

**Lesson Plan**  
**Plastic Engineering**  
**1<sup>st</sup> Semester**

| Lesson Plan- IPST |                                                                                                                                                                                                     |                                                                                                          |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Week              | <b>Name of Faculty- Sh. Ajay Kumar (Theory)</b><br><b>Discipline- Plastic Engg.</b><br><b>Subject- IPST Sem. 1st Lesson plan duration-15 week</b><br><b>Work Load (Lecture) per week: 4 PERIODS</b> |                                                                                                          |
| 1 <sup>st</sup>   | Lecture                                                                                                                                                                                             | Topic                                                                                                    |
|                   | DAY                                                                                                                                                                                                 |                                                                                                          |
|                   | 1                                                                                                                                                                                                   | <b>Unit – I: Introduction to Polymer Science</b>                                                         |
|                   | 2                                                                                                                                                                                                   | Brief History of Polymers                                                                                |
|                   | 3                                                                                                                                                                                                   | Physical State of Polymer Crystalline, Amorphous.                                                        |
|                   | 4                                                                                                                                                                                                   | Effect of Physical State on polymer properties                                                           |
| 2 <sup>ND</sup>   | 5                                                                                                                                                                                                   | Introduction to Rheology- Definition, properties and classification of fluids                            |
|                   | 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 onthe basis of visco-elasticity |
| 3 <sup>rd</sup>   | 9                                                                                                                                                                                                   | <b>Unit –II: Molecular weight of Polymers</b>                                                            |
|                   | 10                                                                                                                                                                                                  | Molecular weight distribution                                                                            |
|                   | 11                                                                                                                                                                                                  | Practical significance of Polymer Molecular weight                                                       |
| 4 <sup>TH</sup>   | 12                                                                                                                                                                                                  | Poly Dispersity Index (PDI)                                                                              |
|                   | 13                                                                                                                                                                                                  | Molecular Weight and its determination                                                                   |
|                   | 14                                                                                                                                                                                                  | Dilute solution viscometry                                                                               |
|                   | 15                                                                                                                                                                                                  | End group analysis                                                                                       |
| 5 <sup>TH</sup>   | 16                                                                                                                                                                                                  | Membrane osmometry                                                                                       |
|                   | 17                                                                                                                                                                                                  | Vapour phase osmometry                                                                                   |
|                   | 18                                                                                                                                                                                                  | Cryoscopy                                                                                                |
|                   | 19                                                                                                                                                                                                  | Ebulliometry                                                                                             |
| 6 <sup>TH</sup>   | 20                                                                                                                                                                                                  | Light scattering                                                                                         |

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

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

| Lesson Plan- Engg. Graphics                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name of Faculty- Sh. Sunil Kumar</b><br><b>Discipline- Plastic Engg.</b><br><b>Subject- Engg. Graphics</b><br><b>Sem. 1st Lesson plan duration-15 week</b><br><b>Work Load (Practical) per week: 2 PERIODS</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Week                                                                                                                                                                                                              | Topics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1 <sup>st</sup>                                                                                                                                                                                                   | <p>Introduction to use and care of drawing instruments, drawing materials, layout and sizes of drawing sheets and drawing boards. Symbols and conventions-</p> <p>a) Conventions of Engineering Materials, Sectional Breaks and Conventional lines.</p> <p>b) Civil Engineering Sanitary fitting symbols</p> <p>c) Electrical fitting symbols for domestic interior installations. Geometrical construction-geometrical figures such as triangles, rectangles, circles, ellipses Definition and classification of lettering, Free hand (of height of 5,8,12 mm) and instrumental lettering (of height 20 to 35 mm): upper case and lower case, single and double stroke, vertical and inclined (Gothic lettering) at 75 degree to horizontal and with suitable height to width ratio 7:4. and curves, hexagons, pentagons bisecting a line and arc , division of line and circle with the help of drawing instruments.</p> |
| 2 <sup>nd</sup>                                                                                                                                                                                                   | Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions). Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., countersunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3 <sup>rd</sup>                                                                                                                                                                                                   | Scales –Needs and importance (theoretical instructions), Type of scales, Definition of Representative Fraction (R.F.) and Length of Scale. To draw/construct plain and diagonal scales.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 4 <sup>th</sup>                                                                                                                                                                                                   | Theory of orthographic projections (Elaborate theoretical instructions). Three views of orthographic projections of different objects of given pictorial view of a block in 1st and 3rd angle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                   | Projection of Points in different quadrant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                                                   | Projection of Straight Line (1 <sup>st</sup> angle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                   | i. Line parallel to both the planes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                                                                                                   | ii. Line perpendicular to any one of the reference plane and parallel to others                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                                                                   | iii. Line inclined to any one of the references and parallel to another plane.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 5 <sup>th</sup>                                                                                                                                                                                                   | Projection of Plane – Different lamina like square rectangular, triangular, circle and hexagonal pentagon. Trace of planes (HT and VT).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                                                   | Identification of surfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 6 <sup>th</sup>                                                                                                                                                                                                   | Importance and salient features                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                                                                   | Drawing of full section,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 7 <sup>th</sup>                                                                                                                                                                                                   | Half section, partial or broken out sections                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 8 <sup>th</sup>                                                                                                                                                                                                   | Offset sections, revolved sections and removed sections (theoretical only).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                   | Orthographic sectional views of different objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|                  |                                                                                                                                                                                                                                   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9 <sup>th</sup>  | 1. Introduction of projection of right solids such as prism & pyramid (square, Pentagon, Hexagonal) cube, cone & cylinder (Axes perpendicular to H.P and parallel to V.P.)                                                        |
| 10 <sup>th</sup> | 2. Introduction of sections of right solids - Section planes, Sections of Hexagonal prism, pentagon pyramid, cylinder and cone (Section plane parallel to anyone reference planes and perpendicular to V.P. and inclined to H.P.) |
| 11 <sup>th</sup> | 3. Development of Surfaces – Development of lateral surfaces of right solids like cone, cylinder, pentagonal prism, pyramid and hexagonal pyramid (Simple problems)                                                               |
| 12 <sup>th</sup> | 1. Fundamentals of isometric projections and isometric scale.                                                                                                                                                                     |
|                  | 2. Isometric views of different laminae like circle, pentagon and hexagon.                                                                                                                                                        |
| 13 <sup>th</sup> | 3. Isometric views of different regular solids like cylinder, cone, cube, cuboid, pyramid and prism.                                                                                                                              |
|                  | 4. Isometric views from given different orthographic projections(front, side and top view)                                                                                                                                        |
| 14 <sup>th</sup> | Basic introduction and operational instructions of various commands in AutoCAD. At least two sheets of different objects on AutoCAD (given pictorial/isometric view of a block).                                                  |
| 15 <sup>th</sup> | AutoCAD skill of student is evaluated in internal assessment only not in external exam.                                                                                                                                           |

**Lesson Plan**  
**Plastic Engineering**  
**3<sup>rd</sup> Semester**

## LESSON PLAN

**Name of Faculty: Sh. Rahul Singh (Theory & Practical)**

**Discipline: Plastic Engineering**

**Semester: 3<sup>rd</sup>**

**Subject: PPT-I**

**Lesson plan Duration: 15 WEEKS**

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

| Week            | THEORY  |                                                              | PRACTICAL |                                                                                         |
|-----------------|---------|--------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------|
|                 | Lecture | TOPIC                                                        | Practical | TOPIC                                                                                   |
| 1 <sup>ST</sup> | 1       | <b>Unit-I: Extruder and its components.</b>                  | 1         | To draw the layout of plastic processing laboratory.                                    |
|                 | 2       | General principles of operation                              |           |                                                                                         |
|                 | 3       | function of various parts, barrel, screw, screen pack,       |           |                                                                                         |
| 2 <sup>ND</sup> | 4       | breaker plate, adaptor.                                      | 2         | Setting up of the extruder for production of pipe (Including diefitting and centering). |
|                 | 5       | die (attachment with extruder general geometry of die swell) |           |                                                                                         |
|                 | 6       | Cooling system, Haul off system, printing                    |           |                                                                                         |
| 3 <sup>RD</sup> | 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 <sup>TH</sup> | 10      | <b>Revise Syllabus/ Viva-Voice</b>                           | 4         | To study process of Blown film Plant.                                                   |
|                 | 11      | <b>Class Test-I</b>                                          |           |                                                                                         |
|                 | 12      | <b>Unit –II: Extruder and importance of screw.</b>           |           |                                                                                         |
| 5 <sup>TH</sup> | 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 <sup>TH</sup> | 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 <sup>TH</sup> | 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 <sup>TH</sup>  | 22 | <b>Revise Syllabus Viva-Voice</b>              | 8 | Study of construction and working of wire and cable coating plant.                |
|                  | 23 | <b>Unit – III: Extrusion processes.</b>        |   |                                                                                   |
|                  | 24 | Blown film extrusion and pipes                 |   |                                                                                   |
| 9 <sup>TH</sup>  | 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 | <b>Revise Syllabus Viva-Voice</b>              |   |                                                                                   |
|                  | 29 | <b>Class Test-II</b>                           |   |                                                                                   |
|                  | 30 | <b>Unit –IV: Advance Extrusion processes:</b>  |   |                                                                                   |
| 11 <sup>TH</sup> | 31 | Introduction to co extrusion                   |   |                                                                                   |
|                  | 32 | Multi-layer blown films, uses and application  |   |                                                                                   |
|                  | 33 | coextruded sheets.                             |   |                                                                                   |
| 12 <sup>TH</sup> | 34 | coextruded pipes                               |   |                                                                                   |
|                  | 35 | Its application, uses and properties.          |   |                                                                                   |
|                  | 36 | <b>Revise Syllabus Viva-Voice</b>              |   |                                                                                   |
| 13 <sup>TH</sup> | 37 | <b>Unit –V: Calendaring process</b>            |   |                                                                                   |
|                  | 38 | Introduction                                   |   |                                                                                   |
|                  | 39 | Blending, scrap and cold trimming              |   |                                                                                   |
| 14 <sup>TH</sup> | 40 | Mills and strainers types of calendars         |   |                                                                                   |
|                  | 41 | take-off stripper section, embosser            |   |                                                                                   |
|                  | 42 | advantages of calendaring over extrusion       |   |                                                                                   |
| 15 <sup>TH</sup> | 43 | various calendaring defects and their remedies |   | Viva voce and final evaluation                                                    |
|                  | 44 | <b>Revise Syllabus</b>                         |   |                                                                                   |
|                  | 45 | <b>Class Test-III</b>                          |   |                                                                                   |

## LESSON PLAN

**Name of Faculty: Sh. Rahul Singh (Theory)**

**Discipline: Plastic Engineering**

**Semester: 3<sup>rd</sup>**

**Subject: PMP-I**

**Lesson plan Duration: 15 WEEKS**

**Work Load (Lecture) per week: 3 PERIODS**

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

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

## LESSON PLAN

**Name of Faculty:** Pankaj Garg (Practical)

**Discipline:** Plastic Engineering.

**Semester:** 3rd

**Subject:** Computer Aided Mould Design (CAMD) Lab

**Duration:** 15 WEEKS

**Work Load (Practical) per week:** 2 PERIODS

| PRACTICAL             |       |                                                                                                                                                                                                                              |
|-----------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PRAC<br>TICAL<br>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                                                                                                                                                                                                     |

|             |    |                                                                                                                                                                                                                                      |
|-------------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>8th</b>  | 8  | Practice on Dimensioning, linear dimensioning, angular dimensioning radius/diameter dimensioning, snap command, aligned dimensioning; applying tolerance; Editing of dimensioning                                                    |
| <b>9th</b>  | 9  | Practice on print commands. Export commands Practice on plot commands. Import commands                                                                                                                                               |
| <b>10th</b> | 10 | Practice on making complete drawings of Stepped pulley and V-belt pulley using AUTOCAD (2D)                                                                                                                                          |
| <b>11th</b> | 11 | Practice on 3D drawing: drawing cube, sphere, cylinder, cone; 3D modeling: Transformation, translation, scaling, rotation etc.<br>Isometric drawing                                                                                  |
| <b>12th</b> | 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. |
| <b>13th</b> | 13 | Analysis and Report Generation for calculating stresses on various designs and structures.                                                                                                                                           |
| <b>14th</b> | 14 | Design of various components used in plastic industries like pulley etc.                                                                                                                                                             |
| <b>15th</b> | 15 | Final viva and evaluation                                                                                                                                                                                                            |

## LESSON PLAN

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

**Discipline: Plastic Engineering**

**Semester: 3<sup>rd</sup>**

**Subject: DDM-I**

**Lesson plan duration: 15 WEEKS**

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

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

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

## LESSON PLAN

Name of Faculty: Sh. Arun Syan (Theory) & (Practical)

Discipline: Plastic Engineering

Semester: 3<sup>rd</sup>

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 <sup>ST</sup> | 1           | <b>Basics of Fluid Flow:</b>                                                          | 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 <sup>ND</sup> | 4           | velocity measurement.                                                                 | 2             | To verify Bernoulli theorem.                                                            |
|                 | 5           | Reynolds's number and their use                                                       |               |                                                                                         |
|                 | 6           | friction losses during flow, pressure                                                 |               |                                                                                         |
| 3 <sup>RD</sup> | 7           | concept of manometer – simple, differential, Continuity equation                      | 3             | To determine the Reynolds number and observe the pattern of laminar and turbulent flow. |
|                 | 8           | <b>Revise Syllabus Viva-Voice</b>                                                     |               |                                                                                         |
|                 | 9           | <b>Heat Transfer: - Modes of heat transfer</b>                                        |               |                                                                                         |
| 4 <sup>TH</sup> | 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 <sup>TH</sup> | 13          | Double pipe, Shell and Tube Heat Exchanger.                                           | 5             | To determine the discharge coefficient ( $C_d$ ) for a Pitot tube.                      |
|                 | 14          | <b>Revise Syllabus</b>                                                                |               |                                                                                         |
|                 | 15          | <b>Viva-Voice</b>                                                                     |               |                                                                                         |
| 6 <sup>TH</sup> | 16          | <b>Thermodynamics</b>                                                                 | 6             | To study the constructional features of reciprocating pump.                             |
|                 | 17          | total heat & specific heat                                                            |               |                                                                                         |
|                 | 18          | Homogenous and heterogeneous system                                                   |               |                                                                                         |
| 7 <sup>TH</sup> | 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 <sup>TH</sup>  | 22 | Concept of Gibbs free energy                               | 8   | To perform an experiment on a mixer for liquid-liquid mixing                                                                      |
|                  | 23 | Phase change                                               |     |                                                                                                                                   |
|                  | 24 | <b>Revise Syllabus Viva-Voice</b>                          |     |                                                                                                                                   |
| 9 <sup>TH</sup>  | 25 | <b>Mechanical Operations</b>                               | 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 <sup>TH</sup> | 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 <sup>TH</sup> | 31 | Concept of Filtration.                                     |     |                                                                                                                                   |
|                  | 32 | principle of Filtration                                    |     |                                                                                                                                   |
|                  | 33 | Introduction to Filter press                               |     |                                                                                                                                   |
| 12 <sup>TH</sup> | 34 | Cyclones Separators                                        |     |                                                                                                                                   |
|                  | 35 | <b>Revise Syllabus</b>                                     |     |                                                                                                                                   |
|                  | 36 | <b>Viva-Voice</b>                                          |     |                                                                                                                                   |
| 13 <sup>TH</sup> | 37 | <b>Pumps and valves</b>                                    |     |                                                                                                                                   |
|                  | 38 | Construction and working of the pumps.                     |     |                                                                                                                                   |
|                  | 39 | Reciprocating pump its principle                           |     |                                                                                                                                   |
| 14 <sup>TH</sup> | 40 | Centrifugal pump its principle                             |     | Viva voce and final evaluation                                                                                                    |
|                  | 41 | gear and screw pump                                        |     |                                                                                                                                   |
|                  | 42 | Ball valve, gate valve piston and butterfly                |     |                                                                                                                                   |
| 15 <sup>th</sup> | 43 | solenoid valve                                             |     |                                                                                                                                   |
|                  | 44 | <b>Revise Syllabus Viva-Voice</b>                          |     |                                                                                                                                   |
|                  | 45 | <b>Class Test-III</b>                                      |     |                                                                                                                                   |

**Lesson Plan**  
**Plastic Engineering**  
**5<sup>th</sup> Semester**

## LESSON PLAN

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

**Discipline:** Plastic Engineering

**Semester:** 5<sup>th</sup>

**Subject:** PLASTIC PROCESSING TECHNIQUES-III

**Lesson plan Duration:** 15 WEEKS

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

| Week            | Working Day | Topic Covered                                            | Practical DAY | TOPIC                                                                                                   |
|-----------------|-------------|----------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------|
| 1 <sup>ST</sup> | 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 <sup>ND</sup> | 5           | Piston-Screw type Injection molding                      |               |                                                                                                         |
|                 | 6           | Reciprocating type Injection molding                     |               |                                                                                                         |
|                 | 7           | Description with detailed construction.                  |               |                                                                                                         |
|                 | 8           | Selection criteria for injection moulding machine        |               |                                                                                                         |
| 3 <sup>RD</sup> | 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 <sup>TH</sup> | 13          | Electronic control system                                |               |                                                                                                         |
|                 | 14          | Parts and functions                                      |               |                                                                                                         |
|                 | 15          | General specification of Injection Molding               |               |                                                                                                         |
|                 | 16          | Start-up procedure                                       |               |                                                                                                         |
| 5 <sup>TH</sup> | 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 <sup>TH</sup>  | 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 <sup>TH</sup>  | 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 <sup>TH</sup>  | 29 | Description with detailed construction.                            |   |                                                                                                                     |
|                  | 30 | Basic principles of blow moulding                                  |   |                                                                                                                     |
|                  | 31 | Types of blow moulding                                             |   |                                                                                                                     |
|                  | 32 | Extrusion blow moulding                                            |   |                                                                                                                     |
| 9 <sup>TH</sup>  | 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 <sup>TH</sup> | 37 | Parison wall thickness control                                     |   |                                                                                                                     |
|                  | 38 | Parison blowing systems                                            |   |                                                                                                                     |
|                  | 39 | Effect of process variables on product design and properties.      |   |                                                                                                                     |
|                  | 40 | Parison programming                                                |   |                                                                                                                     |
| 11 <sup>TH</sup> | 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 <sup>TH</sup> | 45 | Defects in blow moulding products, their causes and remedies. | 6. | Practice of Die setting<br>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 <sup>TH</sup> | 49 | Estimation through trial analysis                             |    |                                                                                                                  |
|                  | 50 | Type of machine                                               |    |                                                                                                                  |
|                  | 51 | Process variables                                             |    |                                                                                                                  |
|                  | 52 | Charge size, wall thickness control                           |    |                                                                                                                  |
| 14 <sup>TH</sup> | 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 <sup>TH</sup> | 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. Sunil Kumar (Theory & Practical) / Sh. Ajay Kumar (Practical)

**Discipline:** Plastic Engineering

**Semester:** 5<sup>th</sup>

**Subject:** PRWM

**Lesson plan Duration:** 15 WEEKS

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

| Week            | THEORY      |                                                                                        | PRACTICAL     |                                                                                           |
|-----------------|-------------|----------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------|
|                 | Lecture DAY | TOPIC                                                                                  | Practical DAY | TOPIC                                                                                     |
| 1 <sup>ST</sup> | 1           | <b>Unit-I : Pollution and Hazards related to Plastics</b> 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 <sup>ND</sup> | 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 <sup>RD</sup> | 7           | Collection of plastic waste                                                            | 3             | Conversion of collected samples into plastic granules                                     |
|                 | 8           | <b>Unit-II: Plastic waste and its Separation</b>                                       |               |                                                                                           |
|                 | 9           | Collection of plastic waste                                                            |               |                                                                                           |
| 4 <sup>TH</sup> | 10          | Sources of plastic wastes,                                                             | 4             | Property modification of plastic granules by adding natural material like cellulose       |
|                 | 11          | <b>Class Test - I</b>                                                                  |               |                                                                                           |
|                 | 12          | Sorting methods such as Identification marks,                                          |               |                                                                                           |
| 5 <sup>TH</sup> | 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 <sup>TH</sup> | 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 <sup>TH</sup> | 19          | Sources of plastic wastes,                                                             |               |                                                                                           |

|                  |    |                                                                                                                    |   |                                                                                             |
|------------------|----|--------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------------|
|                  | 20 | Collection of plastic waste                                                                                        | 7 | To carry out plastic waste management of at least one department/section of the polytechnic |
|                  | 21 | <b>Class Test-II</b>                                                                                               |   |                                                                                             |
| 8 <sup>TH</sup>  | 22 | <b>Unit-III: Polymer degradation and their life expectancy</b>                                                     |   |                                                                                             |
|                  | 23 | Natural and synthetic polymer and their compatibility with surroundings                                            |   |                                                                                             |
|                  | 24 | starch and proteins, silicones and other man-made fabrics.                                                         |   |                                                                                             |
| 9 <sup>TH</sup>  | 25 | Life expectancy of different plastics in environment and thermal degradation, biodegradation and photo degradation |   |                                                                                             |
|                  | 26 | Agents for increasing life expectancy of polymers                                                                  |   |                                                                                             |
|                  | 27 | <b>Unit-IV: Plastic Waste Management:</b>                                                                          |   |                                                                                             |
| 10 <sup>TH</sup> | 28 | Public awareness regarding hazards caused by indiscriminate use of plastics                                        |   |                                                                                             |
|                  | 29 | Proper disposal of plastics, Need and importance of plastic reprocessing.                                          |   |                                                                                             |
|                  | 30 | <b>Unit-V: Plastic Waste Management Techniques</b>                                                                 |   |                                                                                             |
| 11 <sup>TH</sup> | 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 <sup>TH</sup> | 34 | <b>Unit-VI: Machinery and Value addition:</b>                                                                      |   |                                                                                             |
|                  | 35 | Process flow chart by mechanical route - Basic Mechanical recycling                                                |   |                                                                                             |
|                  | 36 | Plant-Additives for improving quality of recycled products                                                         |   |                                                                                             |
| 13 <sup>TH</sup> | 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 <sup>TH</sup> | 40 | waste water recovery by membrane separation                                                                        |   |                                                                                             |
|                  | 41 | Revision of topic                                                                                                  |   |                                                                                             |
|                  | 42 | Again, revised important topic of exam point of view                                                               |   |                                                                                             |
| 15 <sup>TH</sup> | 43 | Viva voce                                                                                                          |   | Viva voce and final evaluation                                                              |
|                  | 44 | Practice for the whole syllabus                                                                                    |   |                                                                                             |
|                  | 45 | <b>Class Test-III</b>                                                                                              |   |                                                                                             |

## LESSON PLAN

**Name of Faculty: Sh. Pankaj Garg (Theory) & (Practical)**

**Discipline: Plastic Engineering**

**Semester: 5<sup>th</sup>**

**Subject: Compounding and Formulation of Plastics (CAFP)**

**Lesson plan Duration: 15 WEEKS**

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

| Week            | THEORY      |                                                        | PRACTICAL     |                                                                                                                                          |
|-----------------|-------------|--------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Lecture DAY | TOPIC                                                  | Practical DAY | TOPIC                                                                                                                                    |
| 1 <sup>ST</sup> | 1           | <b>Unit 1: Introduction</b><br>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 <sup>ND</sup> | 5           | Service life of plastics                               |               | PVC compound in solvents such as THF, EDC and Cyclohexanone and removing PVC and soluble organic materials                               |
|                 | 6           | <b>Class test –I</b>                                   |               |                                                                                                                                          |
|                 | 7           | <b>Unit –II : Definition of additives</b>              |               |                                                                                                                                          |
|                 | 8           | Classification of additives                            |               |                                                                                                                                          |
| 3 <sup>RD</sup> | 9           | Description of following additives and their functions | 2             | Making a PVC compound having following ingredients (100 parts)<br>Stabilizer (2 – 3 parts), Lubricant (0.5 – 1.0 parts);                 |
|                 | 10          | Properties Modifiers                                   |               |                                                                                                                                          |
|                 | 11          | Plasticisers                                           |               |                                                                                                                                          |
|                 | 12          | Fillers                                                |               |                                                                                                                                          |
| 4 <sup>TH</sup> | 13          | Impact modifiers                                       |               | plasticizers (20 – 50 parts);<br>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 <sup>TH</sup> | 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 <sup>TH</sup> | 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 <sup>TH</sup>  | 25 | Antiageing additives                                          | 4 | Analysis of the effects of fillers on mechanical properties of PVC compound                                       |
|                  | 26 | Antioxidants                                                  |   |                                                                                                                   |
|                  | 27 | Anti-ozonants                                                 |   |                                                                                                                   |
|                  | 28 | UV stablisers                                                 |   |                                                                                                                   |
| 8 <sup>TH</sup>  | 29 | Fungicides                                                    | 5 | Compounding of polyethylene with various additives, fillers, stabilizers, blowing agent and rubber                |
|                  | 30 | Antitermites                                                  |   |                                                                                                                   |
|                  | 31 | Bactericide additives                                         |   |                                                                                                                   |
|                  | 32 | Miscellaneous additives:                                      |   |                                                                                                                   |
| 9 <sup>TH</sup>  | 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 <sup>TH</sup> | 37 | Smoke Suppressants                                            |   |                                                                                                                   |
|                  | 38 | <b>Class Test – II</b>                                        |   |                                                                                                                   |
|                  | 39 | Formulation of various ingredients in the compounding         |   |                                                                                                                   |
|                  | 40 | Role of various ingredients in the compounding for both       |   |                                                                                                                   |
| 11 <sup>TH</sup> | 41 | Thermoplastics materials                                      |   |                                                                                                                   |
|                  | 42 | Thermoset materials                                           |   |                                                                                                                   |
|                  | 43 | <b>Unit-III : Compounding equipments :</b>                    |   |                                                                                                                   |
|                  | 44 | Ribbon blender                                                |   |                                                                                                                   |
| 12 <sup>TH</sup> | 45 | High speed mixer                                              |   |                                                                                                                   |
|                  | 46 | Banbury mixer                                                 |   |                                                                                                                   |
|                  | 47 | Two roll mill                                                 |   |                                                                                                                   |
|                  | 48 | Mixer extruder (construction and working of these equipments) |   |                                                                                                                   |
| 13 <sup>TH</sup> | 49 | Ultra turax mixers                                            |   |                                                                                                                   |
|                  | 50 | High sheer mixers                                             |   |                                                                                                                   |
|                  | 51 | Intensive dry mixer                                           |   |                                                                                                                   |
|                  | 52 | Compounders                                                   |   |                                                                                                                   |
| 14 <sup>TH</sup> | 53 | Twin screw extruders                                          |   |                                                                                                                   |
|                  | 54 | Construction of Kneaders                                      |   |                                                                                                                   |
|                  | 55 | Working of Kneaders                                           |   |                                                                                                                   |
|                  | 56 | Dispersors                                                    |   |                                                                                                                   |
| 15 <sup>TH</sup> | 57 | <b>Unit – IV : Compounding of PVC for rigid</b>               |   | Viva voce and final evaluation                                                                                    |
|                  | 58 | Semi-rigid applications                                       |   |                                                                                                                   |
|                  | 59 | Flexible applications.                                        |   |                                                                                                                   |
|                  | 60 | <b>Class Test-III</b>                                         |   |                                                                                                                   |

## LESSON PLAN

Name of Faculty: Sh. Arun Syan

Discipline: Plastic Engineering

Semester: 5<sup>th</sup>

Subject: EDM

Lesson plan Duration: 15 WEEKS

Work Load (Lecture) per week: 3 PERIODS

| WEEK            | THEORY      |                                                                                                                                                          |
|-----------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | LECTURE NOS | TOPIC                                                                                                                                                    |
| 1 <sup>ST</sup> | 1           | UNIT-1. Introduction to EDM                                                                                                                              |
|                 | 2           | Concept /Meaning and its need                                                                                                                            |
|                 | 3           | Qualities and functions of entrepreneur and barriers in entrepreneurship                                                                                 |
|                 | 4           | Sole proprietorship and partnership forms of business organisations                                                                                      |
| 2 <sup>ND</sup> | 5           | Schemes of assistance by entrepreneurial support agencies at National, State                                                                             |
|                 | 6           | District level: NSIC, NRDC, DC:MSME, SIDBI                                                                                                               |
|                 | 7           | NABARD, Commercial Banks                                                                                                                                 |
| 3 <sup>RD</sup> | 8           | SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI)                                                                                                |
|                 | 9           | Science and Technology Entrepreneur Parks (STEP).                                                                                                        |
|                 | 10          | CLASS TEST                                                                                                                                               |
| 4 <sup>TH</sup> | 11          | UNIT-2. Market Survey and Opportunity Identification                                                                                                     |
|                 | 12          | Scanning of business environment                                                                                                                         |
|                 | 13          | Salient features of National and State industrial policies and resultant business opportunities                                                          |
| 5 <sup>TH</sup> | 14          | Types and conduct of market survey                                                                                                                       |
|                 | 15          | Assessment of demand and supply in potential areas of growth                                                                                             |
|                 | 16          | Identifying business opportunity                                                                                                                         |
| 6 <sup>TH</sup> | 17          | Considerations in product selection                                                                                                                      |
|                 | 18          | CLASS TEST                                                                                                                                               |
|                 | 19          | UNIT-3. Project report Preparation                                                                                                                       |
| 7 <sup>TH</sup> | 20          | Preliminary project report                                                                                                                               |
|                 | 21          | Detailed project report including technical, economic and market feasibility                                                                             |
|                 | 22          | Common errors in project report preparations                                                                                                             |
| 8 <sup>TH</sup> | 23          | Exercises on preparation of project report                                                                                                               |
|                 | 24          | UNIT-4. Introduction to Management                                                                                                                       |
|                 | 25          | Definitions and importance of management<br>Functions of management: Importance and Process of planning, organising, staffing, directing and controlling |
| 9 <sup>TH</sup> | 26          | Principles of management (Henri Fayol, F.W. Taylor)                                                                                                      |

|                  |    |                                                                                                                                                                                                                              |
|------------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |    | Concept and structure of an organisation                                                                                                                                                                                     |
|                  | 27 | Types of industrial organizations: Line organization, Line and staff organization, Functional Organisation                                                                                                                   |
| 10 <sup>TH</sup> | 28 | <b>UNIT-5: Leadership and Motivation</b> Leadership: Definition and Need                                                                                                                                                     |
|                  | 29 | Qualities and functions of a leader                                                                                                                                                                                          |
|                  | 30 | Manager Vs leader                                                                                                                                                                                                            |
| 11 <sup>TH</sup> | 31 | Types of leadership                                                                                                                                                                                                          |
|                  | 32 | Motivation: Definitions and characteristics                                                                                                                                                                                  |
|                  | 33 | Factors affecting motivation                                                                                                                                                                                                 |
| 12 <sup>TH</sup> | 34 | Theories of motivation (Maslow, Herzberg, McGregor)                                                                                                                                                                          |
|                  | 35 | <b>UNIT-6: Management Scope in Different Areas</b><br>Human Resource Management : Introduction and objective, Introduction to Man power planning, recruitment and selection<br>Introduction to performance appraisal methods |
|                  | 36 | Material and Store Management: Introduction functions, and objectives,                                                                                                                                                       |
| 13 <sup>TH</sup> | 37 | ABC Analysis and EOQ                                                                                                                                                                                                         |
|                  | 38 | Marketing and sales: Introduction, importance, and its functions                                                                                                                                                             |
|                  | 39 | Physical distribution, Introduction to promotion mix, Sales promotion                                                                                                                                                        |
| 14 <sup>TH</sup> | 40 | Financial Management :Introductions, importance and its functions                                                                                                                                                            |
|                  | 41 | Elementary knowledge of income tax, sales tax, excise duty, custom duty and VAT                                                                                                                                              |
|                  | 42 | <b>UNIT-7: Miscellaneous Topics</b><br>Customer Relation Management (CRM), Definition and need,Types of CRM                                                                                                                  |
| 15 <sup>TH</sup> | 43 | Total Quality Management (TQM) :Statistical process control, Total employees Involvement, Just in time (JIT)                                                                                                                 |
|                  | 44 | Intellectual Property Right (IPR) :Introductions, definition and its importance, Infringement related to patents, copy right, trade mark                                                                                     |
|                  | 45 | <b>CLASS TEST</b>                                                                                                                                                                                                            |

## LESSON PLAN

Name of Faculty: Ajay Kumar

Discipline: Plastic Engineering

Semester: 5<sup>th</sup>

Subject: Plastic Packaging and Printing

Lesson plan Duration: 15 WEEKS

Work Load (Lecture) per week: 3 PERIODS

| WEEK            | THEORY      |                                                          |
|-----------------|-------------|----------------------------------------------------------|
| K               | LECTURE NOS | TOPIC                                                    |
| 1 <sup>ST</sup> | 1           | UNIT-1. Co-extrusion, its types.                         |
|                 | 2           | Extrusion-stretch Blow Moulding                          |
|                 | 3           | Extrusion-stretch Blow Moulding contd.                   |
|                 | 4           | Low Density Polyethylene,                                |
| 2 <sup>ND</sup> | 5           | High Density Polyethylene,                               |
|                 | 6           | Ultra -High Density Polyethylene,                        |
|                 | 7           | Ultra High Molecular High-Density                        |
| 3 <sup>RD</sup> | 8           | Polyethylene Applications in Packaging.                  |
|                 | 9           | Applications in Packaging of Polypropylene               |
|                 | 10          | Applications in Packaging of Polypropylene Films,        |
| 4 <sup>TH</sup> | 11          | Applications in Packaging of Polystyrene-Properties,     |
|                 | 12          | Processing and Applications, PVC in Packaging,           |
|                 | 13          | CLASS TEST                                               |
| 5 <sup>TH</sup> | 14          | Processing and Applications of Nylon - 6 Films,          |
|                 | 15          | Polyester Film, identification of Plastics,              |
|                 | 16          | Expanded Polystyrene, ,Expanded Polyethylene,            |
| 6 <sup>TH</sup> | 17          | Plastic Woven Sacks                                      |
|                 | 18          | Polycarbonate (PC).                                      |
|                 | 19          | Packaging of Processed Food Products, dehydrated.        |
| 7 <sup>TH</sup> | 20          | Ready to use Foods,                                      |
|                 | 21          | Packaging of Meat, Fish & Poultry,                       |
|                 | 22          | Packaging of Fresh Foods,                                |
| 8 <sup>TH</sup> | 23          | Packaging of Dairy Products                              |
|                 | 24          | Packaging of Biscuits,                                   |
|                 | 25          | Bread & Confectionery,                                   |
| 9 <sup>TH</sup> | 26          | Packaging of fruit Juices,                               |
|                 | 27          | A septic Packaging–Sterilization of Packaging Materials, |

|                        |           |                                                                        |
|------------------------|-----------|------------------------------------------------------------------------|
| <b>10<sup>TH</sup></b> | <b>28</b> | <b>Using Aseptic System, Aseptic Packaging,</b>                        |
|                        | <b>29</b> | <b>Sterilization by Irradiation, radiation.</b>                        |
|                        | <b>30</b> | <b>Packaging of Horticultural Crops,</b>                               |
| <b>11<sup>TH</sup></b> | <b>31</b> | <b>Packaging of Pharmaceutical products injectable.</b>                |
|                        | <b>32</b> | <b>Packaging of Pharmaceutical products - Orals,</b>                   |
|                        | <b>33</b> | <b>Packaging of Textiles, Packaging of Fertilizers &amp; Chemical.</b> |
| <b>12<sup>TH</sup></b> | <b>34</b> | <b>Printing Techniques, Gravure,</b>                                   |
|                        | <b>35</b> | <b>Printing Techniques Flexography,</b>                                |
|                        | <b>36</b> | <b>Inkjet Printing for coding,</b>                                     |
| <b>13<sup>TH</sup></b> | <b>37</b> | <b>Marking Applications, Surface Design and Sales Appeal,</b>          |
|                        | <b>38</b> | <b>Graphic and Surface design.</b>                                     |
|                        | <b>39</b> | <b>Printing Inks, Bar Coding</b>                                       |
| <b>14<sup>TH</sup></b> | <b>40</b> | <b>Reinforcements on Distribution Packages,</b>                        |
|                        | <b>41</b> | <b>Corrosion Prevention in Packaging,</b>                              |
|                        | <b>42</b> | <b>Principles of Corrosion and its impact on Packaging.</b>            |
| <b>15<sup>TH</sup></b> | <b>43</b> | <b>Adhesive Tapes, their Manufacture Properties &amp; Laminations,</b> |
|                        | <b>44</b> | <b>BOPP Pressure Sensitive Tapes.</b>                                  |
|                        | <b>45</b> | <b>CLASS TEST</b>                                                      |