

Department of Polymer & Surface Engineering
Four Semesters
Master of Technology Degree Examination Syllabus
Polymer Engineering and Technology Course

Semester III

Laboratory project work on the title of the thesis registered for the degree of M. Tech. in Polymer Engineering and Technology

Semester IV

Laboratory project work on the title of the thesis registered for the degree of M. Tech. in Polymer Engineering and Technology

Total credits: SEM I+SEM II = 42

SEMESTER I

No.		Course code	Subjects	Hours/ week (L + T)	Marks	Credits
1	Core I	PST 2201	Advanced Polymer Science	2+1	50	3
2	Core II	PST 2101	Polymer Processing & Technology I	2+1	50	3
3	Core III		Physical Methods of Analysis	2+1	50	3
4	Elective I	PST 2601	Environment & Polymer Technology	2+1	50	3
5	Elective II		To be selected from the pool of electives*	2+1	50	3
6	Project I	PSP 2101	Literature Review of Research Topic.	2+1	50	3
7	Project II	PSP 2201	Seminar	2+1	50	3
			TOTAL	14+7	350	21

SEMESTER II

No.		Course code	Subjects	Hours/week (L + T)	Marks	Credits
1	Core IV	PST 2401	Additives for polymers	2+1	50	3
2	Core V	PST 2102	Polymer Processing & Technology II	2+1	50	3
3	Core VI	PST 2103	Polymer Blends & Alloys	2+1	50	3
4	Elective III	PST 2104	Smart Polymers	2+1	50	3
5	Core VII	PST 2105	High Polymer Chemistry	2+1	50	3
6	Elective VI		To be selected from the pool of electives*	2+1	50	3
7	Project I	PSP 2301	Literature Review of Research Topic.	2+1	50	3
			TOTAL	14+7	350	21

*Electives offered from our own or any other department

Note: Department will offer the subject provided more than 5 students are opting the course.

Elective I & III: No restriction on students if the students from other Department are willing to take this course.

Syllabus:

Code & Title of the Course	PST 2201 Advance Polymer Science Core I
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	I

Sr.No.	Topic	Hrs
1	Mechanism of polymerization. Stereospecific polymerization. Newer methods of synthesis of polymers. Special purpose polymers.	24
2	Characterization and rheological properties of polymers.	8
3	Polymer solutions. Relation between properties and structure, crystallinity and orientation. Crosslinking of polymers and elastomers, Polymer degradation.	18

Textbooks/Sourcebooks:

1. Textbooks/Sourcebooks: Nanomaterials: from research to applications by Hideo Hosono
2. Nanomaterials: an introduction to synthesis, properties and application by Dieter Vollath
3. Nanomaterials: synthesis, properties, and applications by Alan S. Edelstein, Robert C. Cammarata
4. Nanomaterials handbook by Yury Gogotsi

Code & Title of the Course	PST 2101 Polymer Processing & Technology – I Core II
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	I

Sr.No.	Topic	Hrs
1	General scenario of the Indian Plastics Processing Industry, and the plastics material for processing.	3
4	Properties of plastics under high pressure and temperature, PVT diagrams. Elongational and shearing flows.	3
5	Extrusion: Type of single/twin screw extruders, controls, venting, compounding, reactive processing, extrusion of pipes/profiles, blown film, cast film/sheets, wire and cable coating, extrusion coating/Lamination, woven sacks, monofilament and non woven articles and similar operations foam extrusion, coextrusion, multilayer coextrusion; flow models for extrusion processes, economic aspects of the process, trouble shooting and remedies. Aspects of product design.	8
6	Calendaring: Different machinery and the advantages/limitations. Various operations involved in calendaring, pre and post calendaring operations, new developments, flow analysis, economic aspects, trouble shooting and other aspects of calendaring. Aspects of product design.	6
7	Compression moulding: Basic process, controls on the process, economics, heat transfer, continuous/semi automatic operations, trouble shooting, economic aspects, type of mould. Aspects of product design.	3
8	Fibre Spinning – Basic operations of fibre spinning; modelling of fibre spinning Process. Pultrusion: Basic process, reinforcement, resins, die post pultrusion operations, analysis of flow/curing, pultrusion of thermoplastics and trends, pulwinding, economic aspects, trouble shooting and remedies. Processing of polyurethane, elastomers, speciality polymers, foam etc. Processing of fibre reinforced plastics: Types of reinforcement, resins. Other techniques of processing thermosets, such as injection moulding etc. economic aspects, trouble shooting and remedies. Aspects of product design	21

Textbooks/Sourcebooks:

1. Polymer Processing Fundamentals, Osswald, A.Tim, Hansar Publishers, 1998.
2. Fundamentals of Reaction Injection Moulding, C.W. Macosko, Hanser Publisher, 1989.
3. Encyclopedia of Polymer Science and Technology, John Wiley and Sons, Inc 1965.

4. Fundamentals of Polymer Processing, S. Middleman, Houghton Mifflin Company, 1997.
5. Encyclopedia of Polymer Science and Technology, John Wiley and Sons, Inc 1988.

Code & Title of the Course	PST 2601 Environment & Polymer Technology Elective I
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	I

Sr.No.	Topic	Hrs
1	Role of polymers as replacement to various materials like glass, metal & wood.	3
2	Polymers as energy savers in various fields and their strength to weight ratio	4
3	Advantages & limitations of polymers.	6
4	Misconceptions about polymers.	3
5	Recycling of polymers & environment and Polymer coding	34

Textbooks/Sourcebooks:

1. Plastics Materials J. A. Brydson, Butterworth Scientific, 1990.
2. Polymer chemistry, Seymour and Carraher, Marcel Dekker, 2003.
3. Polymer Blends & Alloys: Folkes & Hopes Blackie academic Professional 1993.
4. Advance in Polymer Blends & Alloys Technology by Malvyn Kohudic, Technomic, 1988.
5. L.A. Utracki, Commercial Polymer Blends, Chapman & Hall, London, 1998.
6. D.R.Paul & Seymour Newman, Polymer Blends, Vo. 1 & 2, Academic Press, New York, 1978.
7. Chris Rauwendaal, Polymer Mixing a self study guide, Hanser Publishers, Munich, 1998.
8. Plastics Materials J. A. Brydson, Butterworth Scientific, 1990.
9. Polymer Blends & Alloys – An Overview,,: RP Singh, CK Das, S.K.Mustafi, Asian Books Published 1st ed. 2002.
10. Advance in Polymer Blends & Alloys Technology by Malvyn Kohudic, Technomic, 1988.
11. Chris Rauwendaal, Polymer Mixing a self study guide, Hanser Publishers, Munich, 1998.
12. Introduction to Polymer Science and Technology by H. S. Kaufman and J. J. Falcetta, Wiley – Interscience Publication, 1977
13. Handbook of Polyethylene, A. J. Peacock, Marcel Dakker Inc,2000.
14. Gerald Scott & Dan Gilad, Degradable Polymer – Principles & Applications, Chapman & Hall,
15. Y.Doï and K.Fukuda (Eds), Biodegradable Plastics and Polymers, Elsevier (1994).

16. Absorbable & Biodegradable Polymers – S.N. Shalaby & K.J.L. Burg, CRC Press (2003).
 17. R.J. Ehrig (Ed.), “Plastics Recycling – Products and Processes” Hanser Publication, Munich
 18. Biopolymers, Wiley, VCH Verlag, 2003.

Code & Title of the Course	PST 2401 Additives for Polymer Core IV
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	II

Sr.No.	Topic	Hrs
1	Classification of additives	3
2	Properties, applications & mechanism of additives like UV stabilizers, antioxidants, anti-ozonents, oxygen scavengers, coupling agents, Rheology modifiers, anti-microbial, & other additives etc.	34
3	Chemistry of additives.	6
4	Evaluation of additives.	2
5	Mechanism of additives.	3
6	Functional additives.	3
7	Newer trends in additives.	2

Textbooks/Sourcebooks:

- 1) R.Gachter and H. Muller, “Plastics Additives Hand Books”, Hanser Publications, Munich (1993).
- 2) J.A. Brydson, “Plastics Materials” Butterworth – Heinmann, Oxford (1999).
- 3) J.Murphy, “The additives for Plastics Hand Book”, Elsevier, Oxford (1996).

Code & Title of the Course	PST 2103 Polymer Blends & Alloys Core V
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	II

Sr.No.	Topic	Hrs
1	Definitions' of polymer blends & alloys (PBAs), compatibility, miscibility etc. Classification of PBAs.	9
2	Why blending is done & comparison of blends/ alloys with copolymers.	2
3	Thermodynamics of miscibility/ compatibility.	4
4	Floory- Huggins theory, Scott theory for miscibility.	3
5	Methods of determining miscibility & compatibility.	2
6	Steps followed for preparation of polymer blends and alloys.	5
7	Methods of Compatibilization/ IPNs. Selection criterion for blends, physical chemistry of polymers and their blends phase diagrams UCST/ LCST	7
8	Factors affecting properties of PBAs.	3
9	Rheological criteria, interfacial criteria. Synergy & additivity, log additivity & inverse additivity rules effect of interaction parameters on properties.	5
10	Different PBAs and their applications with case studies.	10

Textbooks/Sourcebooks:

1. Raw Materials for Industrial Polymers by H Ulrich, Hanser Publication 1989.
2. Principles of Polymer Science, by Bahadur and Sastry, Narosa Publishing House 2002.
3. Fundamentals of Polymer Processing, S. Middleman, Houghton Mifflin Company, 1997.
4. Plastics Materials J. A. Brydson, Butterworth Scientific, 1990.
5. Polymer Science by Gowariker, Johan Wiley and Sons 1986.
6. Safety Management in Industry : N.V.Krishnan, Jaico Publishing House, 1997.
7. Plastics and the Environment Anthony L. Andrady, John Wiley & Sons 2003.
8. Mc Grawhills Hazardss Chemicals safety guide for the plastics industry. Plastics for Environment & Sustainable Development ICPE & CIPET Publication 2003 Ed.
9. G.J.L. Griffin, Chemistry and Technology of Biodegradable Polymers, Blackie Academic Professional, 1994.

Code & Title of the Course	PST 2102 Polymer Processing & Technology- II Core VI
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	II

Sr.No.	Topic	Hrs
1	Injection moulding: Basics of injection moulding, machinery, moulding cycle, feeding of materials, preplasticization. Types of injection moulding machines, analysis of flow through sprue, runners, gates etc., mould loading/unloading, moulding defects, single and multistage screw/plunger machines, clamping systems, injection systems, various controls such as pneumatic, hydraulic electric or electronic; microprocessor based injection moulding machines, Gas assisted injection moulding. Retrofit and improvement. Use of computer software in understanding injection moulding and other processes, economic aspects, trouble shooting and remedies. Aspects of product design.	12
2	Blow Moulding: Basic machinery, moulding cycle of products made by the blow moulding stretch blow moulding, multistage blow moulding, analysis of flow in the blow moulding operations and design aspects. Blow moulding of multilayered articles, technical blow moulding, surface enhancements, economic aspects, trouble shooting and remedies. Aspects of product design.	8
3	Rotational moulding: Basic concepts, suitability of materials for this operations, cycle of rotational moulding, comparison with other moulding operations, analysis of flow and properties of product, economic aspects, trouble shooting and remedies. Aspects of product design.	6
4	Reaction Injection Moulding: Description of process, technological aspects associated with RIM, comparison with other operations, flow analysis, RRIM, newer trends, economics, trouble shooting and remedies. Aspects of product design.	8
5	Resin Transfer Moulding (RTM): The operation, materials, economic aspects, mould making. Thermoforming: The basic process, flow analysis, suitability of materials, applications, economic aspects, trouble shooting and remedies. Aspects of product design. Miscellaneous post processing operations: Fabrication of plastics, joining, welding, bonding etc, decoration of plastics, printing and painting on plastics, powder coating, surface preparation for such processes, hot stamp foil printing, offset printing, flexo/gravure printing, colouring of plastics, master batchers and their use in processing metallizing of plastics and similar operations. Aspects of product design.	16

Textbooks/Sourcebooks:

- 1) Encyclopedia of Polymer Science and Technology, Johan Wiley and Sons, Inc 1965.
- 2) Encyclopedia of Polymer Science and Engineering, Johan Wiley and Sons, Inc 1988.
- 3) Polymer Chemistry by Malcolm P. Stevens, Oxford University Press, Inc, 1990.
- 4) Introduction to Polymer Science and Technology by H. S. Kaufman and J. J. Falcetta, Wiley – Interscience Publication, 1977
- 5) Handbook of Polyethylene, A. J. Peacock, Marcel Dakker Inc,2000
- 6) Polymer Processing Fundamentals, Osswald, A. Tim, Hanser Publishers, 1998.
- 7) Fundamentals of Reaction Injection Moulding, C. W. Macosko, Hanser Publishers, 1989.
- 8) Fundamentals of Polymer Processing, S. Middleman, Houghton Mifflin Compony, 1997.
- 9) D.H.Maron-Jones, “Polymer Processing”, Chapman and Hall, London(1989) or newer edition.
- 10) W.Michaeli, “Plastics Processing – An Introduction” Hanser Publishers, New York (1992).
- 11) Seymour S.Schwartz and Sidney H.Goodman, ‘Plastics Materials and Process, Van Nostrand Reinhold Co., New York (1982).
- 12) Composite Material Handbook, M. M. Schwartz, McGraw-Hill company, 1984.
- 13) Handbook of Thermoplastics, O. Olabisi, Marcel Dekker, 1997.
- 14) Polymer and Resins; Their Chemistry and Chemical Engg, Brage Golding, D.Van Nostrand Company Inc, 1959
- 15) Billmeyer Jr.; Fred W., Synthetic Polymers, Doubleday and Co. Inc., New York (1972).
- 16) Gupta, V.B., and Kothari, V.K., Manufactured Fibre Technology, Chapman & Hall, 1997.
- 17) Fourne, Franz, “Synthetic Fibres, Machines and Equipment, Manufacture, Properties”, Hanser Publishes, 1999.
- 18) Text book of Polymer Science by Billmeyer, John Wiley ans Sons 1984.

Code & Title of the Course	PST 2105 High Polymer Chemistry Core VII
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	I

Sr.No.	Topic	Hrs
1	Synthesis of polymers by addition Polymerization.	15
2	Condensation polymerization and similar routes	15
3	Kinetics of polymerization	5
4	Physical chemistry of polymer solutions	5
5	Structure-property relationship	10

Textbooks/Sourcebooks:

1. High Polymer lattices- (1966)- by Blackly D.C.
2. Chemistry of High Polymer, Degradation Processes – (1956) by Grassic. N
3. Principles of high Polymer – Theory & practise, by Schmidt
4. Chemistry of High Polymer, by – Brain
5. Chemistry in Industry High Polymer by Toolcy
6. Progress in High Polymer, by Rood, J. C.
7. Nature & Chemistry of High Polymer, by – O’ Driscoll

Code & Title of the Course	PST 2104 Smart Polymers
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	Elective III
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	II

Sr.No.	Topic	Hrs
1	Introduction	4
2	Shape memory	5
3	Polymers responding to various stimuli such as heat, light, pressure, fluids/chemicals etc.	12
4	Conducting polymers classification/ requirements for conductivity, doping of polymers, light emitting polymers, liquid crystal polymers, their classification (LCs).	15
5	Advantages & limitations of these polymers.	2
6	Polymers Synthesis of some of these polymers & their structure property relationship.	12

Textbooks/Sourcebooks:

1. Smart Polymers: Applications In Biotechnology And Biomedicine by Igor. Galaev, Bo Mattiasson
2. Smart polymers for bioseparation and bioprocessing by Igor Yu Galaev, Igor Galaev, Bo Mattiasson
3. Coated Textiles: Principles and Applications by Ashish Kumar Sen
4. Bioconjugation protocols: strategies and methods by Christof M. Niemeyer.

Code & Title of the Course	PST 2702 Polymeric Nanocomposites.
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	Elective IV
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	II

Sr.No.	Topic	Hrs
1	Definitions of composites & nano composites.	4
2	Classification of nano-composites & their comparison with normal composites & blends.	8
3	Different materials used to manufacture nano-composites & their grades.	15
4	Methods of manufacturing characterization techniques.	10
5	Processing of nano composites.	8
6	Current challenges, health and safety.	5

Textbooks/Sourcebooks:

1. Polymer Science and Technology of Plastics and Rubbers, P. Ghosh,
2. Principles of Polymer Systems, Rodriguez, Hemisphere Publishing Corpn, 1982.
3. Polymer Science and Technology by J. R. Fried, Prentice-Hall, Inc 1995.
4. Fundamentals of Polymer Processing, S. Middleman, Houghton Mifflin Compony, 1997.
5. Composite Material Handbook, M. M. Schwartz, McGraw-Hill company, 1984.
6. Composites: Design Guide, Industrial Press Inc, 1987.
7. Composite Polymeric Material, R. P. Sheldon, Applied Science Publishers, 1982.
8. Understanding Extrusion by Chris rauwendaal, Hanser Publishers, 1998
9. Fillers and Filled Polymers, J. F. Gerard, Wiley-VCH verlag GmbH, 2001.
10. Composites: Design Guide, Industrial Press Inc, 1987.
11. Composite Material Handbook, M. M. Schwartz, McGraw-Hill company, 1984.
12. Composite Polymeric Material, R. P. Sheldon, Applied Science Publishers, 1982.

Code & Title of the Course	PST 2501 Adhesives and Adhesion
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	Elective II
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	I

Sr.No.	Topic	Hrs
1	Fundamentals of surface phenomenon, surface energy and surface tension. Basics of adhesion.	10
2	Theories of adhesion, applications, advantages and limitations	8
3	Types of substrates. Types of adhesives, surface preparations, methods of adhesive, applications, troubleshooting,	18
4	Various polymers used in adhesive applications.	10
5	Testing of adhesives. Industrial adhesives.	4

Textbooks/Sourcebooks:

1. Hand book of Adhesive technology, Pizzi, A. (ed); Mittal, K.L. (ed), Marcel Dekker, New York, 1996
2. Adhesion and adhesives technology: an introduction, A.V. Pocius, Hanser/Gardner, Munich, 1997.
3. Adhesion and Adhesives - Science and Technology, Kinloch, A.J., Chapman and Hall, 1987.

Code & Title of the Course	PST 2502 Physical and Structural Characterization of
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	Polymers Elective IV
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	II

Sr.No.	Topic	Hrs
1	Fourier Transform Infrared Spectroscopy: Molecular vibrations, basic theory of Fourier transform spectroscopy, inter-ferogram, data points collection; Instrumentation and advantages of FTIR spectrophotometry; Structural and conformational changes in polymers stress induced changes in polymer, chemical transformation and degradation in polymers, surface studies by ATR.	4
2	Microscopy: Basic principal of electron microscopy; Specimen-preparation, replication, coating and surface pretreatment; Structure determination of semi crystalline polymers by SEM and TEM; Lamellar, fibrillar globular and spherulite structures in polymers.	8
3	Thermal Analysis: Thermal transitions and their classification in polymers, glass transition temperature and its mechanism; Melting point of semi crystalline polymers; Characterizing polymer and polymer blends using DTA, DTG and DSC techniques; Thermal conductivity in polymers.	8
4	X-ray Diffraction: Bragg law of X-ray diffraction, crystal geometry; Structural determination of polymers using wide and small angle X-ray diffraction techniques.	5
5	Nuclear Magnetic Resonance Spectroscopy: Theory of NMR phenomenon, relaxation process, chemical shifts, spin-spin interaction, interpretation of NMR spectra; Instrumentation-continuous and pulsed NMR; Characterization of polymers using NMR spectroscopy	8
6	Electrical Properties: Electrical conduction in polymers, dielectric properties, electrical conductivity measurements in polymers, static charge in polymers, commercial application of conducting polymers.	9
6	Optical Properties: Interaction of light with polymers reflection and refraction of light by polymers, birefringence, birefringence in isotropic and anisotropic materials, orientation birefringence and its measurements in polymers.	8

Textbooks/Sourcebooks:

1. Polymer Characterization- Physical Techniques by D.Campbell and J.R.White
2. The Identification of Plastic and Rubber- K.J. Saunders.
3. Instrumental methods of analysis – Willard Dean and Merr.
4. Text book of Polymer Science- Billmeyer.

5. Thermal Characterization of polymeric Materials.

Code & Title of the Course	PST 2703 Rheology of Polymers Elective II
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	I

Sr.No.	Topic	Hrs
1	Basic concepts of Rheology.	4
2	Constitutive equations	6
3	Rheometry and characterization of plastics in terms of Rheology.	15
4	Role of Rheology in polymer processing	10
5	Simple shear flows, elongation flows	15

Textbooks/Sourcebooks:

1. Plastics engineering. RJ Crawford - Butterworth-Heinemann. (2002).
2. Principles of Polymer Engineering, N. G. McCrum, C. P. Buckley and C. B. Bucknall, Oxford Science publications, 1989.
3. Applied Rheology in Polymer Processing, B. R. Gupta, Asian Books Private Limited, New Delhi, 2005
4. Introduction to polymer science, L.H.Sperling, John wily and sons, 1985.

Code & Title of the Course	PST 2704 Speciality Plastics Elective IV
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	II

Sr.No.	Topic	Hrs
1	Polymer synthesis and characterization for high temperature application.	15
2	Photo resists polymers in solar energy utilization,	8
3	Biodegradable polymers,	10
4	Hydrolysis, and other newer type of polymers	12
5	Engineering polymers	5

Textbooks/Sourcebooks:

1. Raw Materials for Industrial Polymers by H Ulrich, Hanser Publication 1989.
2. Principles of Polymer Science, by Bahadur and Sastry, Narosa Publishing House 2002.
3. Encyclopedia of Polymer Science and Technology, Johan Wiley and Sons, Inc 1965.
4. Encyclopedia of Polymer Science and Engineering, Johan Wiley and Sons, Inc 1988.
5. Petrochemicals The Rise of an Industry by Peter H. Spitz, Johan Wiley and sons 1988.
6. Principles of Polymer Science, Bahadur and Sastry, Narosa Publishing House 2002.
7. Text book of polymer Science, Billmeyer, John Wiley and Sons 1984.
8. Principles of Polymer Systems, Rodriguez, Hemisphere Publishing Corp, 1982.
9. Introduction to Polymer Science and Technology, H. S. Kaufman and J. J. Falcetta, Wiley – Interscience Publication, 1977
10. Polymer Science and Technology of Plastics and Rubbers, P. Ghosh,

Code & Title of the Course	PST 2301 Packaging Technology Elective II
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	I

Sr.No.	Topic	Hrs
1	Packaging materials and there characterizations.	5
2	Determination of permeability.	8
3	Modifies and controlled atmosphere packing.	10
4	Design of packing materials based on product characteristic	5
5	Lamination and co extrusion priority on plastics packing materials.	5
6	Physical characteristics and testing of packing materials.	10
7	Biodegradable packing materials.	4
8	Utilisation of waste packing materials.	3

Textbooks/Sourcebooks:

1. Plastics films for packaging, Technology, Application & process Economics
By – Bennoing C.S.
2. Food packaging Tech (1996) by – Bureau G.
3. Wiley Encyclopaedia of Packaging tech (1986) by – Bakker M.
4. Pharmaceutical packaging tech (2000) by – Dean D. A.

Code & Title of the Course	PST 2705 Fabrication and Design of Processing Machinery Elective IV
Marks	50
Number of Hours per Week	L + T (2+1)
Credits	3
Class	M.Tech. Polymer Engineering and Technology
Semester	II

Sr.No.	Topic	Hrs
1	Basics of machine design.	3
2	Calculation of stresses for different plastics in variety of processing machinery such as extruders	8
3	Moulding machines, moulds etc.	10
4	Design and fabrication of ancillary and auxiliary equipments,	6
5	Materials selection and treatments such as nitriding etc.	5
6	Control systems, computer aided design and other aspects of machine design/fabrication	13
7	Standardization of equipments.	5

Textbooks/Sourcebooks:

1. Ultrasonic in Packaging & plastic fabrication by- Thomas R.H. (1974)
2. Handbook of silicon rubber fabrication (1978). by- Lynch W.
3. Plastic fabrication by U.Y.I.R. Induction, Dielectric & Microwave radiation methods (1972) by- Readdy A. F.
4. Materials of Engg. Properties, fabrication, uses & testing (1956) by- Keyser C. A.
5. Controlled release systems fabrication tech – (1988)
By- Hsieh. D
6. Inherently Conducting polymers, processing, fabrication, application, limitations (1989) by- Aldiss. M