ANNA UNIVERSITY: CHENNAI
AFFILIATED INSTITUTIONS
REGULATIONS 2017
B.TECH. POLYMER TECHNOLOGY
CHOICE BASED CREDIT SYSTEM

1. Program Educational Objectives (PEOs)

Bachelor of Technology in Polymer Technology curriculum and syllabus is designed to prepare graduates:

PEO 1: who will be technically proficient in Polymer Technology with a commitment to quality, timeliness and compete with confidence in their career.

PEO 2: who will be professionals with integrity and strong ethical values and will contribute to the professional society.

PEO 3: who will engage in lifelong learning or continuous education opportunities.

PEO 4: who will contribute towards research and professional development and entrepreneurship.

2. Programme Outcomes (POs)

A graduate of this major should be able to:

a. **Engineering Knowledge**: Select and apply the engineering knowledge, technique and skills in Polymer Science and Technology.
b. **Problem Analysis**: Select and apply knowledge of mathematics, science, engineering, and technology to Polymer Technology and engineering problems that require the application of principles and applied procedures or methodologies.
c. **Design/development of solutions**: conduct standard tests and measurements; conduct, analyze, and interpret experiments; and apply experimental results to improve processes.
d. **Conduct investigations of complex problems**: design systems, components, or processes for broadly defined Polymer Technology problems.
e. **Modern Tool Usage**: select and apply appropriate techniques, resources and modern tools in Polymer Science and Technology.
f. **The Engineer and Society**: understand the need for and engage in self-directed continuing professional development.
g. **Environment and Sustainability:** understand the impact of Polymer Technology solutions in a societal and global context
h. **Ethics:** demonstrate an understanding of and a commitment to professional and ethical responsibilities, including a respect for diversity
i. **Individual and team work**: function effectively as a member or leader on a technical team.
j. **Communication:** communicate effectively regarding broadly defined Polymer Technology and Engineering activities.
k. **Project Management and Finance**: Demonstrate knowledge and understanding of engineering and management principles which apply to Polymer Engineering areas.
l. **Life-long learning:** exhibit a commitment to quality, timeliness, and continuous improvement.

3. Programme Specific Outcomes (PSOs)

The graduate is expected to:

PSO1 Polymer industry oriented preparedness: Reveal an ability to identify careers in polymer technology domains like, synthesis of polymers, processing and quality control, which adopt skills required to work in a polymer technology laboratory or a manufacturing facility.

PSO2 Higher Education Preparedness: Demonstrate an ability to appear for competitive examinations to pursue higher studies.

4. PEOs / POs MAPPING

PEOs/ POs	a	b	C	d	e	f	g	h	I	j	k	l	PSO 1	PSO2
PEO 1	✓	✓	✓	✓	✓					✓		✓	✓	✓
PEO 2								✓		✓	✓	✓	✓	✓
PEO 3						✓	✓	✓	✓	✓		✓	✓	✓
PEO 4	✓	✓	✓	✓	✓						✓	✓	✓	✓

5. Semester Course Wise POs Mapping

		Course Title	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2
I YEAR	SEMESTER I	Communicative English	√	√											√	√
		Engineering Mathematics I	√	√	√	√	√								√	√
		Engineering Physics	√	√	√	√									√	√
		Engineering Chemistry	√	√	√	√			√						√	√
		Problem Solving and Python Programming	√	√	√			√	√						√	√
		Engineering Graphics	√	√	√	√	√	√							√	√
		Physics and Chemistry Laboratory	√	√	√			√	√		√				√	√
		Problem Solving and Python Programming Laboratory	√	√	√			√	√		√			√	√	√
	SEMESTER II	Technical English	√	√	√	√	√								√	√
		Engineering Mathematics II	√	√	√	√	√								√	√
		Physics of Materials	√	√	√										√	√
		Physical and Organic Chemistry	√	√	√			√	√						√	√
		Basic Electrical and Electronics Engineering	√	√	√	√	√								√	√

SEMESTER III

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	MA8391	Probability and Statistics	BS	4	4	0	0	4
2	PT8351	Fundamentals of Polymer Science	PC	3	3	0	0	3
3	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
4	PT8353	Mechanics of Solids	ES	3	3	0	0	3
5	PT8352	Introduction to Chemical Engineering	ES	3	3	0	0	3
6	PT8354	Polymer Physics	PC	3	3	0	0	3
PRACTICALS								
7	PT8361	Chemical Engineering Laboratory	ES	4	0	0	4	2
8	PT8311	Polymer Identification and Analysis Laboratory	PC	4	0	0	4	2
9	HS8381	Interpersonal Skills/Listening and Speaking	EEC	2	0	0	2	1
			TOTAL	**29**	**19**	**0**	**10**	**24**

SEMESTER IV

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	MA8491	Numerical Methods	BS	4	4	0	0	4
2	PT8451	Fluid Mechanics and Polymer Rheology	PC	3	3	0	0	3
3	PL8451	Plastics Materials I	PC	3	3	0	0	3
4	PT8401	Rubber Materials	PC	3	3	0	0	3
5	PT8453	Process Instrumentation for Polymer Technologist	ES	3	3	0	0	3
6	PT8452	Mould Manufacturing Technology	PC	3	3	0	0	3
PRACTICALS								
7	PT8461	Mould Manufacturing Technology Laboratory	PC	4	0	0	4	2
8	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
			TOTAL	**25**	**19**	**0**	**6**	**22**

SEMESTER V

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	PT8501	Plastics Processing	PC	3	3	0	0	3
2.	PT8502	Characterization of Polymers	PC	3	3	0	0	3
3.	PL8551	Plastics Materials II	PC	3	3	0	0	3
4.	PT8503	Rubber Compounding	PC	4	4	0	0	4
5.		Professional Elective I	PE	3	3	0	0	3
6.		Open Elective I*	OE	3	3	0	0	3
PRACTICALS								
7.	PT8561	Polymer Preparation Laboratory	PC	4	0	0	4	2
8.	PT8511	Plastics Processing Laboratory	PC	4	0	0	4	2
9.	HS8581	Professional Communication	EEC	2	0	0	2	1
			TOTAL	**29**	**19**	**0**	**10**	**24**

* - Course from the curriculum of the other UG Programmes

SEMESTER VI

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	PT8601	Design of Moulds and Dies for Polymers	PC	3	3	0	0	3
2	PT8602	Rubber Processing and Machinery	PC	4	4	0	0	4
3	PT8603	Testing of Polymers	PC	3	3	0	0	3
4	PT8651	Polymer Blends and Alloys	PC	3	3	0	0	3
5		Professional Elective II	PE	3	3	0	0	3
6		Professional Elective III	PE	3	3	0	0	3
PRACTICALS								
7	PT8611	Rubber Processing Laboratory	PC	4	0	0	4	2
8	PT8612	Polymer Testing Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

SEMESTER VII

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	PT8701	Polymer Product Design	PC	4	4	0	0	4
2	PT8702	Rubber Product Manufacturing	PC	3	3	0	0	3
3	PT8751	Polymer Composites	PC	3	3	0	0	3
4		Professional Elective IV	PE	3	3	0	0	3
5		Professional Elective V	PE	3	3	0	0	3
6		Professional Elective VI	PE	3	3	0	0	3
7		Open Elective II*	OE	3	3	0	0	3
PRACTICALS								
8	PT8711	Computer Aided Polymer Product Design Laboratory	PC	4	0	0	4	2
9	PT8712	Comprehension	EEC	2	0	0	2	1
			TOTAL	**28**	**22**	**0**	**6**	**25**

* - Course from the curriculum of the other UG Programmes

SEMESTER VIII

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1	PT8811	Project Work	EEC	20	0	0	20	10
			TOTAL	**20**	**0**	**0**	**20**	**10**

TOTAL CREDITS:178

PROFESSIONAL ELECTIVES

PROFESSIONAL ELECTIVE I, SEMESTER V

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	PT8001	Design of Machine Elements	PE	3	3	0	0	3
2.	PT8072	Fiber Technology	PE	3	3	0	0	3
3.	PT8073	Plastics Packaging Technology	PE	3	3	0	0	3
4.	GE8071	Disaster Management	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE II, SEMESTER VI

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3
2.	PL8075	Polyurethane Technology	PE	3	3	0	0	3
3.	PL8074	Plastics Waste Management and Recycling Techniques	PE	3	3	0	0	3
4.	PT8074	Polymer Nanocomposites	PE	3	3	0	0	3
5.	PL8072	Biodegradable Polymers	PE	3	3	0	0	3

2.	PT8354	Polymer Physics	PC	3	3	0	0	3
3.	PT8311	Polymer Identification and Analysis Laboratory	PC	4	0	0	4	2
4.	PT8451	Fluid Mechanics and Polymer Rheology	PC	3	3	0	0	3
5.	PL8451	Plastics Materials I	PC	3	3	0	0	3
6.	PT8401	Rubber Materials	PC	3	3	0	0	3
7.	PT8452	Mould Manufacturing Technology	PC	3	3	0	0	3
8.	PT8461	Mould Manufacturing Technology Laboratory	PC	4	0	0	4	2
9.	PT8501	Plastics Processing	PC	3	3	0	0	3
10.	PT8502	Characterization of Polymers	PC	3	3	0	0	3
11.	PL8551	Plastics Materials II	PC	3	3	0	0	3
12.	PT8503	Rubber Compounding	PC	4	4	0	0	4
13.	PT8561	Polymer Preparation Laboratory	PC	4	0	0	4	2
14.	PT8511	Plastics Processing Laboratory	PC	4	0	0	4	2
15.	PT8601	Design of Moulds and Dies for Polymers	PC	3	3	0	0	3
16.	PT8602	Rubber Processing and Machinery	PC	4	4	0	0	4
17.	PT8603	Testing of Polymers	PC	3	3	0	0	3
18.	PT8611	Rubber Processing Laboratory	PC	4	0	0	4	2
19.	PT8612	Polymer Testing Laboratory	PC	4	0	0	4	2
20.	PT8651	Polymer Blends and Alloys	PC	3	3	0	0	3
21.	PT8701	Polymer Product Design	PC	4	4	0	0	4
22.	PT8702	Rubber Product Manufacturing	PC	3	3	0	0	3
23.	PT8751	Polymer Composites	PC	3	3	0	0	3
24.	PT8711	Computer Aided Polymer Product Design Laboratory	PC	4	0	0	4	2

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	HS8381	Interpersonal Skills/Listening and Speaking	EEC	2	0	0	2	1
2.	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
3.	HS8581	Professional Communication	EEC	2	0	0	2	1
4.	PT 8712	Comprehension	EEC	2	0	0	2	1
5.	PT8811	Project Work	EEC	20	0	0	20	10

SUMMARY

Subject Area/Semester	HS	BS	ES	PC	PE	OE	EEC	Total
I	4	12	9					**25**
II	4	10	11					**25**
III	3	4	8	8			1	**24**
IV		4	3	14			1	**22**
V				17	3	3	1	**24**
VI				17	6			**23**
VII				12	9	3	1	**25**
VIII							10	**10**
Total	**11**	**30**	**31**	**68**	**18**	**6**	**14**	**178**

Funnel 15 Nos.

REFERENCES:

1. Dietrich Braun. Simple Methods for Identification of f Plastics, Hanser Publications, 5th edition, 2005.
2. Siddaramaiah, “Practicals in Polymer Science”, CBS Publishers & Distributors, New Delhi, 2007.

HS8381	INTERPERSONAL SKILLS/LISTENING AND SPEAKING	L	T	P	C
		0	0	2	1

OBJECTIVES: The Course will enable learners to:

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- improve general and academic listening skills
- Make effective presentations.

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL: 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

- Listen and respond appropriately.
- Participate in group discussions
- Make effective presentations
- Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

1. **B**rooks,Margret. **Skills for Success. Listening and Speaking**. **Level 4** Oxford University Press, Oxford: 2011.
2. Richards,C. Jack. & David Bholke. **Speak Now Level 3.** Oxford University Press, Oxford: 2010

REFERENCES:

1. Bhatnagar, Nitin and MamtaBhatnagar**. Communicative English for Engineers and Professionals.** Pearson: New Delhi, 2010.
2. Hughes, Glyn and Josephine Moate**. Practical English Classroom.** Oxford University Press: Oxford, 2014.
3. Vargo, Mari**. Speak Now Level 4.** Oxford University Press: Oxford, 2013.
4. Richards C. Jack. **Person to Person (Starter).** Oxford University Press: Oxford, 2006.
5. Ladousse, Gillian Porter**. Role Play.** Oxford University Press: Oxford, 2014

MA8491 NUMERICAL METHODS L T P C
4 0 0 4

OBJECTIVE:

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals in real life situations.
- To acquaint the student with understanding of numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.
- To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT II INTERPOLATION AND APPROXIMATION 12

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Difference operators and relations - Interpolation with equal intervals - Newton's forward and backward difference formulae.

5. Exercise on lathe - external thread
6. Exercise on lathe- taper turning
7. Exercise on Surface Grinding.
8. Exercise on Slotting Machine.
9. Grinding of Cutting tools.
10. Study of different types of Cutting tools.
11. Measurements using Micrometer, vernier, Height gauge and Slip gauge.
12. Measurement of angle using Sine Bar.
13. Application of Dial gauge.

(Any 8 experiments from the above)

TOTAL: 60 PERIODS

OUTCOMES:

Upon completing this course, the students

- Will understand the mould parts manufacturing technique
- Will attain knowledge in turning operations
- Will attain knowledge in slotting and milling operations
- Will know about the grinding methods
- Will understand the measuring instruments

DEMOMSTRATION EXPERIMENT:

To make a simple mold for hand molding machine

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

Shaping machine	2	Nos.
Vertical milling machine	1	No.
Horizontal milling machine	1	No
Lathe	10	Nos.
Plain surface grinding machine	1	No.
Bench grinder	2	Nos.
Vernier caliper	2	Nos.
Vernier height gauge	2	Nos.
Vernier Depth Gauge	1	No
Micrometer	2	Nos
Sine bar	1	No.

HS8461 **ADVANCED READING AND WRITING** **L T P C**
0 0 2 1

OBJECTIVES:

- Strengthen the reading skills of students of engineering.
- Enhance their writing skills with specific reference to technical writing.
- Develop students' critical thinking skills.
- Provide more opportunities to develop their project and proposal writing skills.

UNIT I

Reading - Strategies for effective reading-Use glosses and footnotes to aid reading comprehension- Read and recognize different text types-Predicting content using photos and title

Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence –Write a descriptive paragraph

UNIT II

Reading-Read for details-Use of graphic organizers to review and aid comprehension **Writing**-State reasons and examples to support ideas in writing- Write a paragraph with reasons and examples- Write an opinion paragraph

UNIT III

Reading- Understanding pronoun reference and use of connectors in a passage- speed reading techniques-**Writing-** Elements of a good essay-Types of essays- descriptive-narrative- issue-based-argumentative-analytical.

UNIT IV

Reading- Genre and Organization of Ideas- **Writing-** Email writing- visumes – Job application-project writing-writing convincing proposals.

UNIT V

Reading- Critical reading and thinking- understanding how the text positions the reader- identify **Writing**- Statement of Purpose- letter of recommendation- Vision statement

TOTAL: 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

- Write different types of essays.
- Write winning job applications.
- Read and evaluate texts critically.
- Display critical thinking in various professional contexts.

TEXT BOOKS:

1. Gramer F. Margot and Colin S. Ward **Reading and Writing (Level 3)** Oxford University Press: Oxford, 2011
2. Debra Daise, CharlNorloff, and Paul Carne **Reading and Writing (Level 4)** Oxford University Press: Oxford, 2011

REFERENCES

1. Davis, Jason and Rhonda LIss.**Effective Academic Writing (Level 3)** Oxford University Press: Oxford, 2006
2. E. Suresh Kumar and et al. **Enriching Speaking and Writing Skills.** Second Edition. Orient Black swan: Hyderabad, 2012
3. Withrow, Jeans and et al**. Inspired to Write. Readings and Tasks to develop writing skills.** Cambridge University Press: Cambridge, 2004
4. Goatly, Andrew**. Critical Reading and Writing.** Routledge: United States of America, 2000
5. Petelin, Roslyn and Marsh Durham**. The Professional Writing Guide: Knowing Well and Knowing Why.** Business & Professional Publishing: Australia, 2004

OUTCOMES:

Upon completing this course, the students

- Will be able to operate the automatic injection, blow moulding machine
- Will be able to prepare the blow mould, thermoformed products
- Will be able to demonstrate the plastic sealing & welding and preparation of polymer films by casting method
- Will be able to describe the mould maintenance and manufacturing practices
- Will be able to dramatize the scrap grinder by using the recycling of plastics

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

Injection moulding (Hand injection moulding machine, Semi Automatic injection moulding machine, Fully automatic injection moulding machine)	1 No.
Extruder for compounding of thermoplastics	1 No.
Hand blow moulding machine	1 No.
Fully automatic blow moulding machine	1 No.
Air compressor	1 No.
Scrap grinder	1 No.
Crane for mould handling	1 No.
Bench grinding and buffing machine	1 No.
Bench wise	1 No.
Sheet cutter	1 No.
Moulds for hand injection moulding	3 Nos.
Mould for automatic injection moulding	1 No.
Mould for semiautomatic injection moulding	1 No.
Mould for hand blow moulding	1 No.
Mould for fully automatic blow moulding	1 No.
Thermo Forming Unit	1 No.
Electronic balance	1 No

HS8581 PROFESSIONAL COMMUNICATION L T P C
0 0 2 1

OBJECTIVES:

The couse aims to:

- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional
- Make them Employable Graduates
- Develop their confidence and help them attend interviews successfully

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTLA: 30 PERIODS

OUTCOMES:

At the end of the course Learners will be able to:

- Make effective presentations
- Participate confidently in Group Discussions.
- Attend job interviews and be successful in them.
- Develop adequate Soft Skills required for the workplace

Recommended Software

1. Open Source Software
2. Win English

REFERENCES:

1. Butterfield, Jeff **Soft Skills for Everyone.** Cengage Learning: New Delhi, 2015
2. **Interact** English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
3. E. Suresh Kumar et al. **Communication for Professional Success.** Orient Blackswan: Hyderabad, 2015
4. Raman, Meenakshi and Sangeeta Sharma. **Professional Communication**. Oxford University Press: Oxford, 2014
5. S. Hariharanetal. **Soft Skills**. MJP Publishers: Chennai, 2010.

PT8601 DESIGN OF MOULDS AND DIES FOR POLYMERS L T P C

3 0 0 3

OBJECTIVE:

- To enable the students to learn the design of moulds such as injection, compression, transfer, blow and extrusion dies and moulds.

UNIT I INJECTION MOULDS 9

Classification of Injection Moulds - Design of mould components – Methodical Mould Design – Calculation related to-Number of Cavities, Clamping force, shot weight, Selection of Injection Moulding Machine, Layout of Cavities in multi-impression Mould, Feed Systems - Design of Runners & gate, Ejection Systems, Cooling Systems, Venting

UNIT II COMPRESSION MOULDS 9

Classification of Compression Moulds - Factors that Influence Thermoset Moulding -Materials

- Will design the blow and extrusion molding die for polymer products.
- Will develop new polymer products.

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Computers with LAN - 8 Nos.
2. Software packages
   Pro-E - 1 No
3. Printer - 1 No.

TEXT BOOKS:

1. R.G.W.Pye, Injection Mould Design, SPE Publication.
2. P.S.Cracknell and R.W.Dyson, Hand Book of thermoplastics injection mould design, Chapman & Hall, 1993.

REFERENCES:

1. Herbert Rees, Mould Engineering, Hanser publishers, Munich, Vienna N.Y. 1994.
2. Technical Directory on Design and Tooling for plastics, CIPET, Guindy, Chennai.
3. Design calculations for Compression moulds, Machinery publications, Yellow series, U.K.
4. Mould Flow Manual & Part - Adviser Manual - MOULD FLOW
5. LaszcoSors and ImreBlazs, Design of Plastic Moulds and Dies, Elsevier, Amsterdam - Oxford - Tokyo - NY, 1989.

PT 8712 COMPREHENSION L T P C
0 0 2 1

In the VII Semester a comprehension test will be conducted with at least one written test in the middle of the Semester with Objective type of questions and a terminal viva-voce test in order to evaluate the comprehension of the students in all the subjects covered in the all previous semester subjects.

PT8811 PROJECT WORK L T P C
0 0 20 10

Each student will be assigned a project involving some design and fabrication work as well as theoretical and experimental studies on issues related to Polymer Technology. Continuous internal assessment marks for the project will be given during project review meeting. The student has to prepare and present a detailed project report at the end of the semester and give a presentation about the work done. End semester examination mark will be based on viva voce examination.

PT8001 DESIGN OF MACHINE ELEMENTS L T P C
3 0 0 3

OBJECTIVES

- To familiarize the various steps involved in design process
- To design the different types of joints, bolts and keys
- To design the shafts, couplings & brakes
- To design the different types of drives, belt drives
- To design the springs and bearings

KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

B.TECH. POLYMER TECHNOLOGY

Regulation - 2020

AUTONOMOUS SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABI

(III & IV)

VISION:

To make the Department of Polymer Technology of this Institution the unique of its kind in the field of Research and Development activities in this part of the world.

Mission of the Department:

To impart highly innovative and technical knowledge in the field of Polymer Technology to the urban and unreachable rural student folks through Total Quality Education.

Program Educational Objectives (PEOs):

PEO 1:

Graduates will be technically proficient in Polymer Technology with a commitment to quality, timeliness and compete with confidence in their career.

PEO 2:.

Graduates will contribute towards research and Professional development and entrepreneurship.

PEO 3:

Graduates will engage in lifelong learning or continuous education opportunities.

distillation.

REFERENCES:

1. Shri Gavhane, K.A., 2015. *"Unit Operations I & II",* NiraliPrakashan Publication.
2. McCabe, W.L., Smith, J.C. and Harriott, P., 2014. *Unit operations of chemical engineering* (Vol. 7). New York: McGraw-hill.
3. Richardson, J.F. and Harker, J.H., 2020. *Coulson and Richardsons Chemical Engineering*.

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HS1321 INTERPERSONAL SKILLS - LISTENING AND SPEAKING

L	T	P	C
0	0	2	1

OBJECTIVES:

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- Improve general and academic listening skills
- Make effective presentations..

UNIT I LISTENING AS A KEY SKILL 6

Listening as a key skill- its importance- speaking – give personal information – ask for personal information – express ability – enquire about ability – ask for clarification - Improving pronunciation– pronunciation basics –– stressing syllables and speaking clearly – intonation patterns – conversationstarters: small talk

UNIT II LISTEN TO A PROCESS INFORMATION 6

Listen to a process information- give information, as part of a simple explanation –– taking lecture notes – preparing to listen to a lecture – articulate acomplete idea as opposed to producing fragmented utterances - compare andcontrast information and ideas from multiple sources- converse with reasonable accuracy overa wide range of everyday topics.

UNIT III LEXICAL CHUNKING 6

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minuteinformal talk – greet – respond to greetings – describe health and symptoms – invite and offer –accept – decline – take leave – listen for and follow the gist- listen for detail.

UNIT IV GROUP DISCUSSION **6**

Being an active listener: giving verbal and non-verbal feedback – participating in a groupdiscussion – summarizing academic readings and lectures conversational speech listening toand participating in conversations – persuade- negotiate disagreement in group work.

UNIT V GROUP & PAIR PRESENTATIONS **6**

Formal and informal talk – listen to follow and respond to explanations, directions and instructions in academic and business contexts – strategies for presentations and interactive communication – group/pair presentations

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to

CO1	Develop their communicative competence in English with specific reference to listening
CO2	Prepare conversation with reasonable accuracy
CO3	Apply lexical Chunking for accuracy in speaking
CO4	Demonstrate their ability to communicate effectively in GDs
CO5	Explain directions and instructions in academic and business contexts

TEXT BOOKS:

1. Brooks,Margret,2011, *Skills for Success. Listening and Speaking. Level 4,* Oxford University Press,Oxford.
2. Richards, C, Jack& David Bholke,2010, *Speak Now Level 3,*Oxford University Press, Oxford.

REFERENCES:

1. Bhatnagar, Nitin&MamtaBhatnagar,2010, *Communicative English for Engineers andProfessionals,* Pearson, New Delhi.
2. Hughes, Glyn & Josephine Moate,2014, *Practical English Classroom,* Oxford University Press, Oxford.
3. Vargo, Mari,2013, *Speak Now Level 4*, Oxford University Press, Oxford.
4. Richards, C, Jack,2006,*Person to Person (Starter)*, Oxford University Press, Oxford.
5. Ladousse, Gillian Porter,2014, *Role Play*. Oxford University Press, Oxford.

WEBSOURCES:

1. https://www.cambridge.org/elt/blog/wp-content/uploads/2019/10/Learning-Language-in-Chunks.pdf
2. https://english.eagetutor.com/english/628-how-to-greet-your-boss-people-in-office.html
3. https://www.groupdiscussionideas.com/group-discussion-topics-with-answers/
4. https://www.bbc.co.uk/worldservice/learningenglish/business/talkingbusiness/unit3presentations/1opening.shtml

SEMESTER IV

MA1471 **NUMERICAL METHODS**

L	T	P	C
3	1	0	4

OBJECTIVES:

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals in real life situations.
- To impart the knowledge of various techniques of differentiation and integration.
- To compute the solution of differential equation with initial and boundary conditions.
- To understand the knowledge of finding the solution for the boundary value problems in Partial Differential Equations using finite difference methods.

KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)
S.P.G.Chidambara Nadar - C.Nagammal Campus
S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

DEPARTMENT OF POLYMER TECHNOLOGY
M.Tech. POLYMER SCIENCE AND ENGINEERING
REGULATIONS –2020 - AUTONOMOUS
CHOICE BASED CREDIT SYSTEM
I TO IV SEMESTERS CURRICULUM AND SYLLABUS

Vision of the Department:

- To make the Department of Polymer Technology of this Institution the unique of its kind in the field of Research and Development activities in this part of the world.

Mission of the Department:

- To impart highly innovative and technical knowledge in the field of Polymer Technology to the urban and unreachable rural student folks through Total Quality Education.

Program Educational Objectives (PEOs):

- **PEO 1**: Graduates will be technically proficient in Polymer Science & Engineering and acquire up-to-date knowledge for professional success.
- **PEO 2**: Graduates will exhibit a professional work ethic including an interest in personal and Professional growth.
- **PEO 3**: Graduates will be aware of how their professional role will impact the global Community.

Program Specific Outcomes (PSOs):

- **PSO1. Research:** To apply basic principles of polymer science and engineering in various interdisciplinary fields to engage various levels of research activity.
- **PSO2. Placement and Entrepreneur:** Learn future technologies through acquired foundation skills and knowledge and employ them in industry and business environments

The credit requirement for the programme M.Tech. Polymer Science and Engineering (as per Regulation 2020) is outlined below:

PROFESSIONAL CORE COURSES (PC)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	**PE1101**	Elastomer Technology	PC	3	3	0	0	3
2	**PE1102**	Engineering Plastics	PC	3	3	0	0	3
3	**PE1103**	Macromolecular Science	PC	3	3	0	0	3
4	**PE1104**	Polymer Processing Technology cum laboratory	PC	3	3	0	2	4
5	**PE1111**	Macromolecular Science Laboratory	PC	4	0	0	4	2
6	**PE1201**	Evaluation and Testing of Polymers	PC	3	3	0	0	3
7	**PE1202**	Polymer Additives and Compounding	PC	3	3	0	0	3
8	**PE1203**	Polymer Product Manufacturing	PC	3	3	0	0	3
9	**PE1204**	Polymer Products and Mould Design	PC	3	3	0	0	3
10	**PE1211**	Polymer Testing Laboratory	PC	4	0	0	4	2
11	**PE1301**	Advanced Composites Technology	PC	3	3	0	0	3

Employability Enhancement Courses (EEC)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	**PE1221**	Seminar	EEC	2	0	0	2	1
2	**PE1321**	Project Work (Phase I)	EEC	12	0	0	12	6
3	**PE1322**	Industrial Training (4 Weeks)	EEC	0	0	0	0	1
4	**PE1421**	Project Work (Phase II)	EEC	24	0	0	24	12

S. No.	Category of Courses	I	II	III	IV	Credits
1.	**Foundation Courses (FC)**	-	-	-	-	-
2.	**Professional Core Courses (PC)**	15	14	3		32
3.	**Professional Elective Courses (PE)**	6	6	3		15
4.	**Open Elective Courses (OE)**			3		3
5.	**Employability Enhancement Courses (EEC)**		1	7	12	20
6.	**Online Courses (OL)**			3		3
Semester wise Credits		21	21	19	12	73
Total Credits						**73**

14.	Differential Scanning Calorimeter	1
15.	Thermo Gravimetric Analyser	1
16.	UV Spectrometer	1

PE1221 **SEMINAR** **L T P C**
0 0 2 1

OBJECTIVES:

The seminar power point presentation shall be fundamentals oriented and advanced topics in the polymer engineering with references of journal papers. Presentation is to be planned for duration of 15 minutes including a question answer session of five minutes. The marks will be awarded based on the presentation of the seminar.

PE1301 **ADVANCED COMPOSITE TECHNOLOGY** **L T P C**
3 0 0 3

OBJECTIVES:

- To impart knowledge of various types of composites and its advantages and needs.
- To understand the various types of fiber materials and its applications for making Composites.
- To understand the knowledge of various resins materials used in processing of composites and the basic destructive and non-destructive testing of composites.

UNIT I INTRODUCTION AND MATRIX FOR COMPOSITES 9

Introduction – Characteristics of composites – Classification – Based on matrix – PMC-MMC-CMC - Reinforcement – particulate, fibrous, laminated, and hybrid composites. Matrix Resins **-** Unsaturated Polyester - Vinyl Ester - Epoxy- Thermoset polyimides- Bismaleimides (BMIs), Cyanate esters (CEs), Benzoxazines and Phthalonitriles- Preparation - Properties and Applications

UNIT II REINFORCEMENT MATERIALS 9

Fibre Reinforcements - Types - CSM – Surface Mats - Performs - Woven and Non Woven

Fabrics – Glass - Carbon - Aramid Fibre - Boron Fibres - Natural Fibres – Cotton – Silk – Wool - Jute – Sisal- Functions of fillers, types, properties, chemistry and applications of fillers such as silica, titanium oxide, talc, mica, silicon carbide, graphite.

UNIT III PROCESSING OF COMPOSITES 9

Processing of thermoplastic composites - Types of processing methods, matched die molding, solution, film, lamination, sandwich. Processing conditions,

PE1321	PROJECT WORK (PHASE –I)	L	T	P	C
		0	0	12	6

Project report: To be prepared in proper format. The report may include the aspects of the literature review. Members of a project group shall prepare and submit the report.

A comprehensive oral Viva-voce examination will be conducted to assess the student's, depth of understanding in the specified field of engineering and technology..etc.

An internal and external examiner is appointed for the Conduct of viva voce end examination.

PE1322	Industrial Training	L	T	P	C
		0	0	0	1

Students are required to undertake Industrial Training in an industry related to the field of polymer engineering for a period not less than 4 weeks immediately after first year second semester examination is over.

Students are required to submit neatly typed and bound training report after joining the college.

The report should include information about working of the industry as also specific information of the work done by the student in the industry. The students are also required to attach the Original Certificate issued by the competent authority from the industry where he / she has undergone training mentioning the successful completion of the training.

The student is required to present the report of the skills / knowledge acquired by her/him during the training for his industrial training evaluation.

PE1421	PROJECT WORK (PHASE –II)	L	T	P	C
		0	0	24	12

Project report: To be prepared in proper format. The report shall record all aspects of the work. Members of a project group shall prepare and submit the report.

A comprehensive oral Viva-voce examination will be conducted to assess the student's intellectual achievement, depth of understanding in the specified field of engineering and technology etc.

An internal and external examiner is appointed for the Conduct of viva voce end examination