavity		the ejector system, the ejector grid, complete the top half of drawing, complete the plan view, complete the cross-section, complete the drawing
	5	Types of cavity and core,		
	6	Their advantages disadvantages, bolster plates and its types.		
3 RD	7	Guide pillar	2	To design and draw various mould parts
	8	Guide bush		
	9	Register ring and their types, Mould clamping		
4 TH	10	Direct, indirect	3	To design and draw a single impression two plate injection mould by taking suitable at least four component
	11	Class test –I		
	12	Parting surface, Types of parting surface		
5 TH	13	Selection of parting surface	4	To design and draw a multiple impression two plate injection mould by taking suitable at least two component
	14	Relief of parting surfaces		
	15	Venting, Feed system		
6 TH	16	Runners	5	To design and draw a multiple impression three plate injection mould by taking suitable at least two component
	17	Sprue		
	18	Runners and its types, Balancing of runners		
7 TH	19	Size of runners	6	
	20	Gates		

	21	Types of gates, Size of gates		To design and draw a multiple impression split mould by taking suitable at least two component
8 TH	22	Ejection system	7	To design and draw a multiple impression runnerless mould by taking suitable component
	23	Ejector grid		
	24	Ejector plate assembly, Ejection techniques		
9 TH	25	Ejection from fixed half		
	26	Sprue pullers		
	27	Cooling system Cooling integer, type mould plates and its types		
10 TH	28	Cooling insert bolster assembly and its types		
	29	Cooling other mold parts,		
	30	Water connection and its types, Class Test – II		
11 TH	31	Introduction to Splits		
	32	Sliding splits and types		
	33	Angled lift splits and types, Side cores and side Cavities		
12 TH	34	Introduction		
	35	Types of side core and side cavities		
	36	Molding Internal Undercuts		
13 TH	37	Introduction , Form pin		
	38	Split core		
	39	Side core, Stripping internal undercut.		
14 TH	40	Mould for threaded component		
	41	Introduction		
	42	Moulds for internally threaded components and its types, Moulds for externally threaded components and its types		
15 TH	43	Types of Mold : Two plate mould		Viva voce and final evaluation
	44	Three plate mould		
	45	Hot runner mould, Class Test-III		

LESSON PLAN

Name of Faculty: Sh. Arun Syan (Theory)/ Sh. Ajay Kumar (Practical)

Discipline: Plastic Engineering

Semester: 5th

Subject: PRWM

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 3 PERIODS/ 2 PERIODS

Week	THEORY		PRACTICAL	
	Lecture DAY	TOPIC	Practical DAY	TOPIC
1 ST	1	Unit-I : Pollution and Hazards related to Plastics Pollution caused by plastics	1	To conduct recyclability test
	2	loading of toxic chemicals from plastics into soil		
	3	loading of toxic chemicals from plastics into water		
2 ND	4	including additives, flame retardants,	2	Collection of different plastic wastes and their segregation in various groups
	5	Landfill, incineration of Plastics		
	6	ISI Standards regarding limits of these chemicals in effluents.		
3 RD	7	Collection of plastic waste	3	Conversion of collected samples into plastic granules
	8	Unit-II: Plastic waste and its Separation		
	9	Collection of plastic waste		
4 TH	10	Sources of plastic wastes,	4	Property modification of plastic granules by adding natural material like cellulose
	11	Class Test - I		
	12	Sorting methods such as Identification marks,		
5 TH	13	Segregation methods such as Identification marks,	5	Determination of BOD and COD of given samples of effluents of plastic industry
	14	Density separation,		
	15	Solvent separation		
6 TH	16	Floatation techniques	6	Mixing of virgin polymers with recycled polymers (both by melt method and solvent method)
	17	Equipment based sorting techniques.		
	18	Thermocouples		
7 TH	19	Sources of plastic wastes,	7	

	20	Collection of plastic waste		To carry out plastic waste management of at least one department/section of the polytechnic
	21	Class Test-II		
8 TH	22	Unit-III: Polymer degradation and their life expectancy		
	23	Natural and synthetic polymer and their compatibility with surroundings		
	24	starch and proteins, silicones and other man made fabrics.		
9 TH	25	Life expectancy of different plastics in environment and thermal degradation, biodegradation and photo degradation		
	26	Agents for increasing life expectancy of polymers		
	27	Unit-IV: Plastic Waste Management:		
10 TH	28	Public awareness regarding hazards caused by indiscriminate use of plastics		
	29	Proper disposal of plastics, Need and importance of plastic reprocessing.		
	30	Unit-V: Plastic Waste Management Techniques		
11 TH	31	Stages in plastic recycling,		
	32	Energy recovery from plastic waste, Co-processing in cement Kiln, Plastic waste in road construction.		
	33	Advantages and disadvantages of recycling		
12 TH	34	Unit-VI: Machinery and Value addition:		
	35	Process flow chart by mechanical route - Basic Mechanical recycling		
	36	Plant-Additives for improving quality of recycled products		
13 TH	37	value addition in Plastics recycling viz.,		
	38	PP/HDPE woven sacks to Pots, PE/PE multilayer film waste to moulded products.		
	39	Mulching, canal lining, rainwater harvesting,		
14 TH	40	waste water recovery by membrane separation		
	41	Revision of topic		
	42	Again, revised important topic of exam point of view		
15 TH	43	Viva voce		Viva voce and final evaluation
	44	Practice for the all syllabus		
	45	Class Test-III		

LESSON PLAN

Name of Faculty: Sh. Pankaj Garg (Theory)/ Sh. Rahul Singh (Practical)

Discipline: Plastic Engineering

Semester: 5th

Subject: Compounding and Formulation of Plastics (CAFP)

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 4 PERIODS/ 2 PERIODS

Week	THEORY		PRACTICAL	
	Lecture DAY	TOPIC	Practical DAY	TOPIC
1 ST	1	Unit 1: Introduction Introduction to CAFP	1	Extraction of inorganic additives from PVC i.e. fillers, pigments etc. by dissolving
	2	Principles of compounding		
	3	for modifying and enhancing processing		
	4	Application properties		
2 ND	5	Service life of plastics		PVC compound in solvents such as THF, EDC and Cyclohexanone and removing PVC and soluble organic materials
	6	Class test –I		
	7	Unit –II : Definition of additives		
	8	Classification of additives		
3 RD	9	Description of following additives and their functions	2	Making a PVC compound having following ingredients (100 parts) Stabilizer (2 – 3 parts), Lubricant (0.5 – 1.0 parts);
	10	Properties Modifiers		
	11	Plasticisers		
	12	Fillers		
4 TH	13	Impact modifiers		plasticizers (20 – 50 parts); Pigment (0.5 – 1 part) and Filler (10 –40 parts) on a two roll mill and compression moulding of a sheet
	14	Extenders		
	15	Processing aids		
	16	Heat stabilizers		
5 TH	17	Lubricants	3	Cutting dunbell shaped test pieces for tensile strength from compression moulded sheet as prepared in (2) and
	18	Solvents and diluents		
	19	Surface property modifiers		
	20	Antistatic agents		
6 TH	21	Antislip agent		finding tensile strength and elongation with or without plasticizer. Calculation of percent increase in elongation
	22	Antiblock/slip additives		
	23	Colourants		
	24	Pigments and dyes		

7 TH	25	Antiageing additives	4	Analysis of the effects of fillers on mechanical properties of PVC compound
	26	Antioxidants		
	27	Anti-ozonants		
	28	UV stabilisers		
8 TH	29	Fungicides	5	Compounding of polyethylene with various additives, fillers, stabilizers, blowing agent and rubber
	30	Antitermites		
	31	Bactericide additives		
	32	Miscellaneous additives:		
9 TH	33	Blowing agent	6	Mechanical property measurement of compounded polyethylene and evaluation of the effect of compounding variables.
	34	Flame retardants		
	35	Mould Release agents		
	36	Defoamers		
10 TH	37	Smoke Suppressants		
	38	Class Test – II		
	39	Formulation of various ingredients in the compounding		
	40	Role of various ingredients in the compounding for both		
11 TH	41	Thermoplastics materials		
	42	Thermoset materials		
	43	Unit-III : Compounding equipments :		
	44	Ribbon blender		
12 TH	45	High speed mixer		
	46	Banbury mixer		
	47	Two roll mill		
	48	Mixer extruder (construction and working of these equipments)		
13 TH	49	Ultra turax mixers		
	50	High sheer mixers		
	51	Intensive dry mixer		
	52	Compounders		
14 TH	53	Twin screw extruders		
	54	Construction of Kneaders		
	55	Working of Kneaders		
	56	Dispersors		
15 TH	57	Unit – IV : Compounding of PVC for rigid		Viva voce and final evaluation
	58	Semi-rigid		
	59	Flexible applications.		
	60	Class Test-III		

LESSON PLAN

Name of Faculty: Sh. Sunil Kumar (Theory)/ (Practical)

Discipline: Plastic Engineering

Semester: 5th

Subject: Plastic Testing-II

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 3 PERIODS/ 3 PERIODS

Working Day	Topic Covered	Practical DAY	TOPIC
1.	Introduction to Electrical Properties	1	To carry out volume and surface resistivity test on given samples of plastic
	Dielectric strength		
	Dielectric constant		
2.	Insulation resistance		
	Volume and Surface resistivity		
	Arc resistance		
3.	Antistatic tests	2	To measure gloss of plastic specimen
	Introduction to Optical Properties		
	Refractive index		
4.	Luminous transmittance		
	Clarity		
	Haze		
5.	Colour measurements	3	To determine refractive index of 2 given monomers to establish its purity
	Gloss.		
	Introduction to chemical Properties		
6.	Immersion test		
	Acetic acid immersion test		
	Acetone immersion test		
7.	Stain Resistance of Plastics	4	To determine Arc resistance of plastic sample
	Stress Cracking Resistance		
	Introduction to Flammability		
8.	Flammability Test		
	Ignition Properties		
	Oxygen Index Test		
9.	Flammability of Cellular Plastics	5	To determine Oxygen index .
	Smoke Density Test		
	UL94 Flammability Test.		
10.	Horizontal Burning Test		

	Vertical Burning Test		
	Introduction to Weathering Properties		
11.	Environmental factors affecting plastics		
	Accelerated weathering tests	6	To carryout smoke density test.
	Outdoor weathering of plastics		
12.	Resistance of plastics to biological systems.		
	Test methods for bio-degradable plastics		
	Test standards for bio-degradable plastics		
13.	Criteria used in evaluation of biodegradable plastics		
	Description of current test methods	7	To determine ESCR of given plastic sample.
	Introduction to Product Testing		
14.	Plastics Pipes (PVC & HDPE)		
	Films		
	Woven sacks		
15.	Water Tanks		
	Containers		
	Plastic Foams	Final Viva Voice	