

## LESSON PLAN

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

**Discipline: Plastic Engineering.**

**Semester: 4<sup>th</sup>**

**Subject: PLASTIC PROCESSING TECHNIQUES-II**

**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           | General principles and working of compression molding machine                                       | 1             | To produce small components on hand operated compression molding machine        |
|                 | 2           | Types of compression molding machine – hand operated, automatic single and multi daylight machines, |               |   |
|                 | 3           | bulk factor, preheating of molds, cycle time,   |               |   |
|                 |             |   |               |   |
| 2 <sup>ND</sup> | 4           | process variables and their control   | 2             | To produce components on automatic compression molding machine                  |
|                 | 5           | Common faults and their remedies.   |               |   |
|                 | 6           | Principles of transfer molding.   |               |   |
| 3 <sup>RD</sup> | 7           | Types of transfer molding machines,   | 3             | To determine various defects and their remedies in Compression moulding process |
|                 | 8           | molding cycle faults causes and remedies.   |               |   |
|                 | 9           | Comparison between compression and Transfer Moulding.   |               |   |
| 4 <sup>TH</sup> | 10          | Basic principles, method of thermoforming   | 4             | To produce articles on vacuum forming machine                                   |
|                 | 11          | straight forming drape forming  |               |   |

|                 |    |  |   |   |
|-----------------|----|--|---|---|
|                 | 12 | matched mold forming, snap back forming,         |   |   |
| 5 <sup>TH</sup> | 13 | reverse draw forming and vacuum forming,         | 5 | To determine various defects and their remedies in Vacuum forming process |
|                 | 14 | <b>Class Test-II</b>                             |   |   |
|                 | 15 | limitations and advantages of forming,           |   |   |
| 6 <sup>TH</sup> | 16 | types of heating systems,                        | 6 | To do casting of polyester resin.   |
|                 | 17 | faults: causes and their remedies.               |   |   |
|                 | 18 | Hand Lay-up technique Spray- up technique        |   |   |
| 7 <sup>TH</sup> | 19 | bag moulding                                     | 7 | Exercises on high frequency PVC welding machine                           |
|                 | 20 | Filament winding,                                |   |   |
|                 | 21 | centrifugal casting, pultrusion.                 |   |   |
| 8 <sup>TH</sup> | 22 | Introduction, Plastics materials used in casting | 8 | To study various parts and  |

|                  |    |   |  |   |
|------------------|----|---|--|---|
|                  | 23 | casting Techniques for Thermoplastic                              |  | operating conditions of transfer moulding machine |
|                  | 24 | casting Techniques for Thermoset                                  |  |   |
| 9 <sup>TH</sup>  | 25 | casting Techniques for and Biodegradable Plastics                 |  |   |
|                  | 26 | Forms of Plastics Materials used in Casting Techniques.           |  |   |
|                  | 27 | Casting techniques used with Plastics materials like Cell casting |  |   |
| 10 <sup>TH</sup> | 28 | Potting and encapsulation,  |  |   |
|                  | 29 | CLASS TEST 3  |  |   |
|                  | 30 | film casting,   |  |   |
| 11 <sup>TH</sup> | 31 | Mould Casting   |  |   |
|                  | 32 | Embedding,  |  |   |
|                  | 33 | Plastisol Casting   |  |   |

|                  |    |   |  |                                |
|------------------|----|---|--|--------------------------------|
| 12 <sup>TH</sup> | 34 | Dip casting                               |  |                                |
|                  | 35 | Slush Casting.                            |  |                                |
|                  | 36 | Post Processing and Finishing of Plastics |  |                                |
| 13 <sup>TH</sup> | 37 | Engraving technique contd.                |  |                                |
|                  | 38 | Engraving technique technique             |  |                                |
|                  | 39 | vacuum metalizing contd.                  |  |                                |
| 14 <sup>TH</sup> | 40 | vacuum metalizing                         |  |                                |
|                  | 41 | Painting technique                        |  |                                |
|                  | 42 | Electroplating contd.                     |  |                                |
| 15 <sup>TH</sup> | 43 | Electroplating                            |  | Viva voce and final evaluation |
|                  | 44 | Revision                                  |  |                                |
|                  | 45 | Unit 5 <sup>th</sup> complete             |  |                                |

## LESSON PLAN

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

**Discipline: Plastic Engineering.**

**Semester: 4<sup>th</sup>**

**Subject: Plastic Materials & Properties-II**

**Lesson plan Duration: 15 WEEKS**

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

| Week            | THEORY  |   |
|-----------------|---------|---|
| 1 <sup>ST</sup> | Lecture | TOPIC   |
|                 | DAY     | <b>Unit 1: Introduction</b>                               |
|                 | 1       | Introduction to Engineering thermoplastics                |
|                 | 2       | Preparation of Engineering, thermoplastics                |
|                 | 3       | properties and application of Engineering, thermoplastics |
| 2nd             | 4       | Poly Ether Ether Ketone (PEEK),                           |
|                 | 5       | Poly Phenylene Oxide (PPO),                               |
|                 | 6       | Poly-sulphones (PSO) ,                                    |
| 3rd             | 7       | Poly Tetra Flouro Ethylene (PTFE),                        |
|                 | 8       | Liquid Crystalline Polymer (LCP)                          |
|                 | 9       | Poly acetals (POM),                                       |
| 4 <sup>th</sup> | 10      | <b>UNIT II Reinforced Plastics</b>                        |
|                 | 11      | Introduction to Reinforced Plastics                       |
|                 | 12      | carbon fiber preparation and properties                   |

|                  |    |  |
|------------------|----|--|
| 5 <sup>th</sup>  | 13 | Poly Ether Sulphones (PES)                       |
|                  | 14 | Principles of composite reinforcement,           |
|                  | 15 | Effect of reinforcement on strength of plastics. |
| 6 <sup>th</sup>  | 16 | fillers and additives,                           |
|                  | 17 | Various types of reinforcement fibers,           |
|                  | 18 | Unsaturated Polyester,                           |
| 7 <sup>th</sup>  | 19 | Coupling agents.                                 |
|                  | 20 | glass fiber preparation and properties           |
|                  | 21 | Aramid fiber.                                    |
| 8 <sup>th</sup>  | 22 | Concept of Nano-composite polymers.              |
|                  | 23 | <b>UNIT III Poly-blends and Alloys</b>           |
|                  | 24 | Definition, advantage of polymers blends         |
| 9 <sup>th</sup>  | 25 | Alloys and their advantages                      |
|                  | 26 | role of composition                              |
|                  | 27 | Interpenetrating polymer networks (IPN)          |
| 10 <sup>th</sup> | 28 | PVC- Nitrile rubber,                             |
|                  | 29 | ABS-PVC and PP-EPDM                              |
|                  | 30 | alloys,  |
| 11 <sup>TH</sup> | 31 | role of composition                              |
|                  | 32 | Class test 2                                     |
|                  | 33 | UNIT IV Emerging Materials and Applications      |
| 12 <sup>th</sup> | 34 | Preliminary concept of new materials             |

|                  |    |  |
|------------------|----|--|
|                  | 35 | conducting polymers                                |
|                  | 36 | biopolymers, opto-electronic plastics              |
| 13 <sup>th</sup> | 37 | polymer concretes                                  |
|                  | 38 | Use of polymers in new applications                |
|                  | 39 | food packaging, biomedical membrane separation.    |
| 14 <sup>TH</sup> | 40 | <b>UNIT V : Thermoplastic Elastomers</b>           |
|                  | 41 | Basic properties and applications of the following |
|                  | 42 | Styrene block copolymer                            |
|                  | 43 | Thermoplastic polyurethane elastomers              |
| 15 <sup>th</sup> | 44 | co-polyester elastomers                            |
|                  | 45 | Thermoplastic poly-olefins.                        |
|                  |    | Class Test 3                                       |

## LESSON PLAN

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

**Discipline: Plastic Technology**

**Semester: 4<sup>th</sup>**

**Subject: PLASTIC TESTING AND QUALITY CONTROL**

**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           | UNIT I Concept of Testing & Quality Control  | 1             | To determine the tensile strength, flexural strength of plastics specimen.    |
|                 | 2           | Basic concepts of testing,   |               |   |
|                 | 3           | overview of various test standards   |               |   |
|                 |             |  |               |   |
| 2 <sup>ND</sup> | 4           | Test specimen preparation: preconditioning   | 2             | To determine water absorption of various plastics.                            |
|                 | 5           | Basic concept of statistical quality control, Statistical process control            |               |   |
|                 | 6           | kaizen, three-sigma, 5S and root cause analysis                                      |               |   |
| 3 <sup>RD</sup> | 7           | Analysis of test data to control finished product in relation to service requirement | 3             | To determine impact strength of different plastics specimen.                  |
|                 | 8           | <b>CLASS TEST-I</b>  |               |   |
|                 | 9           | UNIT II Mechanical Testing   |               |   |
| 4 <sup>TH</sup> | 10          | Visual examination, Physical Identification test for identification of Plastics      | 4             | To determine hardness (Shore and Rockwell) of different specimen of plastics. |

|                 |    |   |   |  |
|-----------------|----|---|---|--|
|                 | 11 | Specific gravity, bulk density and Water absorption, Tensile strength, flexural |   |  |
|                 | 12 | fatigue resistance,   |   |  |
| 5 <sup>TH</sup> | 13 | compression strength, impact strength (Izod & Charpy)                           | 5 | To carry out dart impact test on given plastics films/laminates. |
|                 | 14 | Dart impact for films, tear test, creep and stress relaxation                   |   |  |
|                 | 15 | Hardness test – Shore, Rockwell and Brinell hardness, Abrasion resistance       |   |  |
| 6 <sup>TH</sup> | 16 | UNIT III Thermal and Flammability Test  | 6 | To determine the Melt Flow Index of given samples of plastics.   |
|                 | 17 | Flame test for identification of Plastics,                                      |   |  |
|                 | 18 | Vicat softening point (VSP)   |   |  |
| 7 <sup>TH</sup> | 19 | Limiting oxygen index   | 7 | To carry out Heat detection test on                              |

|                  |    |   |    |   |
|------------------|----|---|----|---|
|                  | 20 | heat distortion temperature,                    |    | given samples of plastics   |
|                  | 21 | Melt flow index                                 |    |   |
| 8 <sup>TH</sup>  | 22 | Flame test for identification of Melting point, | 8  | To carry out vicat softening point test on given samples of plastics  |
|                  | 23 | Smoke density test.                             |    |   |
|                  | 24 | Flammability Test                               |    |   |
| 9 <sup>TH</sup>  | 25 | <b>CLASS TEST-II</b>                            | 9  | To carry out environmental stress cracking resistance test on given samples of plastics                                       |
|                  | 26 | UNIT IV Electrical and Optical Test             |    |   |
|                  | 27 | Dielectric strength,                            |    |   |
| 10 <sup>TH</sup> | 28 | volume resistivity                              | 10 | Identification of Plastics by Simple methods / primary tests like visual examination, solubility test, burning and odor test. |
|                  | 29 | arc resistance                                  |    |   |
|                  | 30 | dielectric constant                             |    |   |
| 11 <sup>TH</sup> | 31 | surface resistivity                             | 11 | To determine volume and surface resistivity of different plastics specimens.  |
|                  | 32 | refractive index                                |    |   |



|                  |    |  |    |   |
|------------------|----|--|----|---|
|                  | 33 | Luminous transmittance                         |    |   |
| 12 <sup>TH</sup> | 34 | Clarity and Haze                               | 12 | To determine gloss of different plastics specimens. |
|                  | 35 | Colour measurement                             |    |   |
|                  | 36 | Gloss.   |    |   |
| 13 <sup>TH</sup> | 37 | insulation resistance,                         | 13 | To perform tear testing on plastics specimens.      |
|                  | 38 | UNIT V Chemical and Weathering Testing:        |    |   |
|                  | 39 | Solubility test for identification of Plastics |    |   |
| 14 <sup>TH</sup> | 40 | Environment Stress cracking resistance         |    |   |
|                  | 41 | Accelerated weathering tests                   |    |   |
|                  | 42 | outdoor weathering of plastics,                |    |   |
| 15 <sup>TH</sup> | 43 | Resistance of plastics to biological systems   |    | Viva voce and final evaluation                      |
|                  | 44 | Revise the all syllabus                        |    |   |
|                  | 45 | <b>CLASS TEST-III</b>                          |    |   |

## LESSON PLAN

**Name of Faculty: Ajay Kumar (Theory + Practical)**

**Discipline: Plastic Engineering.**

**Semester: 4<sup>th</sup>**

**Subject: DESIGN OF DIES AND MOULDS – II**

**Lesson plan Duration: 15 WEEKS**

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

| Week            | THEORY      |   | PRACTICAL     |   |
|-----------------|-------------|---|---------------|---|
|                 | Lecture DAY | TOPIC   | Practical DAY | TOPIC   |
| 1 <sup>ST</sup> | 1           | UNIT I Introduction to Extrusion Dies           | 1             | Draw split and plate dies for solid sections. |
|                 | 2           | General features of extrusion dies,             |               |   |
|                 | 3           | design features like characteristic of polymers |               |   |
| 2 <sup>ND</sup> | 4           | polymer melt flow, die geometry                 | 2             | Draw pipe die (In-line type and offset type). |
|                 | 5           | material of construction,                       |               |   |
| 3 <sup>RD</sup> | 6           | heating system and temperature control          | 3             | To draw side fed die for blown film.          |
|                 | 7           | Ease of maintenance and cleaning.               |               |   |
| 4 <sup>TH</sup> | 8           | General features of Die materials               | 4             | To draw bottom fed die for blown film.        |
|                 | 9           | strength and rigidity                           |               |   |
| 5 <sup>TH</sup> | 10          | <b>CLASS TEST-I</b>                             | 5             | To draw rotating tubular die for blown film.  |
|                 | 11          | UNIT II Types of Extrusion Dies                 |               |   |
| 6 <sup>TH</sup> | 12          | Dies for solid sections (like rods)             | 6             | To draw axial flow crosshead parison die      |
|                 | 13          | hollow sections (like pipes and tubes)          |               |   |
| 7 <sup>TH</sup> | 14          | dies for blown films,                           | 7             | To draw radial flow crosshead parison die     |
|                 |             |   |               |   |

|                  |    |  |    |   |
|------------------|----|--|----|---|
| 8 <sup>TH</sup>  | 15 | parison dies, flat film wire and cable Coating. Sheet dies                   | 8  | Drawing of flat film dies like fish tail, coat hanger die.                        |
|                  | 16 | UNIT III Compression Mould Design  |    |   |
| 9 <sup>TH</sup>  | 17 | Types of compression moulds – hand compression moulds, semi-automatic moulds | 9  | To draw adjustable core die and die for core deflector for wire and cable coating |
|                  | 18 | Open flash, semi-positive and positive type                                  |    |   |
| 10 <sup>TH</sup> | 19 | Calculation of clamp pressure, ram pressure, platen size                     | 10 | Drawing of Open flash, semi positive and positive type compression moulds.        |
|                  | 20 | number of impressions  |    |   |
| 11 <sup>TH</sup> | 21 | type of loading chamber design   | 11 | To draw a Pot type transfer mould   |
|                  | 22 | <b>CLASS TEST-II</b>   |    |   |
| 12 <sup>TH</sup> | 23 | UNIT IV Transfer Mould Design  | 12 | To draw a Plunger type transfer   |

|                  |    |  |    |   |
|------------------|----|--|----|---|
|                  | 24 | Principles of transfer moulding, pot capacity, design of sprue, runner and gates,    |    | To draw various types of pinch off design |
| 13 <sup>TH</sup> | 25 | types of Transfer moulds- pot transfer, plunger transfer, Transfer pot calculations, | 13 | To draw layout of a Blow mould.           |
|                  | 26 | Calculation of Clamp pressure, ram pressure, platen size, no. of impressions.        |    |   |
| 14 <sup>TH</sup> | 27 | UNIT V Blow Mould Design   | 14 | Viva voce and final evaluation            |
|                  | 28 | Materials for Blow moulds, Extrusion blow moulds - cavity and pinch off              |    |   |
| 15 <sup>TH</sup> | 29 | injection blow moulds - neck design, mandrel design, and parison thickness contro    |    |   |
|                  | 30 | <b>CLASS TEST-III</b>  |    |   |

## **LESSON PLAN**

**Name of Faculty: PankajGarg /Ajay Kumar/Rahul Singh**

**Discipline: Plastic Engineering.**

**Semester: 6<sup>th</sup>**

**Subject: Major Project**

**Lesson plan Duration: 15 WEEKS**

**Work Load (Practical) per week: 5 PERIODS**

| WEEK             | PRACTICAL     |   |
|------------------|---------------|---|
|                  | PRACTICAL DAY | TOPIC   |
| 1 <sup>ST</sup>  | 1             | Selection of project assignment                                   |
| 2 <sup>ND</sup>  | 2             | Planning and execution of considerations                          |
| 3 <sup>RD</sup>  | 3             | Planning and execution of considerations                          |
| 4 <sup>TH</sup>  | 4             | Quality of performance  |
| 5 <sup>TH</sup>  | 5             | Providing solution of the problems or production of final product |
| 6 <sup>TH</sup>  | 6             | Providing solution of the problems or production of final product |
| 7 <sup>TH</sup>  | 7             | Sense of responsibility   |
| 8 <sup>TH</sup>  | 8             | Sense of responsibility   |
| 9 <sup>TH</sup>  | 9             | Self expression/ communication skills                             |
| 10 <sup>TH</sup> | 10            | Self expression/ communication skills                             |
| 11 <sup>TH</sup> | 11            | Interpersonal skills/human relations                              |

|                        |           |   |
|------------------------|-----------|---|
| <b>12<sup>TH</sup></b> | <b>12</b> | Interpersonal skills/human relations          |
| <b>13<sup>TH</sup></b> | <b>13</b> | Report writing skills                         |
| <b>14<sup>TH</sup></b> | <b>14</b> | Report writing skills                         |
| <b>15<sup>TH</sup></b> | <b>15</b> | Checking of project file, viva and evaluation |

## LESSON PLAN

**Name of Faculty: Pankaj Garg**

**Discipline: Plastic Engineering.**

**Semester: 6<sup>th</sup>**

**Subject:-PLASTIC PRODUCT DESIGN**

**Lesson plan Duration: 15 WEEKS**

**Work Load (Lecture/Practical) per week: 03 PERIODS**

| Week            | THEORY             |  |
|-----------------|--------------------|--|
| 1 <sup>ST</sup> | Lect<br>per<br>DAY | TOPIC  |
|                 |                    | <b>Unit 1: Introduction</b>                      |
|                 | 1                  | Introduction to Plastic Product Design           |
|                 | 2                  | Preliminary design considerations                |
|                 | 3                  | Design steps for plastic product,                |
| 2nd             | 4                  | Unit 2 Materials Selection                       |
|                 | 5                  | Various materials for Plastic Product            |
|                 | 6                  | Selection of material for particular application |
| 3rd             | 7                  | Short Term Properties                            |
|                 | 8                  | Cost economics                                   |
|                 | 9                  | Various processing limitations                   |
| 4 <sup>th</sup> | 10                 | Effects of environmental exposure                |
|                 | 11                 | Limitations of Product Design                    |
|                 | 12                 | Class Test 1                                     |

|                 |    |   |
|-----------------|----|---|
| 5 <sup>th</sup> | 13 | Unit 3 Product Design Features , Surface finish |
|                 | 14 | Texturing                                       |
|                 | 15 | Positioning of holes                            |
| 6 <sup>th</sup> | 16 | Ribs  |
|                 | 17 | Fillets   |
|                 | 18 | Wall thickness                                  |
| 7 <sup>th</sup> | 19 | Unit 4 Design Activities Introduction           |
|                 | 20 | Stages of product development                   |
|                 | 21 | Feasibility study                               |
| 8 <sup>th</sup> | 22 | Class test 2                                    |
|                 | 23 | Unit 5 Method of joining                        |
|                 | 24 | welding   |
| 9 <sup>th</sup> | 25 | Riveting  |
|                 | 26 | Types of Rivetings                              |
|                 | 27 | Cementing, Types of Cementing                   |

|                  |    |                           |
|------------------|----|---------------------------|
| 10 <sup>th</sup> | 28 | Adhesion                  |
|                  | 29 | Types of Adhesion         |
|                  | 30 | Sampling & its types      |
| 11 <sup>th</sup> | 31 | Drilling                  |
|                  | 32 | Assembly methods          |
|                  | 33 | Weld lines                |
| 12 <sup>th</sup> | 34 | Draft angles              |
|                  | 35 | Gate side and location    |
|                  | 36 | Internal plastics threads |
| 13 <sup>th</sup> | 37 | Undercuts, Tolerance      |

|                  |    |   |
|------------------|----|---|
|                  | 38 | Functional surfaces                     |
|                  | 39 | Letters and alphabets                   |
| 14 <sup>th</sup> | 40 | Gate side and location                  |
|                  | 41 | Case study of statically Loaded part    |
|                  | 42 | Dynamically loaded plastic product      |
| 15 <sup>th</sup> | 43 | Gears & its design, Spring & its design |
|                  | 44 | Various others plastic parts            |
|                  | 45 | Class test 3                            |



## LESSON PLAN

**Name of Faculty: Ajay Kumar**

**Discipline: Plastic Engineering.**

**Semester: 6th**

**Subject:- PROGRAMME ELECTIVE II (POLYMER COMPOSITES)**

**Lesson plan Duration: 15 WEEKS**

**Work Load (Lecture/Practical) per week: 03 PERIODS**

| W<br>ee<br>k    | THEORY         |  |
|-----------------|----------------|--|
|                 | Lecture<br>DAY | TOPIC                                  |
| 1 <sup>ST</sup> |                | UNIT I                                 |
|                 | 1              | <b>INTRODUCTION</b>                    |
|                 | 2              | Types of Reinforcements Fiber          |
|                 | 3              | Reinforcements fibers,                 |
|                 | 4              | Types of fibers                        |
| 2 <sup>nd</sup> | 5              | long and short fibers                  |
|                 | 6              | Particulates of fibers                 |
|                 | 7              | Application area,                      |
| 3 <sup>rd</sup> | 8              | Classification of Reinforced Plastics. |
|                 | 9              | FRP (fiber reinforced plastics)        |
|                 | 10             | Particulate reinforced plastics        |
| 4 <sup>th</sup> | 11             | Laminates/panels                       |

|                 |    |   |
|-----------------|----|---|
|                 | 12 | Class Test 1  |
| 5 <sup>th</sup> | 13 | UNIT II Fiber Reinforced Plastics   |
|                 | 14 | Types of Fibers: carbon, glass fibers (E-glass), natural fibers (jute, aramid etc.) |
|                 | 15 | man-made fibers (acrylic, nylon, (PAN), FRPs  |
| 6 <sup>th</sup> | 16 | Preparation, properties and applications of FRPs including                          |
|                 | 17 | Glass fiber reinforced polyesters - Glass fiber reinforced epoxies                  |
|                 | 18 | Glass fiber with polyurethanes - Carbon fiber reinforced epoxies, polyesters        |
| 7 <sup>th</sup> | 19 | Nature fiber reinforced polyesters  |
|                 | 20 | UNIT III Particulate Reinforced Plastics (PRP)                                      |
|                 | 21 | Different types of particulates;  |
| 8 <sup>th</sup> | 22 | talc, mica, carbon black, silica, fly ash   |
|                 | 23 | Fly ash, reinforced epoxies,  |
|                 | 24 | CaCO <sub>3</sub> , Metallic powder)  |
| 9 <sup>th</sup> | 25 | polyesters,   |
|                 | 26 | Silica reinforced polyurethanes and epoxies   |
|                 | 27 | Preparation of FRP  |

|                  |    |   |
|------------------|----|---|
| 10 <sup>th</sup> | 28 | properties and applications of PRPs   |
|                  | 29 | metal particles filled polyurethanes, epoxy                                 |
|                  | 30 | Talc reinforced silicones.  |
| 11 <sup>th</sup> | 31 | Class test 2  |
|                  | 32 | UNIT IV Nano-composites   |
|                  | 33 | Introduction to Nano-particles  |
| 12 <sup>th</sup> | 34 | Nano-composites based on Nano clay and their types and applications         |
|                  | 35 | carbon nano tubes, application and manufacturing methods of nano-composites |
|                  | 36 | UNIT V Types of laminates   |

|                  |    |  |
|------------------|----|--|
| 13 <sup>th</sup> | 37 | Rigid and flexible laminates Plastic             |
|                  | 38 | plastic laminates                                |
|                  | 39 | Plastic –other material                          |
| 14 <sup>th</sup> | 40 | (plastic–wood, plastic-paper, plastic-metal etc. |
|                  | 41 | Laminates preparation, properties                |
|                  | 42 | applications of following laminates              |
| 15 <sup>th</sup> | 43 | Packing material of potato chips and biscuits    |
|                  | 44 | - Plywood  |
|                  | 45 | Class test 3                                     |

## LESSON PLAN

**Name of Faculty: Sunil Kumar (Theory + Practical)**

**Discipline: Plastic Technology**

**Semester: 6th**

**Subject: MAINTENANCE OF PLASTIC PROCESSING MACHINES**

**Lesson plan Duration: 15 WEEKS**

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

| Week            | THEORY      |                                  | PRACTICAL     |  |
|-----------------|-------------|----------------------------------|---------------|--|
|                 | Lecture DAY | TOPIC                            | Practical DAY | TOPIC  |
| 1 <sup>ST</sup> | 1           | UNIT I Maintenance and its types | 1             | To check the alignment and leveling of PVC pipe plant,                             |
|                 | 2           | Maintenance                      |               |  |
|                 | 3           | Importance of Maintenance        |               |  |
|                 |             |                                  |               |  |
| 2nd             | 4           | objective of maintenance         | 2             | To check the alignment and leveling of injection moulding machine                  |
|                 | 5           | preventive maintenance           |               |  |
|                 | 6           | importance of maintenance        |               |  |
| 3rd             | 7           | break-down maintenance           | 3             | To check the alignment and leveling of extrusion and blow moulding machine.        |
|                 | 8           | predictive maintenance           |               |  |
|                 | 9           | schedule maintenance             |               |  |
| 4 <sup>th</sup> | 10          | maintenance planning             | 4             | Maintenance of Hydraulic system such as pumps, motors, valves, O-rings, oil seals. |
|                 | 11          | Total productive maintenance.    |               |  |
|                 | 12          | Class Test 1                     |               |  |

|                 |    |  |   |  |
|-----------------|----|--|---|--|
| 5 <sup>th</sup> | 13 | UNIT II Commissioning and alignment of machines  | 5 | To carry out lubrication and use of lubrication system in machines such as Injection moulding, Blow moulding machines. |
|                 | 14 | Factors to be considered installation/erection and commissioning of plastic processing machinery |   |  |
|                 | 15 | Vibrations and foundation. General method of alignment/ leveling.                                |   |  |
| 6 <sup>th</sup> | 16 | UNIT III Repair and maintenance of following electrical equipments                               | 6 | Repair and maintenance of Pneumatic System like air compressors and valves.  |
|                 | 17 | Electrical induction motors (slipping motors and squirrel cage motors)                           |   |  |
|                 | 18 | their characteristics  |   |  |
| 7 <sup>th</sup> | 19 | Circuit breakers   | 7 | Study and demonstration of various transmission systems (i.e. gears, V-belts, chains, rope).                           |
|                 | 20 | Oil circuit breakers   |   |  |
|                 | 21 | Brief introduction to limit switches   |   |  |
| 8 <sup>th</sup> | 22 | relays, temperature controllers  | 8 | Use of Precision equipments (such as vernier calipers,   |
|                 | 23 | timers   |   |  |

|                  |    |   |    |   |
|------------------|----|---|----|---|
|                  | 24 | variable speed motors   |    | micrometer etc.) for measurement of Dim.  |
| 9 <sup>th</sup>  | 25 | Speed control-Starters  | 9  | Maintenance of mould, die, screw and barrel.                                    |
|                  | 26 | Air circuit breakers  |    |   |
|                  | 27 | miniature circuit breakers                                      |    |   |
| 10 <sup>th</sup> | 28 | thermocouples, heaters  | 10 | To carry out breakdown maintenance of electrical equipments.                    |
|                  | 29 | ordinary and ceramic type                                       |    |   |
|                  | 30 | Study of safety rules and regulations                           |    |   |
| 11 <sup>th</sup> | 31 | Class test 2  | 11 | Study of temperature control with thermocouples and timer (Digital & Analogue). |
|                  | 32 | UNIT IV Repair and maintenance of plastics processing machinery |    |   |

|                  |    |  |    |                                      |
|------------------|----|--|----|--------------------------------------|
|                  | 33 | Repair and maintenance of plastics processing machinery                              |    |                                      |
| 12 <sup>th</sup> | 34 | Barrel, screw, thrust unit, primary gearboxes  | 12 | Hydraulic and Pneumatic Trainer Kit. |
|                  | 35 | calendar roll, mill rolls  |    |                                      |
|                  | 36 | Pumps such as gear pump, piston pump, radial/axial pump and screw pump               |    |                                      |
| 13 <sup>th</sup> | 37 | UNIT V Repair and Maintenance of Valves  |    |                                      |
|                  | 38 | Valves, valve sequences, valve counted balance, break valve, pressure reducing valve |    |                                      |
|                  | 39 | different control valves, solenoid valves  |    |                                      |
| 14 <sup>th</sup> | 40 | Hydraulic motors, hydraulic actuators and pneumatic controls                         |    |                                      |
|                  | 41 | filters, compressors, oil seeds, o-rings Lubrication system                          |    |                                      |
|                  | 42 | central lubrication system   |    |                                      |
| 15 <sup>th</sup> | 43 | Transmission system  |    | Viva voce and Final Evaluation       |
|                  | 44 | Gears, v-belts, chains.  |    |                                      |
|                  | 45 | Class test 3   |    |                                      |