SEMESTER: S7

SPECIALITY POLYMERS

Course Code	PEPOT751	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	Basic Understanding of Polymer Science and Engineering, Including Polymer Chemistry, Properties, And Processing.	Course Type	Theory

Course Objectives:

1. To learn about the design, synthesis, and structure-property relation of high performance and specialty polymers.

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SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**High Temperature and Fire-Resistant Polymers**– fluoropolymers, aromatic polymers, hydrocarbon polymers, polyphenylene sulphide, polysulphones, polyesters, aromatic polyamides, polyketones, heterocyclic polymers, fire resistant polymers, flame retardants.	9
2	**Ionic Polymers**– Synthesis and physical properties: Ion-exchange, hydrophilicity, applications, ionomers based on polyethylene, elastomeric ionomers, ionomers based on polystyrene, PTFE, ionomers with polyaromatic backbones. Polyelectrolytes: ion exchangers, polyelectrolytes based on carboxylates, polyelectrolyte complexes.	9
3	**Polymers With Novel Properties**– Liquid crystalline polymers (LCPs): concept of liquid crystalline (LC) phase, liquid crystalline polymers and their classification, main chain LCPs and side chain LCPs, structure-property	9

	relationship, applications of LCPs. Conducting polymers: charge carriers, doping, synthesis of polyacetylene, polyaniline, polypyrrole, polythiophene. Photo conducting polymers.	
4	**Inorganic Polymers**- polymers containing phosphorous, nitrogen and boron, organometallic polymers, polysiloxanes. Polymers for special applications – Polymer concretes, polymer binders for propellants, polymer-bonded explosives. Polymeric materials used in telecommunication and power transmission. Polymers in agricultural applications: green houses, mulches	**9**

Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Outline the different types of high temperature resistant polymers	**K2**
CO2	Analyze the synthesis and properties of ionic polymers	**K4**
CO3	Develop polymers possessing novel properties	**K6**
CO4	Summarize electrical and electronic application of polymers.	**K2**
CO5	Choose the polymers used in concretes, propellants and explosives	**K6**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		1						1	1
CO2	2	1	2	3		1						1
CO3	2		2		2							1
CO4	2	1		2							2	1
CO5	1	3		1		1	2					1

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Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Industrial Polymers, Specialty Polymers, And Their Applications,	Manas Chanda, Salil K. Roy	CRC Press	2009
2	Specialty Polymers: Materials and Applications	Faiz Mohammad	K. International Pvt. Ltd	2008
3	*Doping in Conjugated Polymers*	Pardip Kar	John Wiley & Sons	2013

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Specialty Polymers	Robert William Dyson	Springer	2012
2	Plastics Technology Hand book	Manas Chanda, Salil K.Roy	CRC press	5th Edn., 2018

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://youtu.be/IztesS8AVIA?si=IrIkQIeZTDY9res6 https://youtu.be/GV8e8RKN_tA?si=n2Obo4q_wWeVdya6
2	https://youtu.be/SNlOKHFO0JU?si=uBkFL03ArxMGicdi
3	https://youtu.be/2xmYYO_qbLs?si=YI46riJ7TOuM3pvs
4	https://youtu.be/K8cwhVTJbmg?si=9nKpj3Rq3bUQ_ISl

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