

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)

Name of program	: Bachelor of Technology	Semester	: VI
Branch	: Plastics Engineering	Code	: C095611(095)
Subject	: Plastic Materials - II	Tutorial Periods	: 1 per week
Theory Periods	: 3 per week	Assignments	: Two (minimum)
Class Tests	: Two (minimum)	Maximum Marks	: 100
Exam. Duration	: Three Hours	Minimum Marks	: 35

Course Objectives:

- To enable the students to learn about the general methods of preparation of an individual class of plastic materials.
- To study the general properties, processing behaviour and applications of the different class of plastic materials
- To understand the structure-property relation of the different class of plastic materials.

UNIT - I

Engineering Plastics: Introduction, sources and manufacturing of plastics raw materials, basic chemistry, methods of manufacture, flow behaviour, general properties and applications of Polyamides, Nylon 6, 66 etc.; Acetal - Homopolymer & copolymer, polycarbonate, thermoplastics polyester, polyphenylene oxide.

UNIT - II

Thermosets: introduction, sources for plastics raw materials, resin preparation, polymer structure, additives – curing and cross-linking–agents, processing behavior, general properties and applications of phenol-formaldehyde, urea-formaldehyde, melamine formaldehyde, unsaturated polyesters, polysulfones.

UNIT - III

Sources and manufacturing of plastics raw materials: basic chemistry – methods of manufacture – flow behavior, general properties and applications of fluoropolymers, polyvinyl fluoride, polyvinylidene fluoride, polyphenylene oxide, polyphenylene sulphide, polytetrafluoroethylene, polychloro trifluoro ethylene, polyetheretherketone., polyimide.

UNIT - IV

Thermoplastic elastomers: Basic structure, manufacture, morphology, commercial grades and applications, thermoplastic styrene block copolymers, polyester thermoplastic elastomers, polyamide thermoplastic elastomers, polyurethane thermoplastic elastomers.

UNIT - V

Speciality plastics: metallocene polymers, high & low-temperature polymers, interpenetrating polymer networks, ultra-high modulus fibres, polymeric foams.

Text Books:

1. Polymer Science-V.R. Gowariker
2. Plastic Materials Ed 7 - By Brydson, J.A.
3. Hand Book of Plastics Materials & Technology - By Rubin, Irwin, J
4. Plastics Engineering Hand Book- Michael L. Bernis
5. Trends and Applications in Advanced Polymeric Materials, Sanjay K. Nayak, SmitaMohanty, Lakshmi Unnikrishnan. ,Wiley Publication ,2017.
6. Technical Manual on Plastic Materials, Sanjay K Nayak et. al., CIPET Internal publication, April 2007.

Reference Books:

1. Plastics Materials - A. W. Birley
2. Modern plastics Hand Book- Charles A. Harper

Course Outcomes:

Students would be able to know the basic chemistry of engineering polymer, thermoset polymers, elastomers and their applications.

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)

Name of program	: Bachelor of Technology	Semester	: VI
Branch	: Plastics Engineering	Code	: C095612(095)
Subject	: Plastics Testing Technology -II	Tutorial Periods	: 1 per week
Theory Periods	: 3 per week	Assignments	: Two (minimum)
Class Tests	: Two (minimum)	Maximum Marks	: 100
Exam. Duration	: Three Hours	Minimum Marks	: 35

Course Objectives:

- To understand the concept of humidity on testing
- To impart significance and importance of Optical and Electrical testing.
- To impart significance and importance of permanence and rheological testing.
- To know the type of test performed on plastics products

Unit -I

Optical Properties: Refractive index, light transmission, haze, clarity, gloss, colour guard and microscope.

Electrical Properties: Insulation resistance, power factor, permittivity, dielectric strength, tracking resistance, arc resistance and antistatic test.

Unit - II

Permeation properties: Water absorption-soluble and insoluble matter, chemical resistance environmental stress cracking resistance, ageing, gas permeability, water vapour permeability and weathering.

Unit –III

rheological properties: newtonian fluids, non-newtonian fluids, measurement of rheology properties: capillary rheometer, dilute solution viscosity and K value (ostwald, fenske, ubbelohde) rotational type (cone and plate type, parallel plate), for thermoset (cup flow, spiral flow, disc flow), for elastomer - moony viscosity

Unit –IV

Product testing of pipe and fittings, film and sheets, container testing and FRP based products. Factors for designing tests for newer products, factors affecting the quality of materials and products, analysis of failure and its measurements

Unit –V

Techniques of characterization, principles and application of DSC- TGA, FTIR, AAS and SEM. Concepts of non-destructive testing, current scenario & advancement in the technology

Text Books:

1. Hand Book of Plastics Testing Technology by Shah, Vishnu, John Wiley and Sons, SPE Monograph
2. Hand Book of Polymer Testing by Brown; Roger P (Ed.), Marcel Dekker, Inc, New York (1999).
3. Fundamentals of Plastics Testing, Sanjay K Nayak. et. al, Springer, USA, (2010).

Reference Books:

1. Hand Book of Plastics Test Methods by Brown; Paul F (Ed), Longman Scientific and Technical, Harlow (1988).
2. Electrical Properties of Polymers by Blythe; A. R., Cambridge University Press, Cambridge (1979).

Course outcomes:

After studying the students would able to know about testing of Electrical properties, optical properties, Rheology properties and Characterization.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program	:	Bachelor of Technology	Semester	:	VI
Branch	:	Plastics Engineering	Code	:	C095613(095)
Subject	:	Plastics Processing Techniques -II	Tutorial Periods	:	1 per week
Theory Periods	:	3 per week	Assignments	:	Two (minimum)
Class Tests	:	Two (minimum)	Maximum Marks	:	100
Exam. Duration	:	Three Hours	Minimum Marks	:	35

Course Objectives

- Understand the advance plastic processing techniques including micro moulding.
- Understand secondary processing methods viz. fabrication and joining, welding etc.
- Analyze troubleshooting during article processing and their remedies.
- To learn the basic processing of thermoplastics by all-electric injection molding, extrusion and advance blow moulding, casting and coating

UNIT-I

Specialized injection moulding processes thin wall product moulding-multi material and multi-color moulding-sandwich moulding, micro processor controlled injection moulding operation. Statistical quality control and process control.

UNIT-II

All electric injection moulding: merits & demerits, gas assist moulding, water assist molding, reaction injection molding, liquid injection molding, lost core molding, thermoset injection molding, structural foam molding: a)low pressure foam b) high pressure foam, in-mold decoration/ reaction transfer molding, filament winding, metal/ceramic powder molding. Molding micro parts and micro structures: Transcription of small surface structures in injection moulding, injection moulding of sub - μm grating optical elements, process analysis and injection moulding of microstructures, Simulation of the micro injection moulding process.

UNIT-III

Advanced blow moulding and extrusion, classification of advanced blow moulding process, deep draw double wall blow, moulding, press blow moulding, stretch blow moulding, injection stretch blow moulding, extrusion stretch blow molding merits & demerits profile extrusion process, multi-layer film, co - extruder sheets & pipes, process, process control, process optimization, application, merits & demerits machining & joining of plastics .

UNIT-IV

Importance of machining, machining methods, joining, welding of plastics, adhesive bonding, mechanical fasteners. Other secondary processes, printing, painting, hot stamping, in mould decoration, electro-plating and vacuum metalizing.

UNIT-V

Casting and coating introduction, casting processes-operation and control of casting processes plastisol processing. Coating process: introduction, coating methods, process and applications. Cellular plastics, introduction foaming processes, foam moulding, rim casting foams, steam chest moulding structural foam moulding, applications, foamed extrusion.

Text Books:

1. Hand Book of Plastic Technology, Volume-1by Allen; W. S. and Baker; P. N.
2. Plastic Processing Operations [Injection, Compression, Transfer, Blow Molding], CBS Publishers and Distributors, New Delhi (2004).
3. Injection Molding Theory & Practice by Rubin, Irvin.

4. Injection Molding Hand Book by Rusato, D.V & Rosato, D.V.
5. Plastic Engineering Hand Book & D – 5 by Society of Plastic Industry.
6. Plastics Material & Processing By Strong, A, Brent, Blow Molding Hand Book By Rosato, D.V & Rosato, D. V. Plastic Extrusion Technology by Hensen.
7. Plastic Engineering Hand Book By SPI
8. Fundamentals of Plastics Processing (Vol. 1) Injection & Blow Moulding, Sanjay K Nayak , S Sugumar, R T Nagaralli, TMH Publication, Vol. 1, 2014.
9. Technical Manual on Plastic Processing, Sanjay K Nayak et. al., CIPET internal publication, April 2007.

Reference Books:

1. Handbook of Applied Polymer Processing Technology by Cheremisinoff; Nicholas P. and Cheremisinoff; Paul N. (Eds.), Marcel Dekker Inc., New York (1996)
2. A Guide to Injection Molding of Plastics by Bolur, P.C.
3. Plastics materials & processing by Brent A. Strong
4. Plastics processing by Danesh Mehta

Course outcomes:

After studying the students would be able to know more about advance processing techniques and new inventions in the field of polymer processing technology.

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)

Name of program	: Bachelor of Technology	Semester	: VI
Branch	: Plastics Engineering	Code	: C095631(095)
Subject	: Membrane Science and Engineering (Professional Elective –II)	Tutorial Periods	: 1 per week
Theory Periods	: 2 per week	Assignments	: Two (minimum)
Class Tests	: Two (minimum)	Maximum Marks	: 100
Exam. Duration	: Three Hours	Minimum Marks	: 35

Course Objectives

- The course aims to study types of membrane and membrane modules.
- To study reverse osmosis, ultra and microfiltration.
- Study of ion exchange and gas separation.

UNIT-I

Introduction, classification and types of membrane, methods of manufacturing membranes, membrane module, diffusions models.

UNIT-II

Reverse osmosis: mechanism, modules design and applications. Ion exchange and electrodialysis: mechanism and applications. Gas Separation: mechanism, modules design and applications.

UNIT-III

Microfiltration membranes: introduction to frontal and cross flow filtration, development of knowledge and understanding of solid liquid separations and cake filtration, general membrane equations and adaptation to cake filtration, calculation of cake properties, time of filtration, bed depth and process optimisation, case studies

UNIT-IV

Ultrafiltration membranes: introduction to ultrafiltration processes, mass transfer and concentration polarisation effects, simple gel theory, osmotic pressure effects, effects of membrane charge, optimisation of separations, case studies

UNIT-V

Nanofiltration: introduction to nanofiltration processes, equilibrium partitioning, pore models for neutral solute rejection, effects of membrane charge, confinement issues and effects on physical properties, pore size distributions, case studies.

Text Books:

1. Chemical Engineering”, Volume 1 by Coulson & Richardson.
2. Membrane Separation by James W. Baker.
3. Chemical Engineers Hand Book by J H Perry, 3rd Edition.
4. Unit Operation of Chemical Engineering by McCabe & Smith, “, McGraw Hill Book Company.

Reference Books:

1. Membrane Modification: Technology and Applications” by CRC Press (ISBN-13: 978-1439866351), 2012 . N. Hilal, M. Khayet and C. J. Wright
2. Membrane Distillation: Principles and Applications, M. Khayet and T. Matsuura, • Elsevier, 2011.

Course outcomes:

- After this course, the students will acquire knowledge regarding membrane and membrane modules.
- The students will acquire knowledge of reverse osmosis, ultra-filtration, microfiltration, ion exchange and gas separation.

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)			
Name of program	:	Bachelor of Technology	Semester : VI
Branch	:	Plastics Engineering	Code : C095632(095)
Subject	:	Nanotechnology (Professional Elective –II)	Tutorial Periods : 1 per week
Theory Periods	:	2 per week	Assignments : Two (minimum)
Class Tests	:	Two (minimum)	Maximum Marks : 100
Exam. Duration	:	Three Hours	Minimum Marks : 35

Course Objectives

- It is proposed to include a new scientific domain, Nanotechnology, in the curriculum of chemical engineering students, which deals with material and structures in nanometer scales. The technology deals with the miniaturization of the current and new instruments, sensors and machines e.g. computers.
- The aim is to summarize the scientific fundamentals and understand techniques of synthesis and processing of nanomaterials

UNIT-I

Introduction to nanotechnology: Definition of Nano, Scientific revolution-Atomic Structure and atomic size, emergence and challenges nanotechnology, classification of nanomaterials: 3D, 2D, 1D, 0D nanomaterials, influence of nano over micro/macro, size effects and crystals, large surface to volume ratio, surface effects on the properties

UNIT-II

Synthesis of Nanomaterials: Nucleation and growth of nanosystems; Introduction to 'Top down' vs. 'Bottom up' approach of synthesis with suitable examples, self-assembly, mechanical milling, sputtering and microwave plasma, chemical reduction and oxidation, hydrothermal, sol-gel processes, film growth, physical vapour deposition (PVD), chemical vapor deposition (CVD), patterning, etching

UNIT III

Nanostructures fabricated by physical techniques: lithography, nanomanipulation and nanolithography, soft lithography.

UNIT-IV

Techniques of characterization of size of nano powders/ particles using BET method and laser diffraction. Various spectroscopic techniques like optical spectroscopy. UV visible and Infrared spectroscopy. Raman spectroscopy. X-ray Fluorescence (XRF), X-ray diffraction (XRD). Basic understanding of each technique with special emphasis on characterization at nano scale

UNIT-V

Applications and safety: nanotechnology and chemical engineering applications: environment, wastewater treatment, photocatalytic reactors, photo electrochemical cells, self-cleaning materials, nanobiotechnology: drug delivery, nanocomposites, surface coatings, biological nonmaterial. nanoelectronics .nanomachines & nanodevices safety aspects, societal, health and environmental impacts.

Text Books:

1. Nanostructures and Nanomaterials by Guozhong, Cao, Imperial College Press, 2004
2. Nanomaterials: Synthesis, Properties and Applications by Edelstein, C, Institute of Physics Publication, Philadelphia

Reference Books:

1. Nanotechnology: Principles and Practices by Kulkarni S K, Capital Publishing
2. Introduction to Nanotechnology by Poole, C P, Owens, John Wiley & Sons publication

Course outcomes:

Students are expected to learn Nanotechnology to design, fabricate and use nanostructures or nanomaterials for various applications in their fields of interest.

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)			
Name of program	:	Bachelor of Technology	Semester : VI
Branch	:	Plastics Engineering	Code : C095633(095)
Subject	:	Polymer Blends and Alloys (Professional Elective –II)	Tutorial Periods : 1 per week
Theory Periods	:	2 per week	Assignments : Two (minimum)
Class Tests	:	Two (minimum)	Maximum Marks : 100
Exam. Duration	:	Three Hours	Minimum Marks : 35

Course Objectives

- To enable the students to learn about the general methods of blending
- To study the rheological, morphological and characterization of blended materials.
- To understand the application for developed materials for specific use.
- To understand the compatibility of polymer to polymer.

UNIT-I

Introduction to polymer blends & alloys- Definitions and nomenclature reasons for making polymer blend – how to select blend components preparation of alloys & blends– economy of blending.

UNIT-II

Compatibilization and reactive blending: Introduction – compatibilization mechanisms – compatibilization methods compatibilization by addition of copolymer reactive blending – future trends. Determination of compatibility behavior of Polymer solution blends by Ultrasonic interferometry.

UNIT-III

Rheology of polymer blends, Introduction to miscibility and immiscibility, types of blends, the Flow behavior of immiscible and miscible polymer blends.

UNIT-IV

Techniques for studying the morphological properties of blends and alloys through optical microscopy, SEM, Atomic Force Microscopy and TEM. Specimen preparation for SEM and TEM analysis.

UNIT-V

Thermal analysis of polymer blends using DSC, TGA and DMA for their various thermal properties such as thermal stability and degradation behavior, determination of melt temperature, glass transition temperature and crystallization temperature

Text Books:

1. Commercial Polymer Blends, Chapman & Hall, London, 1998- L. A. Utracki.
2. Polymer Blends and Alloys an Overview, Asian Books Pvt. Ltd, New Delhi, 2002- R. P. Singh, C. K. Das, S. K. Mustafi.

Reference Books:

1. Polymer Blends, Vol.1 & 2, Academic Press, New York, 1978- D. R. Paul& Seymour Newman.
2. Polymer Mixing A self-study Guide by Chris J. Rauwendaal., Hanser Publishers, Munich, 1998-

Course outcomes:

Students are expected to learn a blend of different polymers based on their compatibility. And to develop the blended materials for specific use.

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)

Name of program	: Bachelor of Technology	Semester	: VI
Branch	: Plastics Engineering	Code	: C095634(095)
Subject	: Speciality Polymers (Professional Elective –II)	Tutorial Periods	: 1 per week
Theory Periods	: 2 per week	Assignments	: Two (minimum)
Class Tests	: Two (minimum)	Maximum Marks	: 100
Exam. Duration	: Three Hours	Minimum Marks	: 35

Course Objectives

- To enable the students to learn about the general methods of preparation of an individual class of plastic materials.
- To study the general properties, processing behavior and applications of speciality plastic materials
- To understand the application for specific use.

UNIT-I

High temperature and fire-resistant polymers, Applications of heat resistant polymers like polyamides, polyimides, polyquinolines, polyquinoxalines, PEEK, polysiloxane, polyphosphazenes, polybenzoxazines and polyetherimide.

UNIT-II

Conducting polymers, conduction mechanism, doping of polymeric systems. Preparation, properties and applications of polyaniline, polyacetylene, polypyrrole, Photo-conducting and piezoelectric polymers

UNIT-III

Polymers as corrosion inhibitors, Polymers as antistatic agents, Polymer colloids, Polymeric surfactants, Polymers in conversion and energy storage. Liquid crystalline polymers

UNIT-IV

Preparation, properties and applications of polymers for biomedical applications, hydrophilic polymers and ionic polymers

UNIT-V

Recent advancements in specialist polymers

Text Books:

1. Speciality polymer by R.W Dayson.
2. Speciality polymer: Materials and Applications by Faiz Mohammad.

Reference Books:

1. Modern Technology of Plastic Processing Industries (2nd Edition).
2. The Complete Technology Book on Expanded Plastics, Polyurethane, Polyamide and Polyester Fibres.

Course outcomes:

Students are expected to learn speciality polymer and its use for specific applications such as defence, aerospace etc.

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)

Name of program	: Bachelor of Technology	Semester	: VI
Branch	: Plastics Engineering	Code	: C095621(095)
Subject	: Plastics Testing –II lab	Tutorial Periods	: Nil
Lab Periods	: 2 per week	Assignments	: Two (minimum)
Class Tests	: Two (minimum)	Maximum Marks	: 40
Exam. Duration	: Three Hours	Minimum Marks	: 20

Course Objectives

- To understand the procedure of mechanical and thermal testing
- To know the fix and variable parameters during testing.
- To understand the importance of environmental conditions and conditioning and their effect on test results.

List of Experiments

- 1) Testing of Opacity on plastics products
- 2) Testing of Haze on plastics products
- 3) Testing of Gloss on plastics products
- 4) Study of Colour measurement on plastics products
- 5) Study of Arc resistance on plastics products
- 6) Study of CTI on plastics products
- 7) Study of Volume and Surface resistivity on plastics products
- 8) Testing of Dielectric strength on plastics products
- 9) Testing of Dilute Solution viscosity and K value on PVC material
- 10) Testing of Water absorption on plastics products
- 11) Testing of Gas Permeability on plastics films
- 12) Testing of Weathering on plastics products

Reference Book:

1. Shah, Vishnu, Hand Book of Plastics Testing Technology, John Wiley and Sons, SPE Monograph
2. Fundamentals of Plastics Testing-Springer Publication
3. Related BIS Standards

Course outcomes:

After the study, students may be able to understand the importance of testing for specific applications and the selection of required test based on end-use applications

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)			
Name of program	:	Bachelor of Technology	Semester : VI
Branch	:	Plastics Engineering	Code : C095622(095)
Subject	:	Plastic processing lab – II lab	Tutorial Periods : Nil
Lab Periods	:	2 per week	Assignments : Two (minimum)
Class Tests	:	Two (minimum)	Maximum Marks : 40
Exam. Duration	:	Three Hours	Minimum Marks : 20
<p>Course Objectives</p> <ul style="list-style-type: none"> • Understand the basic operation process of advance plastic processing techniques. • To learn the setting of machine parameters for all-electric microprocessor-based injection moulding, compression molding and blow molding of thermoplastics plastics. • To know the operation of rotational moulding and FRP process. • Set and optimize the process variables for the improved efficiency of advance moulding techniques. • Apply safety checkups before and during the operation of advance moulding machines. • Apply preventive maintenance measures. 			
<p>List of Experiments:</p> <ol style="list-style-type: none"> 1. Microprocessor controlled advance injection moulding. 2. Study of moulding micro parts and micro structures. 3. Blown film extruder (pipe / tube extruder) 4. Microprocessor controlled advance blow moulding. 5. Thermoforming (Vacuum forming). 6. Plastics-coating, sealing, welding & screen-printing. 7. Study of hot runner mould. 8. Electrical and Mechanical maintenance along with the safety prospective to advance plastics processing techniques i.e. advance injection, blow, extrusion moulding etc. 9. Study of foam moulding. 10. Study of casting process. 11. Injection stretch blow moulding. <p>Note: The above experiments will cover its functioning , parameter setting, operations, safety measures, trouble shooting, maintainance, loading and unloading of mould etc wherever applicable.</p>			
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Plastics Material & Processing By Strong, A, Brent, 2. Blow Molding Hand Book By Rosato, D.V & Rosato, 3. Plastic Extrusion Technology By Hensen 4. Fundamentals of Plastics Processing (Vol. 1) Injection & Blow Moulding, Sanjay K Nayak , S Sugumar, R T Nagaralli, TMH Publication, Vol. 1, 2014. 5. Technical Manual on Plastic Processing, Sanjay K Nayak et. al., CIPET internal publication, April 2007. 			
<p>Course outcomes: Students will be able to-</p> <ul style="list-style-type: none"> • Select the appropriate advance processing technique based on the application. • Select the particular method based on the technical specification of the machine. • Setting of the optimized process variables for improved efficiency. • Troubleshoot and remedy of the defects produced. • Apply maintenance and safety prospective before and during the running of the machine. 			

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)			
Name of program	: Bachelor of Technology	Semester	: VI
Branch	: Plastics Engineering	Code	: C095623(095)
Subject	: Plastics Product Testing lab	Tutorial Periods	: Nil
Lab Periods	: 2 per week	Assignments	: Two (minimum)
Class Tests	: Two (minimum)	Maximum Marks	: 40
Exam. Duration	: Three Hours	Minimum Marks	: 20

Course Objectives

- To know the test required for specific products.
- To know the procedure to perform the required test on the products.
- To know the effect of testing conditions on the test results.
- To justify the fail and pass of the test results and their impact on product quality.

List of Experiments

List of Plastics Product Testing

- 1) Compounding, Blending using Two Roll Mill and Specimen preparation
- 2) Determinations of Carbon Black Content and Dispersion of polyolefin Plastics
- 3) Determination of environmental stress cracking resistance for Polyethylene
- 4) Testing of HDPE Pipes
- 5) Testing of PVC Pipes
- 6) Testing of Water Storage Tanks/Containers
- 7) Testing of Films/Sheets
- 8) Testing of HDPE/PP Woven Sacks/Tapes
- 9) Testing of Bottles for Vanaspati, Ghee, Milk Packing
- 10) Testing of flexible pouches

Reference Books:

1. Shah, Vishnu, Hand Book of Plastics Testing Technology, John Wiley and Sons, SPE Monograph
2. Fundamentals of Plastics Testing-Springer Publication
3. Related BIS Standards

Course outcomes:

- After the study, students will be able to perform the testing on different products.
- It will also provide ideas for the selection of tests on the products based on its requirement.
- They can also judge the quality of plastics products based on testing results.

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)			
Name of program	:	Bachelor of Technology	Semester : VI
Branch	:	Plastics Engineering	Code : C095624(095)
Subject	:	Polymer Characterisation Lab	Tutorial Periods : Nil
Lab Periods	:	2 per week	Assignments : Two (minimum)
Class Tests	:	Two (minimum)	Maximum Marks : 40
Exam. Duration	:	Three Hours	Minimum Marks : 20
<p>Course Objectives</p> <ul style="list-style-type: none"> • To know the use of high-end equipment's • To know the operation of characterization equipment's • To know the analysis of test results. • Know the types of different parameters are analyzed through the equipment. 			
<p>List of Experiments</p> <ol style="list-style-type: none"> 1) Testing through Differential Scanning Calorimetry (DSC) 2) Testing through Thermogravimetric Analysis (TGA) 3) Study on Dynamic Mechanical Analysis (DMA) analysis 4) Study on Scanning Electron Microscopy (SEM) analysis 5) Study on X-Ray Diffractometry (XRD) analysis 6) Study on Gas Chromatography analysis 7) Study on CHNSO analysis 8) Testing through UV visible spectroscopy 9) Testing through Fourier transform infrared spectroscopy (FTIR) 10) Testing of elemental analysis through Atomic absorption spectroscopy (AAS) 11) Testing of Water Vapor Transmission Rate (WVTR) 12) Study of Biodegradability tests 			
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Shah, Vishnu, Hand Book of Plastics Testing Technology, John Wiley and Sons, SPE Monograph 2. Fundamentals of Plastics Testing-Springer Publication 3. Related BIS Standards 			
<p>Course outcomes: After study students can handle the equipment independently and can select the types of equipment based on the required set of analysis.</p>			

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)

Program / Semester: B.Tech (VI)	Branch: Humanities
Subject: Technical Communication & Soft Skills	Course Code: C000601(046)
Total Marks (Internal Assessment): 10	L: 0 T:0 P: 2 Credit(s): 0
Internal Assessments to be conducted: 02	Duration (End Semester Exam): NA

UNIT-1 Communication Skills-Basics: Understanding the communicative environment, Verbal Communication; Non Verbal Communication & Cross Cultural Communication, Body Language & Listening Skills; Employment Communication & writing CVs, Cover Letters for correspondence. Common errors during communication, Humour in Communication.

UNIT-2 Interpersonal communication: Presentation, Interaction and Feedbacks, Stage Manners, Group Discussions (GDs) and facing Personal Interviews, Building Relationships, Understanding Group Dynamics- I, Emotional and Social Skills, Groups, Conflicts and their Resolution, Social Network, Media and Extending Our Identities.

UNIT- 3 Vocational skills: Managing time: Planning and Goal setting, managing stress: Types of Stress; Making best out of Stress, Resilience, Work-life balance, Applying soft-skills to workplace.

UNIT-4 Mindsets and Handling People: Definitions and types of Mindset, Learning Mindset, Developing Growth Mindset, Types of People, How to Lead a Meeting, How to Speak Effectively in Meetings, Behavior & Roles in Meetings, Role Play: Meeting. On Saying "Please", How to say "NO".

UNIT-5 Positive Psychology: Motivating oneself, Persuasion, Survival Strategies, Negotiation, Leadership and motivating others, controlling anger, Gaining Power from Positive Thinking.

Text Books:

1. Petes S. J., Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw-Hill Education, 2011.
2. Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success. Canada: Wiley & Sons, 2006.
3. Dorch, Patricia. What Are Soft Skills? New York: Execu Dress Publisher, 2013.

Reference Books:

- Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams, and Leaders. Washington, DC: Pfeiffer & Company, 2013.
- Peale Norman Vincent. The Power of Positive Thinking: 10 Traits for Maximum Result. Paperback Publication. 2011.
- Klaus, Peggy, Jane Rohman & Molly Hamaker. The Hard Truth about Soft Skills. London: Harper Collins E-books, 2007.

Course Outcomes

1. Learn to listen actively to analyse audience and tailor the delivery accordingly.
2. Increase their awareness of communication behaviour by using propriety-profiling tool.
3. Master three "As" of stressful situation: Avoid, Alter, Accept; to cope with stressors and create a plan to reduce or eliminate them.
4. Develop growth mind-set and able to handle difficult person and situations successfully.
5. Develop technique of turning negativity into positivity and generate self-motivation skills.