GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: Textile Technology

Subject Code : BE04029011

Subject Name : Textile Fibre- II

w. e. f. Academic Year:	2024-25
Semester:	4
Category of the Course:	PCC-04

Prerequisite:	Students should have the basic knowledge of fibres.
Rationale:	Textile fibres manufactured utilizing manmade techniques are popularly being used as a raw material for manufacturing apparels, technical textiles and other textile materials, thus it is necessary to acquire knowledge about the manufacturing of the manmade fibres, their properties and the post processes thereof.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Acquire knowledge about the manufacturing of fibres with the help of melt spinning process and solution spinning	R, U, A
02	Analyze the effect of key process variable on melt and solution spun yarn.	N, E
03	Acquire knowledge about the working of the machinery and the subsequent processes.	U, A
04	Have a detailed knowledge about the texturising process.	R, U, A
05	Know the latest developments in the field of fibres and texturising process.	R, E, C

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	PBL*	Total no of hours per semester		ESE (E)	PA / CA (M)	PA/ CA (I)	PBL (I)	ESE (V)	
45	0	30	45	120	4	70	30	20	30	50	200

*** Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.**

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction - Definition, classification, fibre forming processes, products and properties and application areas.	5	10
2.	Melt spinning process – Introduction, Process, variables and conditions for continuous spinning, special features of high speed spinning, role of some critical parameters and structure formation during spinning.	8	18
3.	Solution spinning process – Process variables, dry spinning and wet spinning, structure formation and comparison of features of the spinning processes.	8	18
4.	Spin finish for manufactured yarns and drawing of the fibres.	4	9
5.	Introduction and classification of textured yarns.	4	9
6.	False twist texturing: Principle mechanisms, material and process parameters, Draw texturing machine and process parameters, Air jet texturing process, process parameters and effects of process parameters.	10	22
7.	Other methods of texturing - Gear crimping, Stuffer box texturing, Knife edge crimping and Knit De-Knit process.	2	5
8.	Recent developments in the field of fibres and texturing.	4	9
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
17	**23**	**23**	**23**	**7**	**7**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Manufactured Fibre Technology, Edited by V. B. Gupta and V. K. Kothari, Chapman and Hall, London, 1997.

2. Production of Synthetic Fibres, A.A.Vaidya, Prentice Hall of India Pvt. Ltd., New Delhi, 1988.
3. Texturising, Dr. H.V. Sreenivasamurthy& B. Purushothama, Woodhead Publishing India Pvt. Ltd., 2017.
4. False Twist Textured Yarns, C. Atkinson, Woodhead Publishing, 2012.
5. Synthetic fibres: Nylon, Polyester, Acrylic, Polyolefin, J. Eric McIntyre, 2005.
6. New Millennium Fibers, T. Hongu, Glyn O. Phillips, M. Takigami, 2005.

(b) Open source software and website:

1. https://nptel.ac.in
2. World Wide Web, Google Search Engine etc.

Suggested Course Practical List:

1. To study the passage of material in highspeed melt spinning machinery.
2. To compare the dry spinning and wet spinning techniques.
3. To analyze the effect of process variables on melt spun fibre properties.
4. To understand the effect of process variables on solution spun fibre properties.
5. To study of spin finish application and its advantages.
6. To examine the drawing process of synthetic filaments and calculate draw ratio.
7. To understand the false twist texturing process and evaluate yarn characteristics.
8. To explore the air jet texturing technique and assess yarn structural changes.
9. To study the effect of yarn tension and twist on texturing quality.
10. To understand the role of polymer type in fibre formation and performance.
11. Study the recent innovations in synthetic fibres and texturing processes.

List of Laboratory/Learning Resources Required:

Twin screw extruder, Spin coater, Bicomponent Extrusion Machine, Dry jet wet spinning machine, False Twist Texturing Machine, Draw texturing machine, Air jet texturing machine, Friction texturing machine etc.

Suggested Activities for Students:

Visit to fibre manufacturing unit, texturing unit and preparing report.

- **List of suggested activities for Problem Based Learning:**

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h Total = 10h	Based on report submitted. Report should contain observations and calculation based on industry/ lab data
2	Assignment writing. Numericals based assignment is preferable.	5 assignments of 2h each. Total = 10h	Based on the assignment submitted
3	Self learning on-line course	Minimum duration of the course should be 10h	Examination based assessment at the end of course. Based on the certificate produced
4	Poster/chart/power point preparation on technical topics	Duration = 6 h	Based on poster/chart preparation and presentation skills
5	Technical Video based learning related to the subject	Duration of video = 5h Report preparation = 5h Total = 10h	Report /presentation based on the video learning outcomes.
6	Working/non-working model on technical topics	Working = 12 h Non- working = 8 h	Based on inter department/external evaluation
7	Industrial exposure for 2-3 days to observe and provide tentative solutions on society/environment/health/any other issue	Duration = 15 h for industrial exposure Problem identification and tentative solution = 10 h Total = 20 h	Based on evaluation of critical problems and solutions
8	Group Discussion on emerging/trending technical topics based on subject	Duration = 1 h each	Based on performance in group discussion, technical depth, knowledge etc.

9	Real world case studies-based learning	Duration of data collection/study = 5h Report preparation = 5h Total = 10h	Based on in-depth study, technical depth, data collected, fact finding, etc.

- All records pertaining to the evaluation and assessment of self-learning activities must be properly maintained and preserved at the institute level. These records should be made available to the university upon request.
- Institutes are encouraged to utilize digital platforms, such as Microsoft Teams, for effective record-keeping and to ensure transparency in the evaluation and assessment of self-learning activities.

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