



Sant Dnyaneshwar Shikshan Sanstha's

Annasaheb Dange College of Engineering & Technology, Ashta.

(An Empowered Autonomous Institute)

Structure and Curriculum

F.Y.B.Tech

Semester-I & II

W.e.f.AY-2025-26

DEPARTMENT OF FOOD TECHNOLOGY



Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist. : Sangli, Maharashtra

(An Empowered Autonomous Institute)

ADCET

F.Y. B.Tech.-Food Technology [Level 4.5, UG Certificate] Semester -I

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	BS	T1	2FTBS101	Applied Mathematics-I	3	1	-	1	4	40	20	40	-	-
02	BS	LIT2	2FTBS102	Applied Chemistry	3	-	2	-	4	40	20	40	50	-
03	ES	LIT2	2FTES103	Engineering Graphics	3	-	2	-	4	40	20	40	50	-
04	ES	T1	2FTES104	Fundamentals of Food Technology	2	-	-	-	2	40	20	40	-	-
05	ES	T1	2FTES105	Introduction to Emerging Technologies	2	-	-	-	2	40	20	40	-	-
06	ES	L2	2FTES106	Design Thinking	-	-	2	-	1	-	-	-	50	-
07	IKS	T2	2FTHS107	Indian Knowledge System	2	-	-	-	2	-	50	-	-	-
08	VSEC	L2	2FTVS108	Idea Lab Workshop	1	-	2	-	2	-	-	-	50	-
09	CC	L2	3BSCCXXX	Liberal Learning Course-I	-	-	2	-	1	-	-	-	50	-
Total					16	1	10	1	22	Total marks: 800				
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria			TA (Theory) : $\geq 8/20$		MSE + ESE (Theory): $\geq 32/80$			TA (Theory) / CIA (Lab) : $\geq 20/50$			ESE (Lab) : $\geq 20/50$			

CC Bouquet:

3BSCC121 - Introduction to Yoga and Mindfulness	3BSCC123 - Six-Sigma Happiness and Mind Mechanics	3BSCC125 - Community Engagement through NSS
3BSCC122 - Physical Fitness and Lifestyle Management	3BSCC124 - Creativity through Visual Arts	3BSCC126 - Cultural Exploration & Heritage

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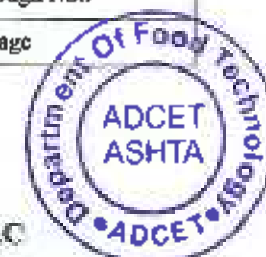
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Ashta - 416301, Dist. : Sangli, Maharashtra

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AD CET

F.Y.B.Tech.-Food Technology

[Level 4.5, UG Certificate] Semester -II

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	BS	T1	2FTBS109	Applied Mathematics-II	3	1	-	1	4	40	20	40	-	-
02	BS	LIT2	2FTBS110	Applied Physics	3	-	2	-	4	40	20	40	50	-
03	PC	T1	2FTPC111	Engineering Thermodynamics	2	-	-	1	2	40	20	40	-	-
04	ES	LIT1	2FTES112	Food Chemistry	3	-	2	-	4	40	20	40	50	50
05	ES	LIT2	2FTES113	Basic Electrical and electronic Engineering	2	-	2	-	3	40	20	40	50	-
06	ES	L2	2FTES114	Programming for problem Solving	1	-	2	-	2	-	-	-	50	-
07	HS	L2	2FTHS115	Professional Communication Skills	-	-	4	-	2	-	-	-	50	-
08	CC	L2	3BSCCXXX	Liberal Learning Course-II	-	-	2	-	1	-	-	-	50	-
Total					14	1	14	2	22	Total marks: 850				

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory) : $\geq 8/20$	MSE + ESE(Theory): $\geq 32/80$	TA (Theory) / CIA (Lab) : $\geq 20/50$	ESE (Lab) : $\geq 20/50$
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CC Bouquet:

3BSCC121 - Introduction to Yoga and Mindfulness	3BSCC123 - Six-Sigma Happiness and Mind Mechanics	3BSCC125 - Community Engagement through NSS
3BSCC122 - Physical Fitness and Lifestyle Management	3BSCC124 - Creativity through Visual Arts	3BSCC126 - Cultural Exploration & Heritage

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Established: 1999

Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist. : Sangli, Maharashtra

(An Empowered Autonomous Institute)



Exit after F.Y.B.Tech. – Food Technology

Additional Credits to qualify for UG Certificate

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	VSEC	L	2FTEX201	Fruit Pulp Processing	-	-	4	-	2	-	-	-	50	-
02	VSEC	L	2FTEX201	Biscuit Production	-	-	4	-	2	-	-	-	50	-
Total														
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria			TA (Theory) : >8/20		MSE + ESE(Theory): ≥32/80			TA (Theory) / CIA (Lab) : ≥20/50			ESE (Lab) : >20/50			


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	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology							
Course Information:								
Class, Semester		FY. B.Tech, Semester - 1					Category	BS
Course Code, Course Title		2FTBS101, Applied Mathematics-I					Type	T1
Prerequisites								
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self Study	Credits	
		3	1		-	1	4	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1		Determine the consistency of systems of linear equations using Echelon form of matrix						
CO2		Compute Eigen values, Eigen vectors, powers and inverse of a square matrix using characteristic equation						
CO3		Apply the concepts of complex number to solve the equations using De Moivre's theorem and hyperbolic identities						
CO4		Calculate partial derivatives, Jacobians, and extreme values of function of two variables using concept of partial differentiation						
CO5		Solve ordinary differential equation of order one and degree one using analytical method and numerical techniques.						
Syllabus:								
Module		Contents						Lecture Hours
I		Solution of System of Linear Equations: Definition of system of linear equations, Classification of system of linear equations, Rank of matrix: Concept and computation using Echelon form and Normal form, Rouché–Capelli Theorem (Statements only), Solution of non-homogeneous system of linear equations, solution of Homogeneous system of linear equations, Applications in engineering.						7
II		Eigen Values and Eigen Vectors: Definition of vectors in R^n , Linear Dependence and Independence of Vectors, Characteristic Equation of Matrix, Cayley-Hamilton theorem (statement only), Applications of Cayley-Hamilton theorem, Eigen Values and Properties, Eigen Vectors and Properties.						7
III		Complex Number: Definition of complex number, Polar and exponential form of complex number, De Moivre's Theorem and Simple Applications, Power and Roots of complex numbers, Applications in solving equations. Hyperbolic Functions: Definitions, Identities of hyperbolic functions, Relation between Circular functions and hyperbolic functions, Inverse hyperbolic functions.						8


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IV	Partial Differentiation and Applications: Functions of several variables, partial derivatives of first order, Higher order partial derivatives, Homogeneous functions, Euler's Theorem on homogeneous function: statement and verification, Jacobians and Properties, Maxima and minima of functions of two variables.	8
V	Ordinary Differential Equation of first order and first degree: Linear differential equation, exact differential equation, reducible to exact differential equation, reducible to linear differential equation, Applications of engineering (branch oriented)	8
VI	Numerical Solution of Ordinary differential equation of First Order & First Degree: Euler's method, Modified Euler's method, Runge-Kutta third order, Runge-Kutta Method of order four, Taylor Series method.	7
Total Lecture Hours		45

List of Tutorial with CO Mapping

Sr.No	Title of Tutorial	CO Mapped
1	Rank of matrix and Solution of Homogeneous System of Linear Equations	1
2	Solution of Non-Homogeneous System of Linear Equations	1
3	Eigen Value, Eigen vectors and Properties	2
4	Cayley-Hamilton theorem and Applications	2
5	De Moivre's Theorem, Applications and Hyperbolic functions	3
6	Partial differentiations and Euler's theorem	4
7	Jacobians and Maxima-Minima of Two Variable Functions	4
8	Euler's and Modified Euler's Methods for Solving Initial Value Problems	5
9	Runge-Kutta Methods and Taylor series method	5
10	Ordinary differential equations of first order and first degree	5
Total Tutorial Hours		15

Text Books

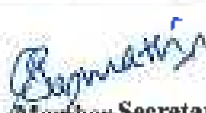
1.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Edition, Laxmi Publications, 2011.
2.	H. K. Das, Advanced Engineering Mathematics, 22th Edition, S. Chand, 2018.
3.	B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010
4.	Dr. B. S. Grewal, Numerical Methods, 9th Edition, Khanna Publishers, 2010

References:

1.	Dr. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2018.
2.	N. P. Bali, Manish Goyal, Advanced Engineering Mathematics, 7th Edition, Infinity science press, 2010.
3.	P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-I, 9th Edition Pune Vidyarthi Griha Prakashan, 1984
4.	P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-II, 7th Edition Pune Vidyarthi Griha Prakashan, 1988.


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Online Learning Resources

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|----|---|
| 1. | NPTEL Course on Engineering Mathematics-I, by Prof. Jitendra Kumar, IIT Kharagpur
https://nptel.ac.in/courses/111105121 |
| 2. | NPTEL Course on Numerical Methods, by Prof. Ameeya Kumar Nayak, Prof. Sanjeev Kumar, IIT Roorkee
https://nptel.ac.in/courses/111107105 |
| 3. | NPTEL Course on Matrix Analysis with Application, by Prof. S. K. Gupta, Prof. Sanjeev Kumar, IIT Roorkee
https://nptel.ac.in/courses/111107112 |
| 4. | NPTEL Course on Mathematics-III, by Prof. Durga C Dalal, Dr. M. Guru Prem Prasad, IIT Guwahati
https://nptel.ac.in/courses/122103012 |



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Course Information:							
Class, Semester	FY. B.Tech, Semester - 1					Category	BS
Course Code, Course Title	2FTBS102, Applied Chemistry					Type	LIT2
Prerequisites	-						
Teaching Scheme (per week)	Lecture	Tutorial		Practical	Self Study	Credits	
	3	-		2	-	4	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		40	20	40		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:							
CO1	Explain the properties and applications of engineering materials for industrial and societal use based on their chemical compositions.						
CO2	Discuss methods for preventing corrosion in metals by relating them to corrosion types and environmental conditions using basic chemical principles.						
CO3	Solve the domestic and industrial problems related to water quality parameters using theoretical knowledge and laboratory experiments.						
CO4	Apply the principles of analytical instruments in the analysis of samples with help of foundational practical chemistry knowledge.						
CO5	Compute the calorific values of fuels for domestic and industrial applications using standard fundamental chemical equations.						
Syllabus:							
Module	Contents						Lecture Hours
I	Water Technology and Management: Introduction, impurities in natural water and it's removal, Water Testing: Acidity, alkalinity, chlorides and hardness of water (definition, causes and significance), WHO Standards. Scales and sludges: Formation in boilers and removal, Disinfection of water, Waste water treatment. Treatment of hard water by: Ion- exchange process, Zeolite process, Desalination of brackish water by Reverse Osmosis (RO), Numericals on temporary, permanent and total hardness of water.						8
II	Chemical and Analytical Techniques: Chemical analysis, its types, Different ways to express concentration of solution. Numerical problems. pH-metry: Introduction, pH measurement using glass electrode and it's applications.						8


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	Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's laws). Instrumentation and applications of UV-Visible spectrophotometer. Chromatography: Introduction, principle, instrumentation and applications of Thin-Layer chromatography (TLC) and Gas-Liquid chromatography (GLC).	
III	Polymers and Composites for Engineering Applications: Polymers: Introduction, Polymerization and it's types, Plastics: Thermo-softening and thermosetting plastics, industrially important plastics like PVC, PTFE (Teflon), ABS, urea-formaldehyde, Conducting polymers, Biodegradable polymers, Molecular weights of a polymer. Composites: Introduction, Constituents, Fibre-reinforced plastics (FRP) and Glass reinforced plastics (GRP), Metal matrix composites.	7
IV	Energy Technology: Batteries: Introduction, Types of batteries, battery characteristics, Lithium- ion batteries (LIBs), Sodium- ion batteries (Instrumentation, advantages, disadvantages and applications). Fuels: Introduction, classification, characteristics of good fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericals on Bomb and Boy's calorimeter. Advanced Energy Systems: Introduction, Fuel cells, Hydrogen cells, Solar cells.	7
V	Corrosion & it's Prevention: Corrosion: Introduction, causes, types of corrosion, Electrochemical corrosion (hydrogen evolution and oxygen absorption mechanisms), Factors affecting rate of corrosion. Prevention of corrosion: Introduction, Hot dipping process (Galvanizing and tinning), Cathodic protection methods, Electroplating process, Metal cladding, prevention by organic coatings (Paints and varnishes).	8
VI	Engineering Materials and Green Chemistry: Introduction, classification of engineering materials. Alloys: Types of alloys, purposes of making alloys, Ferrous alloys: Plain carbon steels (mild, medium and high). Nonferrous alloys: Aluminum alloy (Duralumin and Alnico), Nickel alloy (Nichrome), Tin alloys (Solders). Green Chemistry: Definition, Twelve principles of green chemistry, Research and industrial applications, Green house effect and it's remedies.	7
Total Lecture Hours		45


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List of Experiments with CO Mapping		
S.No	Title / Topic of the Experiment	CO Mapped
1	Determination of acidity of water sample. (Neutralization Titration)	3
2	Determination of alkalinity of water sample. (Acid- Base Titration).	3
3	Determination of chloride content of water by Mohr's method. (Precipitation Titration).	3
4	Determination of total hardness of water sample by EDTA method.	3
5	Preparation of Urea-formaldehyde resin.	1
6	Preparation of Phenol-formaldehyde resin.	1
7	Determination of rate of corrosion of Aluminum in acidic and basic medium	2
8	Estimation of copper in brass solution (Displacement Titration)	1
9	Estimation of zinc in brass solution (Displacement Titration)	1
10	Determination of pH of industrial waste water by using pH meter	4
11	Demonstration of bomb calorimeter to calculate calorific value of fuels.	5
12	Demonstration of Photo-colorimeter.	4
13	Determination of strength of acid/base by using conductivity meter.	4
Total Practical Sessions		15
Total Practical Hours		30

Text Books:

1. S. S. Dara, A Text Book of Engineering Chemistry, 11th Edition, S. Chand & Co. New Delhi, 2008.
2. Shashi Chawala, A Text book of Engineering Chemistry 3rd Edition, Dhanpat Rai Publishing Co. New Delhi, 2007
3. Ziyauddin D. Sande, Vijayalaxmi M. Vairat, Pratapsingh V. Gaikwad, A Text book of Applied Chemistry, 1st Edition, Wiley Publications, 2018

References:

1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publishing Co., New Delhi., 2015.
2. Wiley India, Engineering Chemistry, 1st Edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Chatwal and Anand, Instrumental Methods of Chemical Analysis, 5th Edition, Himalaya Publishing House, Mumbai, 2005
4. B. K. Sharma, Industrial Chemistry, 10th Edition, Goel publication (P) Ltd., 1999
5. S. K. Singh, Fundamentals of Engineering Chemistry, 1st, New Age International (P) Ltd, New Delhi, 2009

Online Learning Resources:

1. Water Technology-- https://youtu.be/dKWJap_nIE
2. For lithium-ion batteries (LIBs): <https://www.youtube.com/watch?v=DBLHaLhyo2w>
3. Wikipedia - Composite materials: https://en.wikipedia.org/wiki/Composite_material

Experiments that may be performed through virtual labs:

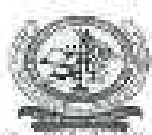
S. No.	Experiment Name	Experiments Links
1.	Water analysis-Determination of Chemical parameters	https://inos-amrt.vlabs.ac.in/exp/water-analysis-chemical-parameters/index.html
2.	Demonstration of Photo-colorimeter	https://pcv-amrt.vlabs.ac.in/exp/spectrophotometry/index.html


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Course Information:

Class, Semester	FY. B.Tech, Semester - 1					Category	ES
Course Code, Course Title	2FTES103, Engineering Graphics					Type	LIT2
Prerequisites	--						
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self Study	Credits
	3	-		2		--	4
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		40	20	40		50	--

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO1	Construct projections of straight lines in various positions with reference planes, by variation in inclination, grade, bearing, and initial conditions.
CO2	Complete the projection of planes and Solids in various positions relative to reference planes, considering variations in initial conditions and inclination, to achieve an accurate shape in inclined positions.
CO3	Prepare the section of solids in simple position and inclined to one reference plane and parallel to other, considering variations in shapes, initial conditions and inclination, to get an accurate sectional view of inclined position of solid.
CO4	Draw the three orthographic views for a given three-dimensional pictorial view, concerning the direction of viewing in first-angle projection, explaining the sectional view, hidden object and dimensions.
CO5	Develop a 3-dimensional isometric view converted from two or three orthogonal views to illuminate a 3D object.

Syllabus:

Module	Contents	Lecture Hours
I	Fundamentals of Engineering Graphics and Projections of Lines Fundamentals of Engineering Graphics: Introduction to Drawing instruments and their uses. Different types of lines used in drawing practice, Dimensioning system as per BSI. Projections of Lines: Introduction to First angle and third angle methods of projection. Projections of points on regular and auxiliary reference planes. Projections of lines (horizontal, frontal, oblique and Profile lines) on regular and auxiliary reference planes. True length of a line, Point View of a line, angles made by the line with reference planes. Projections of intersecting lines, Parallel lines, perpendicular lines, and skew lines. Grade and Bearing of a line	9


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II	Projections of Planes Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes), Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Projections of plane figures inclined to both the planes. (Circle & regular polygon upto hexagon).	6
III	Projections of Solids Projections of Prisms, Pyramids, Cylinder and Cones inclined to both reference planes. (Excluding Frustum and Sphere)	7
IV	Section of Solids Prisms, Pyramids, Cylinders and Cones, in simple position and inclined to one reference plane and parallel to others.	8
V	Orthographic Projections Lines used, selection of views, spacing of views, dimensioning and sections. Drawing required views from given pictorial views (conversion of pictorial views in to orthographic views), including sectional orthographic views.	8
VI	Isometric Projections Introduction to isometric. Isometric scale, Isometric projections and Isometric views /drawings. Circles in isometric view. Isometric views of simple solids and objects.	7
Total Lecture Hours		45

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	Introduction to Engineering Drawing	1
2	Types of Lines and Lettering	1
3	Projection of Line	1
4	Projection of Plane	2
5	Projection of Solids	2
6	Section of Solids	3
7	Orthographic Projection	4
8	Isometric Projection	5
Total Practical Sessions		15
Total Practical Hours		30

Text Books:

1. W. J. Luzadder, Fundamentals of Engineering drawing, Revised Edition, Prentice Hall of India, 1999.
2. N. D. Bhatt, Machine Drawing, 15th Edition, Charotar Publishing House Pvt. Ltd.-Anand, 2007.
3. Jhole, Dhananjay, Engineering Drawing, Revised Edition, Tata McGraw-Hill, 2011.
4. M.J. Mathur, Engineering Drawing & Graphics, Revised Edition, Jain brothers, 1999.


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References:

1. K. Venugopal, Engineering Drawing and Graphics, 5th Edition, New Age Publication, 2004.
2. R. K. Dhawan, A textbook of Engineering Drawing, Revised Edition, S. Chand and Co, 2008.
3. N. B. Shaha and B. C. Rana, Engineering Drawing, 2nd Edition, Person Education, 2012.
4. K. L. Narayana, Machine Drawing, New Age Publication

Online Learning Resources

1. NPTEL Course on *Engineering Drawing*, by Prof. P. S. Robi, IIT Guwahati
<https://nptel.ac.in/courses/112103019>
2. NPTEL Course on *Engineering/ Architectural Graphics- Part I- Orthographic Projection*, by Prof. Avlokita Agarwal, IIT Roorkee
<https://nptel.ac.in/courses/124107157>
3. NPTEL Course on *Engineering Graphics and Design*, by Prof. Naresh Datta, Prof. S. R. Kale, IIT Delhi
<https://nptel.ac.in/courses/112102304>
4. NPTEL Course on *Engineering Drawing and computer graphics*, by Prof. Rajaram Lakkaraju, IIT Kharagpur
https://onlinecourses.nptel.ac.in/noc21_me125/preview


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 Established: 1989	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology						
Course Information:							
Class, Semester	FY, B.Tech, Semester -- 1					Category	ES
Course Code, Course Title	2FTES104 – Fundamentals of Food Technology					Type	T1
Prerequisites	1FTPC105						
Teaching Scheme (per week)	Lecture	Tutorial		Practical	Self Study		Credits
	2	-		-	-		2
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		40	20	40		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:							
CO1	Explain the basic concepts of food groups, functional foods, and the food pyramid.						
CO2	Describe the role of microorganisms in food spoilage, preservation, and probiotics.						
CO3	Apply principles of food chemistry to understand composition and quality of foods.						
CO4	Analyze basic food processing techniques and their role in preservation.						
CO5	Evaluate and design basic food handling practices for quality and safety.						
Syllabus:							
Module	Contents						Lecture Hours
I	Food Pyramid & Food Groups Food pyramid concept, balanced diet, functional foods, staple foods, fortified foods, nutraceuticals						5
II	Food Microbiology Introduction to food microorganisms, food spoilage (bacteria, molds, yeasts), probiotics.						5
III	Fundamentals of Food Chemistry Water, carbohydrates, proteins, lipids, vitamins, minerals, pigments, enzymes in food.						5
IV	Introduction to Food Processing Principles of food preservation (thermal, cold, drying), processing of cereals, fruits & vegetables						5
V	Food Safety & Quality Food hygiene, sanitation, food adulteration, HACCP basics, quality control parameters						5
VI	Emerging Trends in Food Technology Functional ingredients, convenience foods, plant-based foods, novel processing methods						5
Total Lecture Hours						30	


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Text Books

1. Fellows, P.J. Food Processing Technology. Wood head Publishing (2022).
2. N. Shakuntala Manay, M. Shadakshara Swamy, Food facts and Principle, 3rd, New age international Publications, 2021
3. W. C. Frazier, D. C. Westhoff, Food Microbiology, 5th, McGraw-Hill, 2013.
4. Sukumar De, Outline of Dairy Technology, 1st, Oxford University Press, 2008.
5. Salunkhe D.K. and Kadam S.S. Handbook of Fruits Science and Technology: Production, Composition, Storage and Processing, CRC press, 1995.

References:

1. Kirk Lindsay Parkin, Srinivasan Damodaran, Owen R. Fennema, Fennema's Food Chemistry, 5th, CRC Press, 2017.
2. P.J. Fellows, Food Processing Technology: Principles and Practice, 4th, Elsevier Science, 2016.
3. I.S. Singh, Handbook of Fruit and Vegetable Processing, 1st, Sinha and Hui, 2010

Online Learning Resources

1. NPTEL Course on Functional Foods and Nutraceuticals
By Dr Rekha Sharma | UGC - Malaviya Mission Teacher Training Centre, Rashtra Sant Tukadoji Maharaj Nagpur University
https://onlinecourses.swayam2.ac.in/cec25_ag06
2. NPTEL Course on MVP-001: Food Fundamentals and Chemistry By Dr. Mita Sinha Mahapatra
Indira Gandhi National Open University, New Delhi

https://onlinecourses.swayam2.ac.in/mvp25_ag83/preview

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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology						
Course Information:							
Class, Semester	F.Y. B.Tech – Semester I					Category	ES
Course Code, Course Title	2FTES105, Introduction To Emerging Technologies					Type	T1
Prerequisites	--						
Teaching Scheme (per week)	Lecture	Tutorial	Practical		Self Study		Credits
	2	-	-		-		2
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		40	20	40		--	—
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:							
CO1	Describe the key characteristics of emerging technologies such as AI, IoT, AR/VR, Quantum Computing, and Blockchain						
CO2	Apply the concepts of AI, IoT, CPS, and Blockchain to real-world case studies to identify their disruptive impact on digital transformation initiatives						
CO3	Explain the role of robotics, additive manufacturing, and green technologies in supporting sustainability and ethical technology deployment						
CO4	Implement innovative solutions using autonomous systems and green technologies to address sustainability challenges						
Syllabus:							
Module	Contents						Lecture Hours
I	Foundations of Emerging Technologies and Innovation Ecosystem Emerging technologies characteristics and disruptive impact, Indian innovation ecosystem: Digital India, Startup India, AIM, India Stack, National Education Policy and interdisciplinary learning, Case studies: Smart Cities, Aadhaar, UPI, Digital Health Mission.						5
II	Artificial Intelligence, Machine Learning & Data Science AI basics: history, goals, types of AI (Narrow, General, Super AI), Machine learning: supervised, unsupervised, reinforcement learning, Introduction to data science: lifecycle, Big Data (5Vs), visualization, Human-centered AI and ethical concerns: bias, privacy, responsible AI.						5
III	IoT, Cyber-Physical Systems, Edge Computing & Cybersecurity IoT: architecture, sensors, communication, cloud, Cyber-physical systems: smart grid, autonomous vehicles, industrial automation, Edge & fog computing: real-time applications and use cases, Cybersecurity basics: CIA triad, malware, phishing, digital hygiene.						5


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IV	AR/VR, Quantum Technologies and Blockchain AR/VR/XR: definitions, tools, applications in gaming, education, healthcare, Metaverse and immersive computing, Introduction to quantum computing: qubits, entanglement, potential impact. Quantum AI. Block chain, Smart Contracts, DApps, DeFi, NFTs	5
V	Robotics, Autonomous Systems & Additive Manufacturing Robotics: types, sensors, actuators, applications in healthcare, defense, logistics, Autonomous systems: drones, driverless vehicles, swarm robotics, 3D/4D printing: additive manufacturing, materials, future directions, Design thinking for innovation in robotics & manufacturing.	5
VI	Green Technologies, Sustainability & Tech Ethics Emerging technologies for solving climate/environmental challenges, Smart grids, clean energy systems, climate tech, e-waste, Sustainable design and SDGs: tech for social good, Tech ethics: inclusivity, equity, digital divide, societal impact.	5
Total Lecture Hours		30



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Department of Food Technology

Course Information:

Class, Semester	F.Y. B.Tech – Semester I	Category	ES
Course Code, Course Title	2FTES106- Design Thinking	Type	L2
Prerequisites	—		

Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self Study	Credits
	-	-		2		--	1
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		--	--	--		50	--

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO1	Explain the principles and process of Design Thinking and its application in problem-solving.
CO2	Identify and define real-world problems using user-centric observation and empathy techniques.
CO3	Conduct user research through surveys, interviews, and persona building to derive user needs and insights.
CO4	Apply ideation techniques to generate innovative and feasible solutions for identified problems.
CO5	Develop and present prototypes and communicate their solutions effectively using charts, posters, and model presentations.

Syllabus:

Module	Contents
I	Introduction to Design Thinking, Design Thinking Process
II	Empathize Phase: Empathy and Ethics, User Perspective, Activities – Empathy Map, Planning, Persona building.
III	Customer Journey Mapping, Observation of stakeholders, Defining and Conceptualization of problem
IV	Ideation, Activities – 5 Whys & 1 How, Story boarding, Brainstorming.
V	Prototype – Types, Mindsets, Tools.
VI	Testing – Scenario, Methods, Refinements & Recommendations.

List of Experiments with CO Mapping

S.No.	Title / Topic of the Experiment	CO Mapped
1	Introduction to Design Thinking Activity: Make a group of 2-4 students. Give each group a simple, relatable problem (e.g., "Long queues at the campus canteen" or "Difficulty in finding parking on campus"). Ask them to: Empathize: Identify users and their pain points. Define: Write a clear problem statement. Ideate: Brainstorm possible solutions.	1, 2

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	Sketch: Draw their proposed solution on chart paper. Present: Each group will present their idea briefly.	
2	Identification of Problems Activity 1: Present case study (in group) how companies like Airbnb, Apple, IDEO, Netflix, Samsung, Toyota used Design Thinking to drive innovation. Activity 2: User Interviews – The student or group should walk around the campus or their locality to observe and identify at least three (per student) real-life problems faced by users (students, faculty, staff, and community). Conduct interviews to gather qualitative insights. Steps: 1. Observation: Note down pain points using observation and informal interviews. 2. Listing: Write a list of problems identified. 3. Shortlisting: Apply criteria like relevance, feasibility, user impact, and alignment with SDGs to shortlist one problem to work on for further Design Thinking phases.	1, 2
3	Selection of Problems Activity: Students will present (PPT) their selected problem, why they chose it, who the users are, and the evidence collected.	1, 2
4	Designing of Empathy Map Activity: Prepare Empathy Map – Visualize what users say, do, think, and feel.	1, 3
5	Customer Survey and Analysis Activity: Students create a structured survey (MCQ, likert scale, open ended questions etc.) using google forms and prepare charts (bar, pie etc) and do the analysis.	1, 3
6	Persona Building Activity: Based on findings from Observations and interviews, Customer Survey and Analysis from previous experiments, identify pattern i.e. common characteristics, behaviors, needs, pain points, and goals among users and create persona template.	1, 3
7	Customer Journey Map Activity: Select the persona created in the previous experiment, define the Scenario, List Stages/Phases of the Journey, Map User Actions, Identify User Emotions, Identify Touchpoints, Identify Pain Points and opportunities for Improvement.	1, 3
8	Defining the problem Activities: Observation of Stakeholders – Note behaviors and pain points. 5 Whys Method (Drill Down) – Uncover root causes behind a problem. Root Cause Mapping – Visual diagram connecting symptoms to core issues. Refine Problem Statement – Create a focused, actionable problem definition.	1, 3
9	Poster Presentation Activity: Use A2/A1 sheet and draw charts, diagrams, sketches, and minimal text to represent experiment no 1-8.	1, 2, 3
10	Ideation Activities: SCAMPER Model – Modify existing ideas by Substituting, Combining, Adapting, etc. Brainstorming (Crazy 8 Method) – Rapid sketching of 8 ideas in 8 minutes. Mind Mapping – Visually connect ideas around a central problem/theme. Use the suitable and best one activity from above.	1, 4


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11	Prototype Building Activities: Storyboarding – Sketch out user scenarios and interactions. Prototyping – Build a working model or prototype or model.	1, 5
12	Testing Activities: Scenario-Based Testing – Test ideas in realistic user scenarios. Peer Testing – Get feedback from other participants or teams.	1, 5
13	Refinement & Recommendation Activities: Final Presentation – Showcase prototype or working model. Documentation of Learnings – Reflect on the process, improvements, and impact (Make a report). Apply for IPR/Incubation/Research Grant/Paper Publication.	1, 5
Total Practical Sessions		15
Total Practical Hours		30

Text Books

1. E Balaguruswamy, Developing Thinking Skills (The way to Success), First Edition, Khanna Book Publishing Company, 2023
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, First Edition, Harvard Business Review, 2008
3. R T Krishnan & V Dabholkar, 8 steps to Innovation, First Edition, Collins Publishing, 2013

References:

1. Nigel Cross, Design Thinking, First Edition, Bloomsbury, 2011
2. Idris Mootee, Design Thinking for Strategic Innovation, First Edition, Wiley, 2013

Online Learning Resources

1. NPTEL_Design Thinking - A Primer
<https://nptel.in/Asset/3SY/PJ/c/A76r-wJDN74I9qINR-6T9>
2. Design Thinking and Innovation
<https://www.coursera.org/learn/designthinkingandinnovation>


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Department of Food Technology

AD CET

Course Information:

Class, Semester	FY. B. Tech, Semester – I				Category	HS
Course Code, Course Title	2FTHS107 Indian Knowledge System				Type	T2
Prerequisites	-					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	2	-	-	-	2	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	50	-		-

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:

CO1	Explain the historical context and evolution of the Indian Knowledge System (IKS) and its relevance to modern engineering.
CO2	Analyze ancient Indian mathematical, astronomical, and technological methodologies and compare them with contemporary engineering practices.
CO3	Apply concepts from Ayurveda and ancient biological sciences to modern problem-solving in healthcare and related fields.
CO4	Evaluate traditional Indian architecture, materials, and construction principles as early forms of sustainable engineering design.
CO5	Integrate philosophical and scientific logic from Indian thought into ethical decision-making and sustainable engineering practices.

Syllabus:

Module	Contents	Lecture Hours
I	Introduction & Historical Context Overview of the Indian Knowledge System: Philosophy and Scope, Historical timelines and key epochs, Geographical and cultural influences on ancient Indian science, Interdisciplinary approaches in ancient India, Comparative analysis with other ancient civilizations	5
II	Mathematics & Astronomy in Ancient India Foundations of Vedic Mathematics and its modern applications, Concepts of zero, decimal system, and number theory, Astronomical instruments and observational techniques, Calendrical systems and time measurement in ancient India, Engineering parallels in algorithmic design and computational thinking	5
III	Ayurveda and Life Sciences Introduction to Ayurveda: Philosophy, doctrines, and methodologies, Medicinal systems and their chemical/pharmacological principles, Human physiology and surgical techniques in ancient texts (e.g., Sushruta Samhita), Integrating traditional knowledge with modern biomedical engineering, Innovations in material sciences: Natural polymers and biocompatible materials	5

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IV	Architectural Knowledge & Engineering Innovations Ancient Indian architecture: Principles, materials, and techniques, Urban planning and infrastructure in historical Indian kingdoms, Structural innovations: Temples, forts, and water management systems, Engineering analysis of construction techniques from a modern perspective, Case studies: Earthquake-resistant designs in ancient constructions	5
V	Philosophy, Science & Ethics (Lectures 21-25) Indian philosophical schools and their perspectives on science, The concept of Rta (cosmic order) and its engineering analogies, Early scientific inquiry and epistemology in classical texts, Ethics, sustainability, and social responsibility in engineering, Integration of moral values and technical rigor in project design	5
VI	Contemporary Relevance & Innovation (Lectures 26-30) Bridging ancient wisdom with modern technology, Case studies: Reviving lost techniques to inspire modern engineering solutions, Workshops on innovation and design thinking using Indian Knowledge System principles, Integration of cultural heritage in sustainable product design	4
Total Lecture Hours		29

Text Books

1. Indian Knowledge Systems: An Introduction by Dr. Vivek Ramaswamy, Oxford University Press, 2nd, 2005.
2. Traditions of Indian Science: A Textbook by Dr. Shyam R. Jha, Cambridge University Press, 1st, 2010.
3. Contemporary Perspectives on Ancient Indian Wisdom by Dr. Arvind Sharma, Routledge, 1st, 2013.
4. Foundations of the Indian Knowledge System by Dr. Meera Nair, Sage Publications, 3rd, 2015.
5. Indian Thought and Science: Bridging the Past and Present by Dr. Ram Prasad, Springer, 2nd, 2008.

References:

1. Encyclopedia of Indian Intellectual Heritage by Dr. Anil Kumar, Oxford University Press, 1st, 2012.
2. Indian Philosophy and Science: A Reference Guide by Dr. Lalit Singh, Cambridge University Press, 2nd, 2014.
3. The Vedic and Post-Vedic Traditions: A Reference Book by Dr. Pradcep Kumar, Routledge, 1st, 2003.
4. Handbook of Indian Knowledge Systems by Dr. Sunita Reddy, Sage Publications, 1st, 2016.
5. Traditional Indian Sciences: An Annotated Bibliography by Dr. Kavita Menon, Springer, 1st, 2020.

Online Learning Resources

https://onlinecourses.swayam2.ac.in/imh23_mg53/preview



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Course Information:

Class, Semester	F.Y. B.Tech, Semester - I				Category	VSEC
Course Code, Course Title	2FTVS108, IDEA Laboratory				Type	L2
Prerequisites	--					
Teaching Scheme (per week)	Lecture	Tutorial		Practical	Self Study	Credits
	1	-		2	-	2
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	--		50
						ESE
						--

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO 1	Operate basic workshop tools for material processing and assembly
CO 2	Make simple 2D and 3D designs using CAD software and prepare them using 3D printing, laser cutting, or CNC machining
CO 3	Build basic electronic circuits using sensors, LEDs, motors, and microcontrollers
CO 4	Apply fundamental programming concepts in embedded C (Arduino IDE) for controlling hardware and automating simple tasks.
CO 5	Integrate mechanical parts and electronics to design and build working models or prototypes.

Syllabus:

Module	Contents	Lecture Hours
I	Overview of IDEA Lab Introduction to the IDEA Lab: Vision, objectives, National Innovation Ecosystem (IIC, Atal Innovation Mission, NISP), Importance of multi-disciplinary, project-based learning Inspirational case studies from IDEA Labs, Safety protocols, Do & Don'ts in IDEA Lab.	1
II	Fundamentals of Design & Prototyping Design Thinking Basics: Problem identification, ideation, prototyping, testing, and iteration, Introduction to CAD Software: Concepts of 2D and 3D modeling for various applications, File Formats for Fabrication: Understanding STL, DXF, G-Code, SVG, and their uses, Tolerances, fits, and design constraints for manufacturing.	2


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III	Digital Fabrication Technologies 3D Printing: Principles, types of 3D printers, materials, slicing software, and applications. Laser Cutting & Engraving: Principles, types of lasers, materials, design considerations, and safety. CNC Router: Introduction to CNC Router and Mini Desktop Lathe cum Milling operations, G-code fundamentals, material removal processes. 3D Scanning: Principles of 3D scanning, applications in reverse engineering and quality control. PCB Fabrication: Introduction to PCB Milling Machine and PCB Prototype Machine for custom circuit boards.	3
IV	Fundamentals of Embedded Systems & IoT Basic Electrical and Electronic Concepts: Voltage, current, resistance, Ohm's Law, and fundamental components (resistors, capacitors, diodes, LEDs, sensors, actuators), Measuring Instruments Overview of microcontrollers: Overview of Arduino, ESP32, NodeMCU, and their applications in controlling hardware. Circuit simulation using TinkerCAD or Proteus. IoT Basics: Basic networking (Bluetooth/Wi-Fi/Ethernet), cloud integration	3
V	Programming for automation Arduino IDE and Embedded C Programming: Setup, basic syntax (setup(), loop()), digital and analog I/O control. Basic Control Systems: Concepts of open-loop and closed-loop control with simple examples. Introduction to Python.	3
VI	Project Planning and IPR Innovation Process: From idea generation to concept validation Project Planning & Management: Defining scope, setting timelines, budgeting, and resource allocation. Documentation and Presentation: Writing a concept note, creating innovation posters, and effective pitching techniques. Intellectual Property Rights (IPR): Basics of Patents, Copyrights, and Trademarks relevant to innovation.	3
Total Lecture Hours		15
List of Experiments with CO Mapping		
S. No	Title / Topic of the Experiment	CO Mapped
1	Introduction, Lab Safety & Tool Familiarization	1
2	Hands on practice of Mechanical Workshop Tools	1
3	3D Printing of simple parts	2
4	Laser Cutting	2
5	CNC Routing/ Engraving	2
6	Basic Electronics circuit	3
7	PCB Design and Prototyping	3
8	Microcontroller Programming and Sensor Interfacing	4
9	Mini Project	5
Total Practical Sessions		15
Total Practical Hours		30


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Text Books

1. Veeranna D.K., AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual), 1st Edition, Khanna Book Publishing Company, 2022
2. Saji T. Chacko, Susan S. Mathew, AICTE's Prescribed Textbook: Fundamentals of Electrical and Electronics Engineering (with Lab Manual), 1st Edition, Khanna Book Publishing Company, 2024
3. Mehta S.D., Electronic Product Design Volume - I (Basics of PCB Design), 1st Edition, S Chand & Company, 2011
4. Mehta-Gupta, Y.P.Mehta, Vishal Mehta, Workshop Calculation and Science, 1st Edition, Dhanpat Rai Publications, 2020

References:

1. A. K. Maini, Nakul Maini, All-in-One Electronics Simplified, 1st Edition, Khanna Book Publishing Company, 2021
2. J.G. Joshi, Electronics Measurements & Instrumentation, 1st Edition, Khanna Book Publishing Company, 2025
3. Dr. Sabrie Soloman, 3D Printing & Design, 1st Edition, Khanna Book Publishing Company, 2020
4. Kaushik Kumar, Hridayjit Kalita, Workshop/Manufacturing Practices, 5th Edition, S Chand & Company, 2011

Online Learning Resources

1. NPTEL Course on 3D Printing and Design for Educators, By Dr. Sharad K. Pradhan, NITTTR Bhopal https://onlinecourses.swayam2.ac.in/ntr24_cel17/preview
2. NPTEL Course on Electronic Systems Design: Hands-on Circuits and PCB Design with CAD Software, By Prof. Ankur Gupta, IIT Delhi https://onlinecourses.nptel.ac.in/nac24_cel127/preview

Experiments that may be performed through virtual labs:

S. No	Experiment Name	Experiments Links
1.	3D Printing Virtual Simulation Lab	https://3dp-dei.vlabs.ac.in/
2.	Digital Fabrication of Flexible Circuit board	https://fab-coep.vlabs.ac.in/exp/digital-fabrication/
3.	Embedded System Design with 8051 and PIC Microcontroller	https://esd-coep.vlabs.ac.in/



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Course Information:

Class, Semester	FY. B.Tech, Semester - II						Category	BS
Course Code, Course Title	2FTBS109, Applied Mathematics-II						Type	T1
Prerequisites	2FTBS101, Applied Mathematics-I							
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self Study		Credits
	3	1		-		1		4
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE	
		40	20	40		-	-	

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO1	Determine equation of a curve and compute statistical measures to analyze data using statistical techniques
CO2	Compute approximate root of algebraic and transcendental equations using numerical methods
CO3	Calculate approximate solution of system of linear equations using numerical techniques
CO4	Determine unknown values from tabulated data using finite difference and interpolation techniques.
CO5	Compute differentiations and integrations from tabulated data using finite difference and rules of numerical integrations.

Syllabus:

Module	Contents	Lecture Hours
I	Curve fitting and Statistics: Method of Least Squares, Fitting of Straight Line, Fitting of Parabola, Fitting of exponential curves, Lines of Regression.	8
II	Numerical Solution of algebraic and transcendental equation: Introduction, Bisection method, Regula Falsi method, Secant method, Newton Raphson method.	7
III	Numerical Solution of System of linear equation: Gauss elimination method, Gauss-Jordan method, Gauss-Seidal method, Jacobi's iteration method, LU decomposition	7
IV	Statistical Measures: Introduction, Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Partition values: Quartiles, Deciles and Percentiles, Concept of dispersion, Range, Quartile Deviation, Mean Deviation, Mean Square Deviation, Variance and Standard Deviation.	8
V	Finite Differences and Interpolation: Finite differences, Forward and Backward Difference Newton's forward Interpolation formula, Newton's backward Interpolation formula, Stirling Interpolation formula, , Newton's Divided Difference, Lagrange's interpolation formula.	8


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VI	Numerical Differentiation and Integration: Derivatives using Newtons forward and backward difference formula, Newton's Divided difference formula, Integration using Trapezoidal Rule, Simpson's 1/3 Rule and 3/8 rule	7
Total Lecture Hours		45
List of Tutorial with CO Mapping		
Sr.No	Title of Tutorial	CO Mapped
1	Fitting of straight line and Second degree parabola	1
2	Fitting of exponential curves and lines of regression	1
3	Numerical solution of equations by Bisection and Regula-falsi method	2
4	Numerical solution of equations by Newton-Raphson and Secant method	2
5	Numerical solution of system of linear equation	3
6	Measures of Central tendency	1
7	Measures of dispersion	1
8	Interpolation with equal intervals	4
9	Interpolation for unequal intervals	4
10	Numerical differentiation and Integration	5
Total Tutorial Hours		15
Text Books		
1.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8 th Edition, Laxmi Publications, 2011	
2.	H. K. Das, Advanced Engineering Mathematics, 22 th Edition, S. Chand, 2018.	
3.	B. V. Ramana, Higher Engineering Mathematics, 6 th Edition, Tata McGraw Hill Publ., 2010	
4.	Dr. B. S. Grewal, Numerical Methods, 9 th Edition, Khanna Publishers, 2010.	
References:		
1.	Dr. B. S. Grewal, Higher Engineering Mathematics, 44 th Edition, Khanna Publishers, 2018	
2.	N. P. Bali, Manish Goyal, Advanced Engineering Mathematics, 7 th Edition, Infinity science press, 2010.	
3.	S. C. Gupta, V. K. Kapoor, Fundamental of Mathematical Statistics, 10 th Edition, Sultan Chand and Sons Publisher, 2000.	
4.	Seymour Lipschutz, Marc Lars Lipson, Linear Algebra, 4 th Edition, McGraw Hill, 2009.	
Online Learning Resources		
1.	NPTEL Course on Engineering Mathematics-I, by Prof. Jitendra Kumar, IIT Kharagpur https://nptel.ac.in/courses/111105121	
2.	NPTEL Course on Numerical Methods, by Prof. Ameeya Kumar Nayak, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107105	
3.	NPTEL Course Business Statistics, by Prof. Mukesh Kumar Barua, IIT Roorkee https://nptel.ac.in/courses/110107114	
4.	NPTEL Discrete Mathematics, by Dr. Sugata Gangopadhyay, Dr. Aditi Gangopadhyay, IIT Roorkee https://nptel.ac.in/courses/111107058	


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Course Information:								
Class, Semester		FY. B.Tech, Semester - II				Category	BS	
Course Code, Course Title		2FTBS110, Applied Physics				Type	LIT2	
Prerequisites		12 th Standard Physics						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self Study		Credits	
		3	-	2	-		4	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1		Describe the basic principles of nanotechnology for nonmaterial production using appropriate synthesis methods and microscopy techniques.						
CO2		Use the principles of magnetism and semiconductor physics to select suitable materials for engineering applications.						
CO3		Apply optics concepts to analyze diffraction, polarization, lasers, and fiber optic transmission in engineering contexts.						
CO4		Apply theoretical and practical knowledge to solve engineering problems in architectural acoustics and ultrasonic using appropriate formulas and experimental methods.						
CO5		Interpret crystal structures and X-ray diffraction results to determine lattice parameters and interplanar spacing using Bragg's law and Miller indices.						
Syllabus:								
Module		Contents						Lecture Hours
I		Interference , Diffraction & Polarization : Interference -Introduction, Constructive and destructive interference, Newton's rings. Diffraction - Introduction, Diffraction grating, Plane diffraction grating –construction and theory, Determination of wavelength of light using plane diffraction grating, Resolving power of grating, Numericals. Polarization:- Introduction, Polarization of light, Polarization by double refraction, Positive and Negative crystals, Laurent's half shade Polarimeter, Numericals.						7
II		Laser and Fiber Optics : Laser: Introduction, Principle of laser, Pumping and Population inversion, Characteristics of laser, Ruby Laser, Applications of laser in Food industry. Optical fibre: Introduction, Total internal reflection, Structure of optical fibre, Propagation mechanism of optical fibre, Numerical aperture, Acceptance angle, Skip distance, Attenuation, Types of optical fibre, Applications of optical fibre in Food industry.						7


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III	Acoustics and Ultrasonic : Acoustics : Introduction, sound wave, properties of sound wave, Classification of sound waves, Basic requirements for acoustically good hall, Reverberation, Reverberation time, Sabine's formula (Conceptual discussion), Absorption coefficient, Factors affecting the architectural acoustics and their remedies. Ultrasonic: Ultrasonic waves, Magnetostriction effect and Oscillator, Determination of Wavelength and velocity of ultrasonic waves, Detection of ultrasonic waves, applications of ultrasonic waves in field of Food industry, Numericals.	8
IV	Crystallography : Unit cell, Space lattice, Seven crystal system, Bravais space lattices, Properties of cubic unit cell, Relation between lattice constant and density, Interplanar spacing for cubic system, Miller indices, Symmetry elements in cubic crystal, X-ray diffraction, Bragg's law, Bragg's X-ray spectrometer, X-ray spectra (Continuous and characteristics), Numericals.	7
V	Introduction to Materials : Magnetic materials: Origin of magnetism, magnetization, types of magnetic materials, Domain theory of ferromagnetism, hysteresis effect, Soft and hard magnetic materials, applications in Food industry. Semiconductor - Introduction, types of Semiconductor (Intrinsic & Extrinsic), Band theory of semiconductor, Fermi energy and its location in semiconductor, conductivity of semiconductor, Hall effect.	9
VI	Nanophysics : Introduction, Nanotechnology, nano-materials, Top-down and Bottom-up synthesis approach,, Ball milling method, Sol-gel synthesis method, Carbon nanotubes, Properties and applications of carbon nanotubes, Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM), Properties and applications of nano-materials in Food industry .	7
Total Lecture Hours		45
List of Experiments with CO Mapping		
S. No	Title / Topic of the Experiment	(X) Mapped
1	Plane Diffraction Grating- Determine the wavelength of light using plane diffraction grating.	3
2	Laurent's Half shade Polarimeter - Determination of specific rotation of optically active material.	3
3	Laser - Determination of wavelength of He-Ne laser light using diffraction grating.	3
4	Laser - Determination of divergence of He-Ne laser light	3
5	Numerical aperture of optical fibre: To calculate NA of optical fibre by laser diode.	3
6	Inverse Square Law- Verify inverse square law.	3
7	Band gap energy: To determine band gap energy of given semiconductor.	2
8	Ultrasonic interferometer- To determine the velocity of ultrasonic waves in given liquid and to determine the compressibility of the liquid	4


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9	Kund's tube for determination of velocity of sound	4
10	Newton's Rings-To determine the wavelength of the given monochromatic source of light by Newton's ring method	3
11	BH Curve Tracer	3
12	Hall Effect	3
13	Determination of Miller Indices of a given plane and models	5
14	Crystal Symmetry-23 Symmetries in cubic crystal	5
Total Practical Sessions		15
Total Practical Hours		30

Minimum TEN experiments should be performed from the above list

Text Books

1. M.N. Avadhanulu & P. G. Kshirsagar, A Text Book of Engineering Physics, 12th Edition, S. Chand Publication, 2018
2. P. K. Palanisamy, Engineering Physics, 2nd Edition, Sci Tech pub. (P) Ltd. 2018
3. G Vijayakumari, Engineering Physics, 3rd Edition, Vikas Pub. House (P) Ltd, 2009
4. K.K. Chattopadhyay and A.N. Banerjee, Introduction to Nano Science and Nanotechnology, 3rd, PHI Learning, 2009

References:

1. David Halliday, Robert Resnick & Jearl Walker, Fundamentals of Physics, 12th Edition, 2021.
2. Resnick-Halliday, Krane, Engineering Physics, 8th Edition, John Wiley & Sons Pub., 2008.
3. R. K. Gaur & Gupta S. L, Engineering Physics, 8th Edition, Dhanapat Rai Publication, 2008
4. Sulbha K. Kulkarni, Nanotechnology Principles and Practices, 4th Edition, Springer, 2007
5. Charles Kittel, Introduction to Solid State Physics, 7th Edition, Wiley India Pvt. Ltd, 2008
6. V. Raghvan, Materials Science and Engineering, 5th Edition, PHI Learning, 2006.

Online Learning Resources

1. For optics- <https://nptel.ac.in/courses/122/107/122107035/>
2. For Quantum Physics - <https://nptel.ac.in/courses/122/106/122106034/>
3. For Ultrasonic -- <https://www.youtube.com/watch?v=3531/engineering-physics-i/8>
4. For Solid State Physics -- <https://nptel.ac.in/courses/115/105/115105099/>

Experiments that may be performed through virtual labs:

S.No	Experiment Name	Experiments Links
1.	Photoelectric Effect	https://mp-smrt.vlabs.ac.in/exp/photoelectric-effect/index.html
2.	Numerical Aperture of Optical Fiber	https://io-smrt.vlabs.ac.in/exp/numerical-aperture-optical-fiber/
3.	LASER Beam divergence and spot size	https://io-smrt.vlabs.ac.in/exp/laser-beam-divergence/

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Annasaheb Dange College of Engineering and Technology
 Ashta - 416301, Dist. : Sangli, Maharashtra
 (An Empowered Autonomous Institute)
 Department of Food Technology

Course Information:

Class, Semester	FY. B.Tech, Semester - II				Category	PC
Course Code, Course Title	2FTPC111, Engineering Thermodynamics				Type	T1
Prerequisites	--					
Teaching Scheme (per week)	Lecture	Tutorial		Practical	Self Study	Credits
	2	-		-	1	2
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		40	20	40		-
						ESE
						-

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO1	Differentiate types of systems and its thermodynamic properties.
CO2	Apply thermodynamic property relationships to given system.
CO3	Analyze given thermodynamic system for its properties.
CO4	Evaluate thermodynamic data for food processing applications.

Syllabus:

Modul e	Contents	Lecture Hours
I	First Law and basic concepts Basic: Scope & limitation of thermodynamics, Dimension & Units, force, temperature, pressure, work, energy and heat, properties- extensive, intensive, dependent/independent. First law of thermodynamics: heat & work, reversible & irreversible process. Closed systems, internal energy, enthalpy, heat capacity, open systems, latent heat.	5
II	Volumetric properties of pure fluids: P-V-T behavior of pure substances, virial equation of state, ideal gas temperature, universal gas constant, the ideal gas & equations for various processes, application of the virial equation. The vanderwaal equation of state	5
III	Second law of thermodynamics: Second law of thermodynamics & entropy: reversibility, irreversibility, entropy, the second law of thermodynamics, entropy changes of an ideal gas, significance of entropy in food industry	5
IV	Solution thermodynamics: Partial properties, Equations relating molar and partial molar properties, partial properties in binary solutions, relations among partial properties, problems, ideal gas mixture.	5
V	Phase equilibrium: Phase equilibria, fugacity: definition, fugacity in vapor phase, fugacity coefficients, mixing of ideal gases, criteria of phase equilibrium. Liquid-liquid equilibrium, solid-liquid equilibrium.	5

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VI	Chemical reaction equilibrium: Equilibrium of single reaction, application of equilibrium criteria to chemical reactions. Gibbs phase rule, the standard gibbs energy change & the equilibrium constant & their temperature.	5
Total Lecture Hours		30
Text Books		
1. Smith, van ness, Abbott, Introduction to Chemical Engineering Thermodynamics, 8 th , McGraw-Hill Companies, inc., Series in Chemical Engineering, 2018		
2. Camila Gambini Pereira, Thermodynamics of phase Equilibrium in Food Engineering, 1 st , Academic Press, 2018		
3. S.I Sandler, Chemical, Biochemical & Engineering Thermodynamics, 5 th , Wiley a publications, 2017		
References:		
1. S. M. Walas, Phase equilibrium in Chemical Engineering, 1 st , Butterworth publishers, 1985		
Online Learning Resources		
1. NPTEL Course on Engineering Thermodynamics By Prof. V. Raghavan IIT Madras https://onlinecourses.nptel.ac.in/noc23_me141/preview		
2. NPTEL Course on Thermodynamics By Prof. Anand T. N. C. IIT Palakkad https://onlinecourses.nptel.ac.in/noc23_me76/preview		



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Department of Food Technology



Course Information:

Class, Semester	FY. B.Tech, Semester - II				Category	ES
Course Code, Course Title	2FTES112 –Food Chemistry				Type	LFT1
Prerequisites	1FTBS103 ,1FTES112					
Teaching Scheme (per week)	Lecture 3	Tutorial -	Practical 2	Self Study -	Credits 4	
Examination Scheme (Marks)	Theory	MSE 40	TA 20	ESE 40	Practical CIA 50	ESE 50

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO1	Understand the chemical composition and functional roles of food components such as water, macronutrients, and sensory compounds in relation to food preservation and quality.
CO2	Classify the chemical reactions, structures, and industrial significance of carbohydrates in food systems.
CO3	Understand the structural and functional properties of proteins and demonstrate their modifications and applications in food processing.
CO4	Analyze the chemical nature, classification, degradation, and nutritional aspects of lipids in foods and assess their implications for stability and safety.
CO5	Evaluate the chemistry, functionality, and nutritional relevance of vitamins and assess their stability during processing and health impacts.

Syllabus:

Module	Contents	Lecture Hours
I	Introduction: Nature, scope, and development of food chemistry; proximate analysis; water in food systems (free and bound water); water activity and preservation; sensory attributes; antinutritional factors.	7
II	Carbohydrates: Classification, structure, chemical properties; reactions (caramelization, Maillard reaction); sucrose hydrolysis; starch properties and modification; glucose syrups and commercial products.	8
III	Proteins: Amino acids, peptides, protein structures; denaturation, functional properties; isolation and purification; food protein systems; modified proteins.	8
IV	Lipids: Chemistry of lipids, classification; fatty acids, sterols, waxes; lipid deterioration (rancidity, reversion); thermal stability and nutritional aspects	7
V	Vitamins: Classification, chemistry, functions, sources, RDA; stability during processing; assays; deficiency and toxicity.	7

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VI	Food Additives and Contaminants: Definition and classification of food additives (preservatives, emulsifiers, stabilizers, colorants, flavor enhancers); chemical nature, functionality, and technological roles in food systems; permissible limits and regulations (FSSAI, Codex); contaminants—types (natural, environmental, processing-induced)		8
Total Lecture Hours			45
List of Experiments with CO Mapping			
S.No	Title / Topic of the Experiment		CO Mapped
1	Determination of Moisture content by Hot Air Oven method		1
2	Preparation of different gel system		2
3	Preparation of Emulsion and Determination of Emulsion stability		4
4	Isolation of protein from different food sources		3
5	Preparation of protein Isolate/Concentrate		3
6	Isolation of starch of given sample		2
7	Studies on different properties of starches		2
8	Determination of total sugar in food		2
9	Determination of physical properties of Fat		4
10	Determination of acid value of oil		4
11	Determination of iodine values of oil		4
12	Project		1-5 As possible
Total Practical Sessions		15	Total Practical Hours
			30
Text Books			
1. Owen R, Fennema Marcel Dekker, Food Chemistry, Inc., New York, USA, 3 rd 1996. 2. Lillian Hoagland Meyer, Food Chemistry, The AVI Publishing Co Inc., Connecticut, MA, USA, 1 st , 1973 3. DeMan JM, Principles of Food Chemistry, AVI Publishing Co Inc. 3 rd 1999. Swaminathan M., Ganesh & Co. Essentials of Food and Nutrition, Reprint, 2003			
References:			
1. John W. Brady, Cornell Introductory Food Chemistry, Cornstock Publishing Associates University Press, Ithaca, USA, 1 st , 2013. 2. H.-D. Belitz, W. Grosch and P. Schieberle, Food Chemistry, Springer-Verlag, Berlin Heidelberg, 5 th , 2009 3. David Newton, Facts on File, Food Chemistry, Inc. New York, 1 st 2007. 4. Eskin NAM, Henderson HM and Townsend RJ, Biochemistry of Foods, Academic Press, New York, 2 nd , 2001			
Online Learning Resources			
1. NPTEL Course on Food Oils and Fats: Chemistry and Technology by Prof. Hari. Niwas Mishra IIT Kharagpur https://onlinecourses.nptel.ac.in/noc25_ag16/preview			

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 Established: 1969	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology						
Course Information:							
Class, Semester	FY. B.Tech, Semester - II				Category	ES	
Course Code, Course Title	2FTES113, Basic Electrical & Electronics Engineering				Type	LIT2	
Prerequisites	-						
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self Study	Credits		
	2	-	2	-	3		
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		40	20	40		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:							
CO1	Solve the electrical circuits using fundamental laws to find electrical parameters.						
CO2	Determine voltage, current and power using phasor concepts and sinusoidal waveform parameters of AC circuit						
CO3	Describe electrical heating and explain the working of AC/DC machines and transformer.						
CO4	Interpret characteristics and working of semiconductor devices, rectifiers and transducers in various applications.						
CO5	Apply number systems and logic gate operation to implement basic digital circuits.						
Syllabus:							
Module	Contents					Lecture Hours	
I	DC Circuits: Introduction to Basic Electrical Quantities, Ohm's Law, Its applications and limitations, Equivalent Resistance of series parallel circuit, Kirchhoff's current Law, Kirchhoff's voltage law.					05	
II	AC Circuits: Generation of Sinusoidal Voltage, Waveform, Cycle, Frequency, Time Period, Instantaneous value, RMS Value, Average Value, Form Factor, and Peak factor, Phasor representation of sinusoidal waveforms, Real, Reactive and Apparent power, Power factor, Analysis of single-phase ac circuits (R, L and C).					05	
III	Electrical Heating: Importance of heating, Principles of resistive heating, Dielectric (Microwave) Heating, Modes of heat transfer, Application of heating. Electrical Machine: Principle, Construction, Working and Applications of DC motor, Single-phase induction motor and transformer.					06	
IV	Semiconductor devices and Its Applications: Introduction to PN junction and Zener diode, Half wave and full wave rectifier, Bipolar junction transistors and Its input output characteristics – CE, CC, CB Configuration.					05	


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V	Digital Electronics: Difference between analog and digital signal, Number conversion systems, Introduction to logic gates, Boolean algebra and theorems.	05
VI	Transducer and Its Applications: Transducers for Displacement, Level, Temperature, Pressure, Applications of transducers in digital thermometer, microwave oven.	04
Total Lecture Hours		30

List of Experiments with CO Mapping

Sr.No	Title / Topic of the Experiment	CO Mapped
1	Study of Basic Electrical Components, Equipment and their symbols, and Safety Precautions in Electrical Engineering.	1
2	Experimental Verification of Kirchhoff's Laws.	1
3	Measurement of Power and Power Factor in a Single-phase Circuit.	2
4	Load Test on Single Phase Transformer,	3
5	Effect of Temperature on Resistance.	3
6	Experimental verification of Semiconductor Diode Characteristics	4
7	Experimental verification of Zener Diode Characteristics	4
8	Characteristics of Single-Phase Half-wave and Full-wave rectifiers.	4
9	Verification of truth tables of basic logic gates	5
10	Implementation of basic logic gates using universal gates.	5
11	To understand working principle of LVDT	4
12	To understand working principle of Thermocouple	4
Total Practical Sessions	15	Total Practical Hours 30

Text Books

1. D. P. Kothari, I. J. Nagrath, Basic Electrical Engineering, 4th, Tata McGraw Hill, 2019
2. D. C. Kulshreshtha, Basic Electrical Engineering, 2nd, McGraw Hill, 2020
3. D. P. Kothari, Basic Electrical & Electronics Engineering, 2nd, TMH New Delhi, 2020
4. D. Patranabi, Sensors and transducers, 2nd, PHI learning Pvt. Ltd., 2003

References:

1. Millman and Halkias, Integrated Electronics, 2nd, McGraw Hill, 2010
2. A.K. Thereja and B.L. Thereja, Electrical Technology volume II, 24th, S. Chand & Co. Publications, 2024
3. L. Bakshi and A. Bakshi, Basic Electrical Engineering, 1st, Technical Publications, Pune, 2005
4. Albert Malvin, David Bates, Electronic Principles, 7th, McGraw Hill Education, 2017

Online Learning Resources

1. https://onlinecourses.nptel.ac.in/noc25_ee91/preview
2. https://onlinecourses.nptel.ac.in/noc25_ee92/preview


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Experiments that may be performed through virtual labs:		
Sr. No	Experiment Name	Experiments Links
1.	To understand working principle of LVDT	https://sl-coep.vlabs.ac.in/exp/lvdt/
2.	To understand working principle of Thermocouple	https://sl-coep.vlabs.ac.in/exp/temperature-sensor/
3.	Experimental Verification of Kirchhoff's Laws.	https://bes-iitr.vlabs.ac.in/exp/kirchhoff-law/



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Course Information:									
Class, Semester		F.Y. B.Tech – Semester II					Category	ES	
Course Code, Course Title		2FTES114 Programming for Problem Solving					Type	L2	
Prerequisites		-							
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study		Credits
		1	-		2		-		2
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	FSE	
			-	-	-		50	--	
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:									
CO1		Prepare an algorithm and draw a flowchart to accurately solve various mathematical problems by using structured approach.							
CO2		Apply the fundamental concepts like data types, operators to solve mathematical problems by using the C language.							
CO3		Apply the decision and looping constructs to solve the problems related to decision, repetitive statements for real time problem statement using C							
CO4		Develop a C program to demonstrate the modular approach by using the concept of function, structure and pointer							
CO5		Write, Compile and debug C program for various problem statements by using structured approach.							
Syllabus:									
Module		Contents						Lecture Hours	
I		Basics of Programming The meaning of algorithms, Flowcharts, Pseudo codes, Writing Algorithms and drawing flowcharts for simple exercises, C Program development environment.						2	
II		C Fundamentals Importance of 'C' Language, History, Structure of 'C' Program, Sample 'C' Program, Constants, variables and data types, Enumeration. Operators and expressions, Managing input / output operations, Control statements-Decision making, Case control & Looping Constructs.						3	
III		Arrays and Strings 1D and 2D Arrays: Declaration, Initialization, Input/output; Multidimensional Arrays; String Handling: Basics and Standard Functions						2	
IV		Functions User Defined Functions, Function Declaration, Definition, Calling, Return Types, Parameter Passing, Scope, Recursion, Library Functions						2	


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V	Structure & Pointers Structure Definition, Initialization, Accessing Variables, Arrays of Structures, Structures with Functions, Unions, Pointers: Basics, Arithmetic, Arrays, Strings, Functions, Dynamic Memory Allocation	4
VI	File Handling: File Operations: Open, Read, Write, Close; Error Handling, Random Access Files, Command Line Arguments, Preprocessor Directives	2
Total Lecture Hours		15

List of Experiments with CO Mapping

S.No	Title / Topic of the Experiment	CO Mapped
1	Write an algorithm and draw flowchart for given problem statements.	1
2	Implement a program using different data types and operators in C.	2
3	Implement a program using decision control statements.	3
4	Implement a program using repetitive control statements (for, while, do-while).	3
5	Implement a program using a selection control statement.	3
6	Implement a program using nested loop (for, while loop).	3
7	Program to demonstrate one dimensional array	3
8	Program to demonstrate two-dimensional array	3
9	Implement a program to demonstrate String handling functions.	3
10	Implement a program using user defined functions in C.	4
11	Program to demonstrate concept of recursion (factorial, Fibonacci)	4
12	Implement a program to demonstrate the concept of structures in C.	4
13	Implement a program to demonstrate the concept of arrays of structures in C.	4
14	Implement a program to demonstrate the concept of pointers in C.	4
15	Implement a program to demonstrate the concept of file handling in C.	5
Total Practical Sessions		15
Total Practical Hours		30

Text Books

1. ISRD Group, Programming and Problem Solving Using C Language, McGraw-Hill Publications, 2012.
2. Yashwant Kanetkar, Let Us C, 3rd Edition, BPB, 2011.
3. Harvey M. Deitel, Paul J. Deitel, Abbey Deitel, C How to Program, 2nd Edition, Pearson, 2009.
4. E. Balaguruswamy, Programming in ANSI C, 4th Edition, BPB Publications, 2008

References:

1. D. M. Ritchie, The 'C' Programming Language, 2nd Edition, Pearson, 1998.
2. Sidnal, C Programming Laboratory: Handbook for Beginners, 1st Edition, Wiley India Limited, 2012.
3. Yashwant Kanetkar, Understanding Pointers in C, 4th Edition, BPB Publications, 2001.
4. Yashwant Kanetkar, Test Your C Skills, 5th Edition, BPB Publications, 2013


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Online Learning Resources

1. NPTEL Course on Computer Programming By Dr. T. Sugirtha IIT Tiruchirappalli

<https://nptel.ac.in/courses/111105035>

2. I learn C Programming

<https://www.programiz.com/c-programming>

3. C Programming Tutorials

<https://www.tutorialspoint.com/cprogramming/index.htm>

4. C Programming Language

<https://www.geeksforgeeks.org/c-programming-language>



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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology						
Course Information:							
Class, Semester	FY. B.Tech, Semester - II					Category	HS
Course Code, Course Title	2FTHS115 Professional Communication Skills					Type	L2
Prerequisites	-						
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self Study	Credits
	-	--		4		-	2
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	-	-		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:							
CO1	Demonstrate the Listening, Speaking, Reading and Writing (LSRW) skills considering the frame of English language rules accurately for effective and sound communication in academic and profession contexts.						
CO2	Exhibit their portfolio and career choices confidently, considering corporate expectations by using digital tools convincingly.						
CO3	Write letters, reports, Emails and Blogs proficiently by following required techniques that help in getting acquainted with professional correspondence.						
CO4	Attain professional skill while convincingly presenting on allotted topics using MS PowerPoint and AI techniques.						
CO5	Justify own role in communicative events in well-organized manner with balanced zeal.						
List of Experiments with CO Mapping							
S. No	Title / Topic of the Experiment						CO Mapped
1	Self - Introduction						1
2	SWOT Analysis						1
3	Basics of English Pronunciation						1
4	Rapid Review of Grammar						1
5	Diagnosing Listening and Speaking Skills						1
6	Diagnosing Reading and Writing Skills						1
7	Introduction to MS Office (Word, Excel, PPT)						1,4
8	Presenting my career choices						1,2
9	Preparing Portfolio						1,2
10	Describing Technical Charts, Image, and Processes						1,4
11	Using Language Learning Apps and Tools						1,4
12	Presenting Portfolio						1,2
13	Effective Presentation Skills						1,4


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14	Delivering Power Point Presentation	1,4,5
15	Job Application and Resume Writing	1,3
16	Email Writing	1,3
17	Group Discussion	1,5
18	Public Speaking	1,5
19	Report Writing	1,3
20	Organizing an Event	1,5
21	Technical Writing	1,3
22	Blog Writing	1,3
23	Mock Interview	1,2,5
24	Achievement Test	1
Total Practical Sessions		30
Total Practical Hours		60

Text Books

1. The Professional: Defining the New Standard of Excellence at Work Subroto Bagchi Penguin Books India Pvt. Ltd. Revised Edition, 2011.
2. Cambridge Guide to IELTS. Pauline Cullen, Amanda French, Cambridge University Press, Reprint, 2017.
3. A Practical Course in Effective English Speaking Skills. J. K. Gangal, PHI Learning Private Limited, New Delhi, Print, 2012.
4. English For Engineers. Dr. Shyamaji Dubey, Dr. Manish Kumar. Vikas Publication House Pvt. Ltd. New Delhi, Print, 2020.
5. Personality Development and Soft Skills. Barun K. Mitra, Oxford University Press, New Delhi, 7th impression, 2012.

References:

1. High-school English Grammar and Composition. Wren and Martin, S. Chand and Co., New Delhi, 1st edition, 2015.
2. The Ace of Soft Skills. Ajai Chowdry, Bala Balchandran. Pearson Publication, Delhi, 1st edition, 2017.
3. Effective Technical Communication. M. Ashraf Rizvi, McGraw Hill Education, Chennai, 2nd edition, 2017.
4. Business Communication. Hory Sankar Mukerjee, Oxford University Press, New Delhi, 2nd edition, 2013.
5. Communicative English for Engineers and Professionals. Nitin Bhatnagar, Mamta Bhatnagar, Pearson Publication, Delhi, 1st edition, 2013.

Online Learning Resources

1. **Software:** Pronunciation apps (e.g., ELSA Speak, Speak English), grammar checkers (e.g., Grammarly).
2. **Online Platform** Coursera (for basic English courses), Duolingo, BBC Learning English.
3. NPTEL Course on Computer Programming By Dr. T. Sugirtha IIT Tiruchirappalli
<https://nptel.ac.in/courses/111105035>


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Course Information:

Class, Semester	FY. B.Tech, Semester - I/ II						Category	BS
Course Code, Course Title	3BSCCI21 , Introduction to Yoga and Mindfulness						Type	L2
Teaching Scheme (per week)	Lecture		Tutorial		Practical		Self Study	Credits
	-		-		2		-	1
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE	
		-	-	-		50	-	

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO1	Describe the significance and practical applications of yoga for holistic well-being under guided classroom sessions, ensuring coverage of physical, mental, and spiritual aspects.
CO2	Explain the role of subtle energy systems (chakras, nadis) in health enhancement using yogic practices, showing linkage to at least two health benefits.
CO3	Compare different paths of yoga (Bhakti, Jnana, Karma, Raja) through readings and discussions, citing at least one key practice and outcome for each..
CO4	Demonstrate the Eight Limbs of Yoga in practical sessions, reflecting personal integration of at least four limbs in daily habits or behavior.
CO5	Apply yoga and mindfulness techniques in real-life stress situations to improve emotional resilience, showing measurable improvement in two or more psycho-somatic areas.

Practice Session

S. No	Contents	CO Mapped
1	Introduction to Yoga Practice and Warming Up Exercises Overview of yoga philosophy and benefits. Practice basic stretching and warm-up routines. Introduction to breath awareness and mindfulness.	1,5
2	Omkar ,Prathana and types of Asanas , Surya Namaskar. Practice of Chant Omkar and opening prayer for mental centering. Perform Surya Namaskar and learn its 10-step sequence. Explore basic asana types: standing, sitting, supine.	1,4
3	Sleeping position Asanas Practice of Setubandhasana, Pawanmuktasana, ChakrasaSetuBandhasana, Understand the effects on back, digestion, and spine.	1, 2
4	Opposite sleeping position Practice of Bhujangasana, shalbasana, Dhanurashan, Makrasana Focus on strengthening the back and improving posture.	1, 2


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5	Seating Position Practice of Padmaasana , Vajrasana , Gaurmukhasana , Vakrasana Learn their benefits for digestion and meditation readiness.	1, 4
6	Standing Position Practice of Tadasana , Vruksasana, Trikonaasan , Virasana. Emphasize balance, posture, and muscular endurance.	1, 4
7	Meditation Guided practice of breath-based (Anapan) and insight (Vipassana) meditation. Focus on observation without judgment.	4, 5
8	Mantra meditation Practice chanting and internal repetition of mantras. Use traditional mantras for focus and mental calm.	4, 5
9	Yognidra Perform deep relaxation technique (guided Yoga Nidra). Experience body awareness and mental stillness.	4, 5
10	Pranayam 1 Practice Anulom Vilom (alternate nostril), Bhramari (humming bee), and Sheetal (cooling breath). Focus on breath control and emotional regulation.	2, 5
11	Pranayam 2 Practice Sitkari and Kapalbhatri. Learn their effects on metabolism, energy, and clarity.	2, 5
12	Tratak Perform Tratak (candle gazing) for concentration. Understand through demonstration or video.	4, 5
Total Practical Sessions		15
Total Practical Hours		30
Text Books		
1. YogJeevan . Dr. ChakoteRiya1st Edition2016		
2. YogParchichayaMandlikGuruji Nashik ,MandlikGurujiSecond Edition 2020		
References:		
1. Yoga for Modern Age Vethathiri Edition 16th 2023		
2. Maharishi, Simplified Physical ExercisesVethathiri Edition I 2014		


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Course Information:

Class, Semester	FY, B.Tech, Semester - I / II				Category	BS
Course Code, Course Title	3BSCC122, Physical Fitness and Lifestyle Management				Type	L2
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self Study	Credits	
	-	-	02	-	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	-	50	-

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO1	Explain the fundamentals of physical education and its role in developing holistic well-being.
CO2	Demonstrate appropriate fitness practices and techniques to improve cardiovascular endurance, strength, and flexibility.
CO3	Apply principles of wellness, including nutrition, sleep, and stress management, to maintain a healthy lifestyle.
CO4	Integrate yoga, mindfulness, and relaxation techniques to promote mental well-being and emotional balance.
CO5	Design a personalized lifestyle management plan based on fitness assessment, health goals, and behavior change strategies.

Practice Session

S. No	Contents	CO Mapped
1	Introduction to Physical Education Understand the meaning and objectives of physical education. Learn its role in promoting health, fitness, and overall well-being. Explore career options and importance in daily life.	1
2	General Warm up Practice dynamic warm-up routines before workouts. Increase heart rate and blood circulation to muscles. Prevent injuries and improve workout performance.	2
3	Limbering down exercises, Free hand exercises, Cooling down exercises Perform safe cool-down techniques post activity. Reduce muscle soreness and stiffness. Bring heart rate back to normal gradually.	2
4	Stretching exercises / Flexibility exercises Improve range of motion in joints. Reduce muscle tension and prevent injuries. Learn static and dynamic stretching methods.	2

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5	Fitness Evaluation 1 mile run and walk, Push ups , seat ups ,Seat and reach and BMI . Assess personal fitness using 1-mile run, push-ups, sit-ups, etc.Calculate BMI to understand body composition.Set personalized fitness goals based on results.	5
6	Aerobic activities Perform rhythmic activities to improve cardiovascular health.Engage in exercises like jogging, skipping, or dance aerobics.Enhance lung capacity and endurance.	2
7	Sports and games (Cricket, Volleyball, basketball, Kho-Kho,Kabaddi, Athletics) Play team games like Cricket, Volleyball, Kabaddi, etc.Develop teamwork, coordination, and sportsmanship.Improve motor skills and physical agility.	2
8	Sports and games (Badminton, Table Tennis, Chess) Participate in games like Table Tennis, Badminton, Chess. Improve reflexes, concentration, and decision-making. Promote mental sharpness and social interaction.	4
9	Circuit Training, Strength Activities Perform multiple exercises in a sequence (circuit). Focus on building muscular strength and stamina. Use minimal equipment for maximum benefit.	2
10	Agility and Coordinative activities Practice quick movement drills to improve reflexes. Enhance body coordination and balance. Develop speed and reaction time.	2
11	Body weight exercises Do exercises like push-ups, squats, lunges, and planks.Improve strength using your own body resistance.No need for gym equipment.	2
12	Functional training Mimic real-life movement patterns (bending, lifting, reaching). Improve daily functional strength and flexibility. Prevent posture-related problems.	3
Total Practical Sessions		15
Total Practical Hours		30
Text Books:		
1. Test, Measurement and Evaluation in Sports and Physical Education*. 5th ed., Friends Publications, 2023.		
2. Rules of Games and Sports Updated version, Khel Shaitya Kendra, 2023,		
References:		
1 Beashel, Paul, and John Taylor. Physical Education: Essential Issues, Hodder Stoughton, 1997.		
2 Sodhi, H. S., and S. K. Sidhu. <i>Physique and Selection of Sportsmen</i> . Punjab Publishing House, 1984.		


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Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist. : Sangli, Maharashtra
(An Empowered Autonomous Institute)
Department of Food Technology


Course Information:

Class, Semester	FY. B.Tech, Semester - I/ II				Category	BS
Course Code, Course Title	3BSCC123, Six Sigma Happiness and Mind Mechanics				Type	L2
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self Study	Credits	
	-	-	2	-	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	-		50
						ESE
						-

Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:

CO1	Analyze personal life patterns and decision-making processes using visual tools like life maps and time audits to improve self-awareness and productivity.
CO2	Identify and modify recurring behavioral or emotional challenges using root cause analysis and habit-tracking techniques
CO3	Apply reflective and psychological tools such as the Gratitude Journal, PERMA Wheel, and mindfulness meditation to enhance emotional well-being.
CO4	Utilize creative thinking and visualization techniques such as mind mapping, personal development canvas, and flow activities to enhance planning and motivation.
CO5	Formulate and monitor measurable personal goals using SMART criteria and Six Sigma strategies to construct a structured self-improvement and lifestyle plan.

Practice Session

S. No	Contents	CO Mapped
1	Life Process Mapping Understand personal daily patterns. Identify meaningful and unproductive activities. Improve decision-making awareness. Build a visual blueprint of life routines.	1
2	Time Audit Diary Track hourly usage of time. Identify time-wasters and focus zones. Increase productivity through reflection. Learn prioritization techniques.	1,2
3	Root Cause Analysis Find root causes behind repeated problems. Use cause-effect diagrams (Fishbone). Develop problem-solving skills. Prevent recurring emotional or behavioral setbacks.	1
4	Habit Tracker Creation Monitor progress of personal habits. Encourage accountability and consistency. Recognize triggers and patterns. Reinforce good habits using visual tools.	3

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5	Control Chart for Habits Apply Six Sigma's statistical approach to habits. Track habit frequency over time. Identify variation in behavior patterns. Improve self-control and discipline.	3
6	Gratitude Journal Practice daily reflection on positive moments. Enhance emotional well-being. Reduce stress and negativity. Cultivate a habit of appreciation.	4
7	PERMA Wheel Self-Assessment. Evaluate happiness using 5 key pillars (Positive emotion, Engagement, Relationships, Meaning, and Achievement). Identify strengths and gaps in life satisfaction. Build awareness of emotional and social well-being. Create a personalized improvement plan.	4
8	Flow Activity Practice Engage in high-focus enjoyable activity. Understand the "flow" mental state. Boost intrinsic motivation. Reduce distractions and increase creativity.	4
9	Mind Mapping the Brain Visually organize thoughts and plans. Stimulate right and left brain together. Enhance memory, planning, and clarity. Strengthen problem-solving and goal-setting.	1, 5
10	Guided Mindfulness Meditation Practice breath work and awareness techniques. Reduce anxiety and mental fatigue. Increase present-moment awareness. Build emotional balance.	4
11	Personal Development Canvas Create a visual profile of strengths, values, and aspirations. Encourage strategic self-improvement. Connect life areas (career, personal, social). Track personal growth visually.	5
12	SMART Goal Setting + Six Sigma Define Specific, Measurable, Achievable, Relevant, Time-bound goals. Integrate Six Sigma process for goal monitoring. Improve consistency in self-development. Align actions with purpose and metrics.	5
Total Practical Sessions		15
Total Practical Hours		30
References:		
1 S. Radhakrishnan, An Idealist View Of Life, 2015, HarperCollins.		
2. Yogi Kochhar, Six Sigma Happiness (English Edition).		
3 An idealist way of Life – S Radhakrishnan		


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 Established: 1999	Annasabeh Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology							
Course Information:								
Class, Semester	FY. B.Tech, Semester - I / II						Category	BS
Course Code, Course Title	3BSCC124, Creativity through Visual Arts						Type	L2
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self Study		Credits
	-	-		2		-		1
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE	
		-	-	-		50	-	
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1	Identify and apply the elements of art—line, shape, color, texture, and space—through various drawing and painting techniques.							
CO2	Demonstrate creativity and technical skills in using different mediums such as pastels, pen & ink, and water-based paints.							
CO3	Create original prints using simplified printmaking techniques such as relief, intaglio, and monoprint methods.							
CO4	Design visually appealing digital artwork such as posters, icons, and layouts using basic digital tools.							
CO5	Analyze and reflect on personal artwork and peer creations to improve visual communication and aesthetic understanding.							
Practice Session								
S. No	Contents							CO Mapped
1	Fundamentals of Visual arts Introduction to elements of art: line, shape, colour, texture, space. Practice drawing with pencil and charcoal using simple objects and shapes. Explore light and shade for 3D effects.							1
2	Basic Graphic Design Learn principles of alignment, contrast, hierarchy, and balance. Create a basic visual composition using text and image elements. Use sketching or digital tools for layout planning.							2
3	Typography & Font Design Study of typefaces: serif, sans-serif, script, decorative. Draw custom fonts and stylized letters. Create a short phrase using hand-drawn typography.							2


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4	Logo Design Understand logo types: symbolic, text-based, combination marks. Design a logo for a fictional company or cultural event. Focus on clarity, colour choice, and relevance.	4
5	Poster Design Choose a theme: social message, event, awareness, culture. Develop layout and imagery using watercolour, pen & ink, or digital tools. Apply principles of visual hierarchy and focal point.	4
6	Photography Task: Lines & Angles Capture photographs focusing on geometric lines, angles, and symmetry. Submit 3–5 original photographs with a short description of each. Discuss visual impact and framing.	1, 5
7	Digital Infographic Design Choose a topic (e.g., Indian innovations, clean energy, internet safety). Create a digital infographic using free tools like Canva or PowerPoint. Combine icons, minimal text, and visuals to communicate clearly.	4
8	Visual Metaphor Drawing Select a concept (e.g., freedom, growth, technology) and represent it visually. Use drawing techniques to convey metaphor without text. Encourage creativity and symbolic thinking.	3, 5
9	Calligraphic strokes of Devnagari Practice traditional and artistic Devanagari calligraphy. Use ink pens or brush pens to form characters. Create a short meaningful phrase in decorative calligraphy.	2
10	Collage on Innovation in India Use newspapers, magazines, or printed material. Prepare a collage on topics like ISRO, start-ups, or digital India. Emphasize arrangement, contrast, and theme clarity.	3, 5
11	Modern Arts Introduction and fundamental of modern art, Study abstract and modern Indian Artists. Create an abstract or modern art piece using acrylics, pastels, or digital tools. Focus on expression and experimentation.	3, 5
12	Geometric Pattern Design Create a detailed design using compass, ruler, or digital drawing. Highlight symmetry, color, and repetition.	1, 2
Total Practical Sessions		15
Total Practical Hours		30
References:		
1.	The New Drawing on the Right Side of the Brain. TarcherPerigee, 2012.	
2.	Digital Illustration: A Master Class in Creative Image-making. Rotovision, 2010.	
3.	A History of Indian Painting: The Modern Period. Abhinav Publications, 1994.	
4.	Basics of Visual Art. New Academic Publishing, 2015.	


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 Established: 1999	AnnasahebDange College of Engineering and Technology Ashta - 416301, Dist. :Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology							
Course Information:								
Class, Semester		FY. B.Tech, Semester - I/ II					Category	BS
Course Code, Course Title		3BSCC125,Community Engagement through NSS					Type	L2
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self Study		Credits	
		-	-	02	-		1	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	-	-		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1	Identify the structure and needs of the local community through direct engagement and observation.							
CO2	Analyze community issues and participate in collaborative problem-solving activities.							
CO3	Demonstrate social and civic responsibility by applying engineering knowledge in real-world social contexts.							
CO4	Develop teamwork, leadership, and democratic values through community mobilization and shared responsibility.							
CO5	Respond effectively to emergencies and promote national integration, unity, and social harmony through participation in relevant campaigns and awareness programs.							
Practice Session								
S. No	Contents							CO Mapped
1	Cleanliness Drive (Swachh Bharat Abhiyan) Conduct campus and neighbourhood cleaning. Raise awareness about hygiene and waste segregation.							1,2,3
2	Tree Plantation Plant saplings in college or public areas. Educate the community on environmental benefits.							1,3
3	Road Safety Campaign Conduct rallies, skits, or poster campaigns. Spread awareness about traffic rules and safe driving.							2,3,5
4	Health Check-up Camp Organize basic health screening with medical professionals. Promote hygiene, nutrition, and disease prevention.							1,2,5
5	Literacy Drive Teach basic reading and writing to underprivileged children or adults. Distribute learning materials and encourage regular attendance.							1,3,5

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6	Voter Awareness Campaign (SVEEP) Inform citizens about voter rights and the election process. Promote ethical voting through posters and street plays.	2,3,5			
7	Plastic-Free Campus Initiative Educate peers on the harmful effects of plastic. Conduct collection drives and promote reusable alternatives.	2,3			
8	Cultural and Heritage Promotion Organize folk art, dance, and storytelling sessions. Engage the community in preserving local culture.	3,5			
9	Yoga and Wellness Sessions Conduct yoga and mindfulness sessions for students and locals. Promote physical and mental health through regular practice.	3,4			
10	Self-Defence Training for Girls Organize practical training on basic self-defence techniques. Empower girls with safety awareness and confidence.	4,5			
11	Social Contribution Orphanage/ Old age home visit Hold discussions or exhibitions on gender, caste, and social equality. Encourage inclusive behavior and respect for diversity.	3,4,5			
12	Digital Literacy Program Teach basic smartphone and internet use to the elderly or untrained groups. Promote safe and productive use of digital tools	2,3,5			
Total Practical Sessions		15	Total Practical Hours		30
References Books:					
1. NSS Course Manual, Published by NSS Cell, VTU Belagavi. 2. Government of Karnataka, NSS cell, activities reports and its manual. 3. Government of India, nss cell, Activities reports and its manual.					


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology							
Course Information:								
Class, Semester		FY, B.Tech, Semester - I / II					Category	BS
Course Code, Course Title		3BSCC126, Cultural Exploration & Heritage					Type	L2
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study	Credits
		-	-		2		-	1
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	-	-		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1	Identify and describe key elements of cultural heritage including tangible, intangible, and natural heritage with real-life examples.							
CO2	Demonstrate understanding of regional and national cultural practices through participation in experiential activities.							
CO3	Analyze the significance of preserving cultural heritage in the context of globalization and modernization.							
CO4	Collaborate in group projects to creatively document and present cultural themes using various mediums.							
CO5	Reflect critically on personal and collective cultural identities through journals, discussions, and presentations.							
Practice Session								
S.No	Contents							CO Mapped
1	Introduction to Cultural Exploration and Heritage Understand the meaning of tangible, intangible, and natural heritage. Discuss real-life examples of cultural elements. Reflect on how culture shapes identity.							1,5
2	Heritage Mapping/ Case Study on a Heritage Site Choose a local region or community. Identify and locate key cultural sites (temples, festivals, crafts). Create a visual or digital heritage map. Present findings in written or visual format							1,3,4
3	Vaidik Tal Vadya Songs and Music tradition Introduction to Vedic Music, Demonstration of Vaidik Tal Vadya, Listening Session of Vedic Chants & Samagana. Group Singing of a Vedic Verse or Traditional Bhajan							2, 5
4	Folk Dance Watch or participate in folk dance. Discuss the significance, costumes, and music of each. Compare cultural roots and evolution.							2, 4


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5	Traditional Music Dholki ,Tabala, Dhol ,LezimListen to selected regional or classical music samples. Identify the instruments, lyrics, and cultural setting.	2, 4			
6	Traditional Instrumental Taal, Tritaal, Tabala Observe or perform simple rhythms or melodies. Explore the cultural and ceremonial use of instruments.	1, 2			
7	Singing Types of singing, Vocal Singing Introduction to music fundamentals	2, 4			
8	Drama Introduction, Types, Information about acting, Stage information , Present / performance on stage	4,5			
9	Classical dance, Western dance Introduction toclassical, and western dance demonstrations. Different types	2, 4			
10	Karaoke Singing Introduction, Types, Basic music information	2, 4			
11	Short film Prepare short film , Present / performance on stage , Topic concern with Indian Cultural heritage	3, 4, 5			
12	Final Showcase Present all your work in a class exhibition. Explain the cultural significance of each project. Receive peer and teacher feedback.	4, 5			
Total Practical Sessions		15	Total Practical Hours		30
Text Books					
1. NrutasaurabhaManjiriShriramDev XII 2015					
2. Indian Art and Culture , NitinSinghaniamcGraw Hill Education IV 2022					
3. The Wonder That Was India Picador India Second2004					
4. The National Culture of India National Book Trust (NBT), India Second2016					
References:					
1.Bhattacharyya, Haridas, editor. <i>The Cultural Heritage of India</i> . The Ramakrishna Mission Institute of Culture, multiple volumes, revised ed.					
2. Singhania, Nitin. <i>Indian Art and Culture</i> . 4th ed., McGraw Hill Education, 2022.					
3. Basham, A. L. <i>The Wonder That Was India</i> . Picador India, 2004.					
4. Jokilehto, Jukka. <i>A History of Architectural Conservation</i> . 2nd ed., Routledge, 2017.					


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Sant Dnyaneshwar Shikshan Sanstha's

Annasaheb Dange College of Engineering & Technology, Ashta.

(An Empowered Autonomous Institute)

Structure and Curriculum

Revision-02

S.Y.B.Tech

Semester-III & IV

W.e.f.AY-2026-27

DEPARTMENT OF FOOD TECHNOLOGY



Established: 1999

Annasaheb Dange College of Engineering and Technology
 Ashra - 416301, Dist : Sangli, Maharashtra
 (An Empowered Autonomous Institute)

S.Y. B.Tech.-Food Technology
 [Level 5, UG Diploma] Semester - III

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	PC	T1	2FTPC201	Food Biochemistry	3	-	-	3	3	40	20	40	-	-
02	PC	LIT1	2FTPC202	Food Microbiology	3	-	2	3	4	40	20	40	50	50
03	PC	LIT1	2FTPC203	Unit Operations	3	-	2	3	4	40	20	40	50	50
04	PC	LIT2	2FTPC204	Fluid Mechanics	2	-	2	2	3	40	20	40	50	-
05	PC	T1	2FTPC205	Principles of Food preservation	3	-	-	3	3	40	20	40	-	-
06	VS	L2	2FTVS206	Fundamentals of Good Laboratory Practices	1	-	2	1	2	-	20	-	50	-
07	HS	T2	2FTHS207	Universal Human Values	2	-	-	2	2	-	50	-	-	-
08	IIS	T2	2FTHS208	Indian Constitution	1	-	-	1	1	-	50	-	-	-
09	MA	T2	2FTMA209	Aptitude and Reasoning- I	2	-	-	2	-	-	50	-	-	-
Total					20	-	08	20	22					
Legend: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria			TA (Theory) : ≥8/20		MSE + ESE (Theory) : ≥32/80		TA (Theory) / CIA (Lab) : ≥20/50		ESE (Lab) : ≥20/50		ESE (Theory) ≥40/100			

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Established: 1999

Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist. : Sangli, Maharashtra

(An Empowered Autonomous Institute)

ADGET

S.Y. B.Tech.-Food Technology

[Level 5, UG Diploma] Semester -IV

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory		Laboratory		
										MSE	TA	ESE	CIA	ESE
01	PC	LIT1	2FTPC210	Processing of Fruits and Vegetable	3	-	2	3	4	40	20	40	50	50
02	PC	LIT1	2FTPC211	Heat and Mass Transfer	3	-	2	3	4	40	20	40	50	50
03	PE	T1	2FTPE2XX	Professional Elective - I	3	-	-	3	3	40	20	40	-	-
04	MM	LIT2	2FTMP213	Multidisciplinary Minor - I	3	-	2	3	4	40	20	40	50	-
05	OE	T1	2ILOE2XX	Open Elective - I	2	-	-	2	2	-	-	100	-	-
06	HS	T2	2FTHS2XX	Foreign Language	2	-	-	2	2	-	50	-	-	-
07	HS	T2	2FTHS319	Psychology	1	-	-	1	1	-	50	-	-	-
08	HS	T2	2FTHS220	Environmental Studies	2	-	-	2	2	-	50	-	-	-
09	RM	L3	2FTRM221	Research Methodology	-	-	2	-	1	-	-	-	50	-
10	MA	T2	2FTMA222	Aptitude and Reasoning- II	2	-	-	2	-	-	50	-	-	-
11	EL	L2	2FTEL223	Innovation and Product Development	-	-	2	-	1	-	-	-	50	-
Total					21	-	10	21	24					

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory) : ≥8/20	MSE - ESE(Theory): ≥32/80	TA (Theory) / CIA (Lab) : ≥20/50	ESE (Lab) : ≥20/100	ESE (Theory) : ≥40/100
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Summer Internship (in Industry, R&D organization, or Academic Institute) shall be undertaken after the IV Semester during the summer vacation. The evaluation of the internship will be during the V Semester

Foreign Language - Duoquet

2FTHS217- Foreign Language - German

2FTHS218- Foreign Language - Japanese

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Annasaheb Dange College of Engineering and Technology
 Ashra - 416301, Dist. : Sangli, Maharashtra
 (An Empowered Autonomous Institute)



S.Y. B. Tech. – Food Technology
 [Level 5, UG Diploma]

Bridge Courses:

Sr. No.	Semester	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
											Theory		Laboratory		
											MSE	TA	ESE	CIA	ESE
01	III	ES	FT	2FTE8104	Fundamentals of Food Technology	2	-	-	2	2	-	-	100	-	-
02	IV	ES	LIT	2FTE8113	Food Chemistry	3	-	2	3	4	-	-	100	50	-

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

*Note: All direct second year students admitted to the B.Tech. Food Technology shall compulsorily undergo the prescribed bridge courses. Students admitted from diploma other than the parent discipline shall additionally complete bridge courses as prescribed by the designated committee.

Exit after S.Y. B. Tech. – Food Technology

Eligibility Criteria

- All conditions applicable to the Exit Option After First Year shall also apply. In addition, the following criteria must be met:
- Students will have the option to exit the Food Technology Program after successfully completing the second year.
- To qualify this exit option students must complete internship of minimum 8 weeks in Food Technology related field, aimed at enhancing practical knowledge and industry exposure. Students must submit internship report in accordance with the schedule and guidelines provided.

Outcome:

- Upon exit, they will be awarded an Undergraduate Diploma in Food Technology

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Established: 1979

Annasaheb Dange College of Engineering and Technology
 Ashra - 416301, Dist. : Sangli, Maharashtra
 (An Empowered Autonomous Institute)

Professional Electives / Honor's tracks (Credit-20)

Track Name	PE-I	PE-II	PE-III	PE-IV	PE-V	PE-VI
Class	S.Y.B. Tech	T.Y.B. Tech	T.Y.B. Tech	T.Y.B. Tech	Final Year, B. Tech	Final Year, B. Tech
Semester	IV	V	VI	VI	VII	VIII
Food Certification & Regulatory Compliance	Food Safety & Quality Management 2FTPE212	Food Safety Standards and Regulatory Frameworks 2FTPE304	Food Certification Systems and Compliance Management 2FTPE312	Food Labeling, Packaging, and Traceability Regulations 2FTPE315	Food Fraud, Adulteration, and Regulatory Control Measures 2FTPE406	MOOC Courses offered by NPTEL/ SWAYAM only 2FTPE410 2FTPE411 2FTPE412
Applied Food Nutrition & Specialty Foods	Nutrition 2FTPE213	Food Additives 2FTPE305	Food Fortification 2FTPE313	Design and formulation of foods 2FTPE316	Specialty food 2FTPE407	
Advanced Food Processing and Microbial Technology	Industrial Microbiology 2FTPE214	Fermentation Technology 2FTPE306	Enzyme Technology 2FTPE314	Food Biotechnology 2FTPE317	Industrial Biotechnology Applications 2FTPE408	

- Students may choose Professional Elective courses from a single track or across multiple tracks, based on their academic interests and career aspirations.
- Only one Professional Elective course may be selected from a given column in a semester. Additional courses from the same column may be taken in subsequent semesters, but not concurrently.
- Students opting for the Honours Degree shall complete all Honours courses from a single track, which shall be different from the track chosen for their Professional Elective courses.

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Established: 1999

Annasaheb Dange College of Engineering and Technology

Ashra - 416301, Dist. : Sangli, Maharashtra

(An Empowered Autonomous Institute)

ADCEET

Multidisciplinary Minor (14 Credits)

Minor Stream:- Food Engineering & Process Control (FP)

Sr. No.	Semester	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
											Theory		Laboratory		
											MSE	TA	ESE	CIA	ESE
01	IV	MM	LH2	2FTFP215	Fundamentals of Food Process Engineering	3	-	2	3	4	40	20	40	50	-
02	V	MM	TL	2FTFP307	Instrumentation and Process Control	3	-	-	3	3	40	20	40	-	-
03	VI	MM	LH2	2FTFP318	Food Plant Design & layout	3	-	2	3	4	40	20	40	50	-
04	VII	MM	TL	2FTFP405	Applications in food quality control	3	-	-	3	3	40	20	40	-	-
Total						12	-	04	12	14					

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 Established: 1999	Annasaheb Dunge College of Engineering and Technology Ashra - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology							
Course Information:								
Class, Semester		SY. B.Tech, Semester - III					Category	PC
Course Code, Course Title		2FTPC201 –Food Biochemistry					Type	T1
Prerequisites		2FTES112 –Food Chemistry						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self-Study	Credits
		3	-		-		3	3
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1		Explain the fundamental concepts of food biochemistry and their significance in food science and technology.						
CO2		Illustrate the structure and functions of cells and major biomolecules in food systems.						
CO3		Apply the principles of carbohydrate, protein, and enzyme biochemistry in food processing and preservation.						
CO4		Demonstrate the role of lipids, vitamins, and minerals in maintaining food quality and stability.						
CO5		Utilize emerging technologies and biochemical principles to improve food processing and quality.						
Syllabus:								
Module		Contents						Lecture Hours
I		Introduction to Food Biochemistry:- Introduction to Food Biochemistry: Scope & importance, Role of biochemistry in food processing & industry, Structure of atoms, molecules & chemical bonds, Biomolecules overview (carbohydrates, proteins, pH, concept and significance in foods, lipids), Water chemistry in food systems, pH concept and significance in foods, Buffers and buffering capacity, Applications in real food systems.						08
II		Cell Structure and Organization:- Cell theory and classification, Prokaryotic vs Eukaryotic cells, Structure and function of cell organelles, Cell membrane structure, Transport mechanisms (diffusion, osmosis, active transport), Overview of cellular metabolism, importance of cells in food systems (microbial, plant, animal).						07
III		Functional Biochemistry of Carbohydrates:- Functional role of carbohydrates in food systems, Water interaction & solubility behavior, Starch gelatinization and pasting properties, Retrogradation and staling, Maillard reaction: mechanism & control, Caramelization and color/flavor development, Role of sugars in preservation (osmotic effect, jams).						08


 Member Secretary-BoS


 Chairman-BoS


 Member Secretary-AC


 Chairman-AC

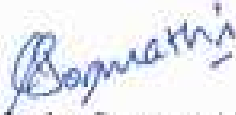
IV	Functional Biochemistry of Proteins and Enzymes:- Functional properties of proteins in foods, Protein hydration and solubility behavior, Emulsification and foaming properties, Protein Denaturation and coagulation, Enzymes in food systems (practical role), Enzymatic browning and its control, Enzymes in fermentation & processing. Industrial applications (bakery, dairy, beverages)	07
V	Functional Biochemistry of Lipids, Vitamins & Minerals Functional role of lipids in food (texture, flavor), Lipid oxidation mechanisms, Rancidity : types, detection & prevention, Role of antioxidants in food systems, Stability and loss of vitamins during processing, Role of minerals in food quality & nutrition, Interaction of micronutrients with food components.	07
VI	Modern Technologies in Food Biochemistry: <i>Enzyme Technology</i> Industrial applications of enzymes in food processing Enzyme immobilization techniques and advantages. <i>Biotechnological Approaches</i> : Fermentation technology and metabolic modification, Role of microorganisms in value-added food production, Nanotechnology in Foods: Nano-encapsulation and delivery system, Applications in food preservation and packaging. <i>Functional Foods and Bioactive Compounds</i> : Nutraceuticals and health-promoting components, Role of antioxidants and phytochemicals. <i>Oenics Technologies</i> : Applications in food quality, safety, and authentication. <i>Future Trends in Food Biochemistry</i> : Smart and sustainable food systems, Advances in biochemical analysis techniques.	08
Total Lecture Hours		45
Test Books		
1. Y. H. Hui, Benjamin K. Simpson et al., Food Biochemistry and Food Processing, 2 nd Edition, Wiley-Blackwell, 2012.		
2. N.A.M. Eskin, F. Shahidi, , Elsevier, Biochemistry of Foods, 3 rd Edition, 2012.		
3. Darshan Malik et al., Textbook of Nutritional Biochemistry, Latest Edition, Springer Nature Singapore, 2023.		
4. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H., Outlines of Biochemistry, 5 th Edition, John Wiley and Sons, (2001).		
References:		
1. Advances in Food Biochemistry, 1 st Edition, CRC Press, 2010.		
2. Biochemistry of Food Proteins, B.J.F. Hudson, 1 st Edition, Springer, 1992.		
3. Food Biochemistry and Food Processing, Y. H. Hui, 1 st Edition, Blackwell Publishing, 2006.		
Online Learning Resources		
1. NPTEL-Courses on Food Chemistry, Biochemistry, Food Processing		
2. Wiley Online Library -Access to journals like Journal of Food Biochemistry		
3. Coursera-Courses on nutrition, metabolism, food science		



Member Secretary-BoS



Chairman -BoS



Member Secretary-AC



Chairman-AC

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Course Information:									
Class, Semester		SY. B.Tech, Semester - III					Category	PC	
Course Code, Course Title		2FTPC202 –Food Microbiology					Type	LIT	
Prerequisites		-							
Teaching Scheme (per week)		Lecture		Tutorial		Practical		Self-Study	Credits
		3		-		2		3	4
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			40	20	40		50	50	
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:									
CO1		Explain the historical development of microbiology and the contributions of eminent scientists.							
CO2		Classify microorganisms based on their characteristics, structure, and taxonomy.							
CO3		Apply the principles of microbial growth and nutrition in the cultivation of microorganisms.							
CO4		Demonstrate the use of microbiological techniques and culture media for the isolation and identification of microorganisms.							
CO5		Utilize microbiological standards and analytical methods to assess food quality and safety.							
Syllabus:									
Module		Contents						Lecture Hours	
I		Historical Perspective, Microbial Taxonomy and Diversity History and scope of Microbiology, landmark discoveries, classification and nomenclature of microorganisms, Bergey's Manual, systematic bacteriology, three- and five-kingdom concepts, classification of prokaryotes and eukaryotes.						07	
II		Prokaryotic Cells and Viruses Structure and multiplication of bacteria, introduction to viruses, structure and replication of animal viruses, bacteriophages – structure and replication.						08	
III		Eukaryotic Microorganisms Algae structure and replication, life cycle of <i>Gracilaria</i> , fungi structure and replication, life cycle of <i>Rhizopus stolonifer</i> , yeast structure and replication, life cycle of <i>Saccharomyces cerevisiae</i> , protozoa structure and life cycle of <i>Entamoeba histolytica</i>						08	
IV		Microbial Nutrition and Growth- Nutritional requirements, nutritional types, microbial growth curve, growth kinetics, batch and continuous culture, factors affecting growth, sporulation and germination, bacteriological media and applications.						07	
V		Microbiological Criteria and Standards (ICMSF Concept) Role of International Commission on Microbiological Specifications for Foods, Indicator and index organisms, Microbiological criteria in foods, ICMSF Sampling Plans: Sampling and sample preparation for food microbiology, Enumeration methods: Total Plate Count (TPC), Yeast and Mold Count, Coliform count (MPN method), Interpretation of results as per standards, Foodborne Pathogens and Detection; Significance and detection of <i>Salmonella</i> , <i>Escherichia coli</i> , <i>Staphylococcus aureus</i> , Use of selective and differential media, Rapid Methods and Food Safety Systems.						08	

VI	Food Spoilage: Spoilage of cereals & cereal products, milk & milk products, fruit & vegetable products, meat, poultry egg, fish products Food borne illness: Bacterial & Non-bacterial food borne illness	07
Total Lecture Hours		45
		List of Experiment with CO Mapping
Sr. No.	Title of the Experiment	CO Mapped
1	Study of Microscope and Observation of Microorganisms	1, 2, 3
2	Sterilization and Disinfection Techniques in Food Microbiology Laboratory	3, 5
3	Preparation of Culture Media for Food Microorganisms	4, 5
4	Isolation of Foodborne Bacteria by Streak Plate Method	5
5	Simple (Monochrome) Staining of Bacteria	2, 5
6	Gram Staining of Foodborne Bacteria	2, 5
7	Negative Staining Technique for Bacteria	2, 5
8	Lactophenol Cotton Blue Staining for Food Spoilage Fungi	2, 3
9	Enumeration of Microorganisms in Food by Total Plate Count (TPC)	3, 5
10	Coliform Estimation in Food by MPN Method	3, 5
11	Preparation of Fermented Food Product (e.g., Curd/Bread)	3, 4, 5
Total Practical Hours		30
		Minimum TEN experiments should be performed from the above list
Text Books		
1. M. J Pelczar, E.C.Schan, N.R Krein, Microbiology, 5 th Edition, Tata McGraw Hill, 2006.		
2. M.R. Adams, M.O.Moss, Food Microbiology, 3 rd Edition, Royal society of chemistry, 2008		
3. S. C. Paria, Textbook of Microbiology & Immunology, 2 nd Edition, Elsevier India, 2012.		
4. Frazier, W.C., and Westhoff, D.C, Food Microbiology, 4 th Edition, McGraw-Hill, New York, 1988.		
5. Jay, J. M, Modern Food Microbiology, 6 th Edition, Chapman & Hall, New York, N.Y, 2000		
References:		
1. L.M Prescott, J.P Harley, D.A Klein, Microbiology, 7 th Edition, McGraw-Hill, Education, 2008.		
2. K.P Talara, B. Chess, Foundations in Microbiology, 10 th Edition, McGraw-Hill, Education 2017		
3. Ahmed E., Yousef, Carolyn Carlstrom, Food Microbiology: A Laboratory Manual, 1 st Edition John Wiley & Sons, 2003.		
Online Learning Resources		
1. https://onlinecourses.swayam2.ac.in/cec19_ag03/preview .		

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Course Information:									
Class, Semester		SY, B.Tech, Semester – III					Category	PC	
Course Code, Course Title		2FTPC203 - Unit Operations					Type	LTI	
Prerequisites		-							
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study		Credits
		3	-		2		3		4
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			40	20	40		50	50	
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:									
CO1	Describe the principles, concepts, and significance of unit operations used in food processing industries.								
CO2	Outline the operating principles and applications of food processing equipment used in various engineering operations.								
CO3	Demonstrate engineering principles and mathematical concepts to solve problems related to food engineering operations.								
CO4	Differentiate various food engineering operations and equipment based on their principles, performance, and industrial applications								
CO5	Apply appropriate engineering concepts to evaluate food processing operations for efficient processing and product quality								
Syllabus:									
Module	Contents							Lecture Hours	
I	Introduction to Unit Operations Concept of unit operations, Role in food processing industry, Classification of unit operations, Physical properties of food materials (size, shape, density), Rheological properties and viscosity measurement, Introduction to material balance, Simple material balance calculations, Flow of fluids in food processing, Flow through packed bed, Flow through fluidized bed							08	
II	Size Reduction and Mixing Principles of size reduction, Mechanisms of comminution (compression, impact, attrition), Crushers and grinders, Cutting and disintegration equipment, Laws of size reduction (Rittinger's, Kick's, Bond's), Screening principles, Types of screens, Screening efficiency, Particle size analysis Mixing - Principles and mechanism of mixing, Agitation in liquids, Types of impellers (propeller, turbine, paddle), Mixing equipment: ribbon blender, sigma mixer, planetary mixer.							07	
III	Filtration and Centrifugation Principles of filtration, Filtration theory, Filtration rate and pressure drop, Filtration equipment: plate and frame filter press, vacuum leaf filter, Centrifugation principles, Types of centrifuges, Sedimentation and settling, Clarification processes, Membrane separation basics							08	
IV	Evaporation and Crystallization: Principles of evaporation, mass and energy balance, factors affecting rate of evaporation, evaporation equipment, Crystallization -theory and principles, kinetics, applications in food industry, equipment for crystallization							07	

V	Extrusion Food Extrusion, Single screw extruder, Twin screw extruder, Effect of extrusion on food products, Breakfast cereals by extrusion technology, Texturized vegetable protein, Recent Advances in extrusion technology	07
VI	Freezing Introduction to Freezing, Principles of Freezing, Types of Freezing Methods, Freezing Equipment (Blast freezer, Plate freezer, Fluidized bed freezer, Cryogenic freezer, Working principles and industrial applications), Changes During Freezing, Factors Affecting Freezing Rate, Storage of Frozen Foods, Thawing of Frozen Foods	08
Total Lecture Hours		45

List of Experiments with CO Mapping

Sr. No	Title / Topic of the Experiment	CO Mapped
1	Determination of viscosity of liquid using Redwood Viscometer	1
2	Determination of reduction ratio of pulverizer	2
3	Evaluation of size reduction efficiency in slicing, dicing, shredding, and pulping operations	1, 5
4	Determination of mixing efficiency using planetary mixer and spiral mixer	1, 5
5	Evaluation of mixing characteristics in an agitated vessel	2
6	Determination of separation efficiency in centrifugal separation	1, 5
7	Determination of filtration time in a plate and frame filter press	3
8	Evaluation of filtration performance of a vacuum leaf filter	4
9	Determination of settling velocity and sedimentation characteristics	4
10	Analysis of flow behavior through a fluidized bed	4
Total Practical Hours		30

Minimum TEN experiments should be performed from the above list

Text Books

1. Food Processing Technology: Principles and Practice, P. J. Fellows, Elsevier, 5th, 2022
2. Introduction to Food Engineering, R. Paul Singh, Dennis R. Heldman, Academic Press, 6th, 2024
3. Unit Operations in Food Processing, R. L. Earle, Pergamon Press, 2nd, 1983

References:

1. Handbook of Food Engineering Dennis R. Heldman (Editor) CRC Press 2nd 2006
2. Food Engineering and Process Applications Dennis R. Heldman, Daryl B. Lund (Editors) CRC Press 2nd 2007

Online Learning Resources

1. NPTEL Course on Thermal Operations in Food Process Engineering: Theory and Applications By Prof. Tridib Kumar Goswami IIT Kharagpur https://onlinecourses.nptel.ac.in/noc19_ag06/preview
2. Food Processing Unit Operations – e Cornell - Cornell University <https://ecomell.cornell.edu/certificates/food-and-plant-science/food-processing-unit-operations/>

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Course Information:							
Class, Semester	SY. B.Tech, Semester – III					Category	PC
Course Code, Course Title	2FTPC204- Fluid Mechanics					Type	LIT2
Prerequisites	–						
Teaching Scheme (Per week)	Lecture	Tutorial		Practical		Self Study	Credits
	2	-		2		2	3
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		40	20	40		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:							
CO1	Describe the properties of fluids, pressure measurement techniques, and flow behavior relevant to food processing operations.						
CO2	Illustrate the principles of fluid flow and the operation of flow measurement devices used in food processing industries.						
CO3	Apply the concepts of viscous flow to determine flow characteristics and losses in fluid transport systems.						
CO4	Discuss the construction, working principles, and applications of pumps used in food processing industries.						
CO5	Interpret the principles of viscometry and fluidization in the characterization and handling of food materials.						
Syllabus:							
Module	Contents						Lecture Hours
I	Introduction to fluid flow: Physical properties of fluids like mass density, specific gravity, viscosity, pressure, factors affecting the rheological parameters; fluid pressure and its measurement; manometers, simple manometers, differential manometers; concept of Reynolds's						05
II	Fluid flow measurement: Derivation of continuity equation; different types of energies of a liquid in motion; derivation of Bernoulli's equation; Practical applications of Bernoulli's equation like Venturimeter, Orifice meter, Pitot tube.						05
III	Laminar viscous fluid flow: Flow of viscous fluid through circular pipe, Coefficient of friction; head loss due to Friction in pipes; head loss due to sudden enlargement, contraction, vena contract, entrance and exit losses; Stokes law (laminar flow around a sphere); laminar flow through porous media; pressure drop in flow through porous media.						06
IV	Pumps: Types of pumps and classification criteria, Theory and working of centrifugal pump, reciprocating pumps, external gear pump (rotary pump), Lobe pump, Vane pump etc.						04
V	Viscometry: Theory and working of capillary tube viscometer for Newtonian and non-Newtonian fluids; Falling sphere resistance method; Rotational viscometer; Cone and plate type viscometer; Circular disc viscometer.						04

VI	Fluidization: Physical properties of particles like size, shape, sphericity, porosity, superficial and interstitial velocity, hydraulic radius, equivalent diameter etc. Mechanism of fluidization, characteristics of gas – solid fluidized systems, Fanning friction factor for porous media; minimum porosity, bed weight, pressure drop in fluidized bed, theory and analysis of fluidization process; particulate fluidization; aggregative (or bubbling) fluidization; principle of fluidized bed drying equipment; pneumatic conveyers	06
Total Lecture Hours		30
List of Experiment with CO Mapping		
Sr. No.	Title of the Experiment	CO Mapped
1	Study of different types of pipes, pipe fittings, tools and materials	1
2	Study of different types of valves used in food processing	1
3	Study of manometers and pressure measuring devices	1,2
4	Verification of Bernoulli's theorem	2
5	Determination of critical Reynolds number	1
6	Calibration of Pitot tube	1
7	Determination of discharge coefficient of venturimeter	2
8	Determination of frictional losses and fitting losses in pipes	2
9	Study of different types of pumps (centrifugal, reciprocating, rotary)	3
10	Study/operation of viscometers (capillary/rotational)	4
Total Practical Hours		30
Minimum TEN experiments and 1 project should be performed from the above list		
Text Books		
1. Frank M. White. 2010. Fluid Mechanics, 7 th Ed. McGraw-Hill Book Co., Inc., Boston, USA		
2. Yunus A. Çengel and John M. Cimbala. 2006. Fluid Mechanics: Fundamentals and Applications. McGraw-Hill, Inc., New York, USA.		
3. Bruce R. Munson, Donald F. Young and Theodore H. Okiishi. 2002. Fundamentals of Fluid Mechanics, 4th Ed. John Wiley & Sons, Inc., New York, USA.		
References:		
1. E. John Finnemore and Joseph B. Franzini. 2002. Fluid Mechanics with Engineering Applications, 10th Ed. McGraw-Hill, Inc., New York, USA		
2. R. Byron Bird, Warren E. Stewart and Edwin N. Lightfoot. 2002. Transport Phenomena, 2nd Ed. John Wiley & Sons, Inc., New York, USA		
3. Noel de Nevers. 1991. Fluid Mechanics for Chemical Engineers. McGraw-Hill, Inc., New York, USA.		
4. Victor L. Streeter. 1962. Fluid Mechanics, 3rd Ed. McGraw-Hill Book Co., Inc., Boston, USA.		
Online Learning Resources		
1. NPTEL Course on Fluid Mechanics-I, by Prof. Gautam Biswas, Prof. Suman Chakraborty https://nptel.ac.in/courses/112104118		
2. NPTEL Course on Introduction To Fluid Mechanics, by Prof. Suman Chakraborty IIT Kharagpur https://onlinecourses.nptel.ac.in/noc22_me31/preview		

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Course Information:								
Class, Semester		SY. B.Tech, Semester – III				Category	PC	
Course Code, Course Title		2FTPC205, Principles of Food preservation				Type	T1	
Prerequisites		2FTES104, Fundamentals of Food Technology						
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self Study		Credits
		3	-		-	3		3
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1	Describe the classification and sources of food, causes of food spoilage, and the principles of food preservation based on fundamental food preservation concepts.							
CO2	Explain the principles, methods, equipment, and effects of thermal processing, refrigeration, freezing, drying, dehydration, and concentration on food quality and shelf life.							
CO3	Apply the principles of food preservation using chemical preservatives, food additives, and irradiation for maintaining food quality and extending shelf life under appropriate preservation conditions.							
CO4	Analyze the suitability of recent food preservation technologies such as High Pressure Processing (HPP), Pulsed Electric Field (PEF), ultrasound, dielectric, ohmic, and infrared heating based on their preservation efficiency and impact on food quality.							
Syllabus:								
Module	Contents							Lecture Hours
I	Food Classification and Preservation Sources of food, scope and benefit of industrial food preservation, perishable, non perishable food, causes of food spoilage. Preservation by salt & sugar – Principle, Method, Equipment and effect on food quality							08
II	Food Preservation by Thermal Processing Thermal processing methods of preservation – Principle and equipment, Canning, blanching, pasteurization, sterilization, evaporation.							07
III	Preservation by use of Low Temperature Refrigeration and freezing, types of freezing, common spoilages occurring during freezing, difference between refrigeration and freezing. Food irradiation Preservation by radiation, chemicals & preservatives. Definition, Methods of Irradiation, Direct & Indirect effect							08
IV	Food Drying and Dehydration Preservation by drying dehydration and concentration – Principle, Methods, Equipment and effect on quality :Difference, importance of drying & dehydration over other methods of drying and dehydration, equipments and machineries, physical and chemical changes in food during drying and dehydration.							07

V	Preservation by using Preservatives: Food preservation: Definition, principles, importance of food preservation, traditional and modern methods of food preservation. Food additives – definition, types, Class I and Class II preservatives.	07
VI	Recent Preservation Methods Recent methods in preservation: Pulsed electric field processing, high pressure processing, processing using ultrasound, dielectric, ohmic and infrared heating. Theory, equipments and effect on food quality.	08
Total Lecture Hours		45
Text Books		
1. Fellows, J.P., Food Processing Technology: Principles and Practices, 2nd Edition, Woodhead Publishing, Cambridge, 2022.		
2. Potter, N.N. and Hotchkiss, J.H., Food Science, 5th Edition, Springer, 1998.		
3. Goyal, Megh R., Mishra, Santosh K. and Birwal, Preeti, Food Processing and Preservation Technology: Advances, Methods, and Applications, 1st Edition, 2022.		
4. Mudgil, Deepak and Mudgil, Sheweta, Food Processing and Preservation, 1st Edition, 2021.		
References:		
1. Kapoor, Swati and Kaur, Gurkirat (Editors), Emerging Techniques for Food Processing and Preservation, 1st Edition, 2024.		
2. Giridhari Lal, Siddappa, G.S. and Tandon, G.L., Preservation of Fruits and Vegetables, CFTRI, ICAR, New Delhi, 1st Edition, 1959.		
3. Vijayakshader, Text Book on Food Storage and Preservation, Kalyani Publishers, Delhi, 1st Edition.		
4. Srilakshmi, B., Food Science, New Age Publishers, New Delhi, 8th Edition, 2018.		
5. Manay, Shakuntala and Shadakshara Swamy, Foods, Facts and Principles, New Age Publishers, New Delhi, 6th Edition, 2019.		
Online Learning Resources		
1. NPTEL Course on Novel Technologies for Food Processing and Shelf Life Extension, by Prof. Hari Niwas Mishra, IIT Kharagpur https://www.nptel.ac.in/courses/126/105/126105015		
2. NPTEL Course on Fundamentals of Food Process Engineering, by Prof. Jayeeta Mitra, IIT Kharagpur https://onlinecourses.nptel.ac.in/noc25_ag24/preview		
3. NPTEL Course on Thermal Processing of Foods, by Prof. R. Anandalakshmi, IIT Guwahati https://onlinecourses.nptel.ac.in/noc24_ch60/preview		
4. NPTEL Course on Impact of Flow of Fluids in Food Processing and Preservation, by Prof. Kanishka Bhunia & Prof. Tridib Kumar Goswami, IIT Kharagpur https://onlinecourses.nptel.ac.in/noc26_ag03/preview		

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Course Information:							
Class, Semester	SY. B.Tech, Semester – III					Category	VS
Course Code, Course Title	2FTVS206 – Fundamentals of Good Laboratory Practices					Type	L2
Prerequisites	-						
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self Study	Credits
	1	-		2		1	2
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	20	-		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:							
CO1	Describe the principles, scope, importance of Good Laboratory Practices (GLP), and distinguish GLP from Good Manufacturing Practices (GMP) based on laboratory quality system requirements.						
CO2	Explain laboratory infrastructure, safety requirements, chemical handling, labeling, storage, and waste disposal practices as per GLP guidelines.						
CO3	Apply calibration procedures, equipment handling, sampling techniques, and analytical method validation following GLP requirements.						
CO4	Apply documentation practices including preparation of Standard Operating Procedures (SOPs), record keeping, and compliance documentation for maintaining laboratory quality systems.						
CO5	Demonstrate laboratory safety, quality assurance, and Good Laboratory Practices while performing laboratory activities in accordance with GLP requirements.						
List of Experiments with CO Mapping							
Module	Contents						Lecture Hours
I	Introduction to GLP Definition, principles, importance, and scope of Good Laboratory Practices (GLP) in food laboratories.						02
II	GLP and GMP Overview Comparison of GLP and Good Manufacturing Practices (GMP), organizational structure, roles, and responsibilities in a GLP laboratory.						03
III	Laboratory Infrastructure and Safety Laboratory layout, infrastructure, utilities, environmental conditions, safety practices, chemical handling, labeling, storage, and waste disposal.						03
IV	Calibration and Equipment Handling Principles of calibration, calibration of instruments (analytical balance, pH meter, thermometer), cleaning, drying, and maintenance of laboratory glassware and equipment.						02
V	Sampling and Analytical Practices Sampling techniques, sample handling and storage, analytical method validation (accuracy, precision, repeatability), monitoring environmental parameters.						03
VI	Documentation and Quality Systems Preparation of SOPs, documentation practices, record keeping, compliance checklist, and quality assurance in GLP laboratories.						02
Total Lecture Hours						15	

List of Experiments with CO Mapping		
Sr. No.	Title of the Experiment	CO Mapped
1	Study of Good Laboratory Practices (GLP) guidelines and preparation of a compliance checklist	1, 2
2	Comparative study of Good Manufacturing Practices (GMP) versus Good Laboratory Practices (GLP)	1
3	Study of organizational structure, roles, and responsibilities in a GLP-in laboratory	1, 2
4	Analytical method validation: study of accuracy, precision, repeatability, and reporting format	2, 3
5	Calibration of laboratory instruments such as analytical balance, pH meter, and thermometer	3
6	Safe handling, labeling, and storage of laboratory chemicals according to GLP	2, 3
7	Cleaning, drying, and maintenance of laboratory glassware and equipment under GLP	2, 3
8	Assessment of laboratory infrastructure, utilities, and accommodation requirements as per GLP	1, 2
9	Monitoring and reading of environmental parameters: temperature, humidity, and housekeeping practices	2, 3
10	Sampling, sample handling, storage, and documentation procedures in GLP laboratories	1, 2
11	Preparation of Standard Operating Procedures (SOPs) and maintenance of laboratory documentation	3
12	Demonstration of laboratory safety practices including handling spillage, waste disposal, and fire safety	4
Total Practical Hours		30
Minimum TEN experiments should be performed from the above list		
Text Books		
1.	Nielsen, S. Suzanne, Food Analysis, 6th Edition, Springer, 2024.	
2.	Nielsen, S. Suzanne, Food Analysis, 5th Edition, Springer, 2017.	
3.	Alli, Intez, Food Quality Assurance: Principles and Practices, 2nd Edition, Taylor & Francis, 2016.	
2.	OECD, Good Laboratory Practice Training Manual, 2021/2022 Edition.	
References:		
1.	Handbook of Food Analytical Chemistry, Wiley, Volumes 1 & 2, 1st Edition, 2004-2005.	
2.	Nielsen, S. Suzanne, Food Analysis Laboratory Manual, 3rd Edition, Springer, 2017.	
3.	ISO/IEC, 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories, 1st Edition, 2017.	
4.	Banerjee, Surajit K., Quality Assurance in Food Industry, Vol. I & II, 1st Edition, 2024.	
Online Learning Resources		
1.	Alison – An Introduction to Good Lab Practices (GLP) Free online course introducing GLP principles, safety, documentation, and lab systems. https://alison.com/course/an-introduction-to-good-lab-practices	
2.	Good Laboratory Practices (GLP) – Food Tech Safety Course Free online course focused on GLP principles, safety (PPE, MSDS), documentation and basic controls. https://foodtechsafety.com/good-laboratory-practices-glp-free-online-course-for-life-science-professionals/	

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Course Information:								
Class, Semester		SY. B. Tech, Semester - III				Category	HS	
Course Code, Course Title		2FTHS207, Universal Human Values				Type	T2	
Prerequisites								
Teaching Scheme (per week)		Lecture		Tutorial		Practical	Self Study	Credits
		2		-		-	2	2
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	50	-		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1		Explain the evolution, need, and significance of Universal Human Values in the context of global developments, societal challenges, and professional life.						
CO2		Apply the understanding of self, harmony, and human relationships to improve personal behavior and interpersonal interactions.						
CO3		Demonstrate the principles of social and environmental responsibility by relating human actions to sustainable and ethical living.						
CO4		Analyze ethical issues in engineering and emerging technologies such as Artificial Intelligence and Robotics using appropriate ethical frameworks.						
CO5		Evaluate value-based decisions and approaches for personal growth and professional practice through reflection and case analysis.						
Syllabus:								
Module		Contents					Lecture Hours	
I		Evolution and Need of Universal Human Values: Meaning and concept of Universal Human Values, Historical evolution of value systems, Impact of Industrial Revolution on society and lifestyle, Consequences of World War II and global conflicts, Emergence of global value frameworks, Role of United Nations and UNESCO, Introduction of UHV in Indian education system by AICTE, Present-day challenges: stress, lack of purpose, environmental issues					05	
II		Understanding the Human Being: Human being as a combination of self and body, Distinction between self (consciousness) and body (physical entity),Needs of self vs needs of body, Happiness vs physical pleasure, Harmony in the self (thoughts, feelings, actions),Self-exploration and self-awareness					05	
III		Harmony in Relationships: Meaning and importance of relationships, Values in relationships (Trust, Respect, Affection, Care, Guidance, Reverence, Love),Mutual fulfillment in relationships, Role of family in value development, Interpersonal conflicts and resolution, Relationship in professional environment					05	

IV	Harmony in Society and Nature: Individual → Family → Society → Nation → World, Concept of undivided society, Social harmony and responsibility, Coexistence in nature, Human-nature relationship, Environmental degradation and its causes, Sustainable living and resource utilization, Local and global environmental issues	05
V	Universal Human Values in Engineering and Technology: Professional ethics in engineering, Role of engineers in society, Guidelines by IEEE, Ethical issues in modern technology, Role of institutions like Open AI, Core Framework to Assess Values: Self-Reflection Model, Value-Action Gap Model, Emotional Intelligence (EQ) Framework (The Nine Values (Bhavas) Assessment Model)	05
VI	Application of UHV in Personal and Professional Life: Self-reflection and personal development, Value-based decision making, Goal setting with values, Fulfilling Basic Human Aspirations Application of UHV in career and workplace, Development of holistic and responsible lifestyle, Core Framework to Assess Values: Emotional Intelligence (EQ) Framework, (Human-AI Value Alignment) Ikigai Model	05
Total Lecture Hours		30
Text Books		
1.Human Values and Professional Ethics:R. R. Gaur, R. Sangal, G. P. Bagaria, Excel Books, New Delhi, 2010		
2. Engineering Ethics: Charles E. Harris Jr., Michael S. Pritchard, Michael J. Rabins, Cengage Learning, 2013		
3. Understanding Human Being, Nature and Existence Comprehensively: UHV Team, UHV, 2022.		
4. Life 3.0, Max Tegmark, Knopf, 2017		
References:		
1. AICTE Universal Human Values Course Material, 2017 onwards		
2.IEEE Code of Ethics		
3. Ethics in Engineering(4 th Edition): Martin, M. W., Schinzinger, R., & Qin Zhu. McGraw-Hill, 2005.		
Online Learning Resources		
1.TED Talks on ethics, happiness, human behaviour		
2.NPTEL Courses on UHV and Engineering Ethics		
3.MIT: AI Ethics lectures (OpenCourseWare)		

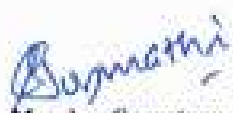
 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology						
Course Information:							
Class, Semester	SY. B. Tech, Semester -III					Category	HS
Course Code, Course Title	2FTHS208, Indian Constitution					Type	T2
Prerequisites	-						
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self-Study	Credits
	1	-		-		1	1
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	50	-		-	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:							
CO1	Describe the evolution and salient features of the Indian Constitution using the Government of India Acts of 1935 and 1947.						
CO2	Illustrate the philosophy of the Indian Constitution using the Preamble, Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy						
CO3	Explain the constitutional amendment process, principles of the Basic Structure, and emergency provisions under the Indian Constitution						
CO4	Summarize the structure and functioning of the Union and State Governments using the parliamentary and legislative systems.						
Syllabus:							
Module	Contents						Lecture Hours
I	Constitution: Basic Structure & Making of Constitution Meaning of the constitution law and constitutionalism, Historical perspective of the constitution of India, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Meaning and importance of Constitution, Making of Indian Constitution – Sources, Salient features of Indian Constitution, Preamble.						04
II	Fundamental Rights & Fundamental Duties Fundamental Rights – Features and characteristics, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles-Definition and Meaning, 42 nd Constitutional Amendment Act, List and Importance of Fundamental Duties.						06
III	Amendments of Constitution and Emergency Provisions: Meaning and need of Constitutional Amendments, Procedure of Amendment under Article 368, Types of Amendments, Important Constitutional Amendments (42 nd , 44 th , 73 rd , 74 th , 86 th and 101 st Amendments), Basic Structure Doctrine, Emergency Provisions – Meaning and Objectives, National Emergency (Article 352), State Emergency/President's Rule (Article 356), Financial Emergency (Article 360), Effects of Emergency on Fundamental Rights and Centre-State Relations, Safeguards introduced by 44 th Constitutional Amendment.						03

IV	Government of The Union and States: President of India – Election and Powers, Prime Minister of India - Election and Powers, Lok Sabha - Structure, Rajyasabha – Structure, Governor of State, Chief Minister and Council of Ministers in a state.	02
Total Lecture Hours		15
Text Books		
1. M. Laxmikanth, Indian Polity, 7th Edition, McGraw Hill Publications Delhi, 2023.		
2. P. M. Bakshi, The Constitution of India, 19th Edition, Lexis Nexis, 2023.		
3. Durga Das Basu, Introduction to the Constitution of India, 26th Edition, Lexis Nexis, 2022.		
4. M. Laxmikanth, Governance in India, 3rd Edition, McGraw Hill Publications Delhi, 2021.		
5. J. N. Pandey, The Constitutional Law of India, 59th Edition, Allahabad: Central Law Agency, 2022.		
References:		
1. V. N. Shukla, Constitution of India, 14th Edition, EBC, 2022.		
2. V. N. Tripathi, Constitution of India, 9th Edition, Premier Publishing Company, 2021.		
3. M. V. Pylee, India's Constitution, 18th Edition, S. Chand Publications, New Delhi, 2020.		
Online Learning Resources		
https://legislative.gov.in/constitution-of-india/		
nptel.ac.in/courses/129106003?utm		

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Course Information:								
Class, Semester	S. Y. B. Tech. Semester – III						Category	MA
Course Code, Course Title	2FTMA209– Aptitude and Reasoning Part - I						Type	T2
Prerequisites	–							
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self-Study	Credits	
	2	–		–		2	-	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE	
		-	50	-		-	-	
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:								
CO1	Apply quantitative aptitude concepts such as HCF & LCM, Vedic Mathematics, Ages, Percentage, Profit & Loss to solve numerical and real-time problem-solving tasks efficiently.							
CO2	Analyze and solve logical reasoning problems based on Number Series, Alphabet Series, Coding-Decoding, Cubes & Dice by applying systematic analytical approaches.							
CO3	Develop professional and career readiness skills through SWOT Analysis, understanding of Engineering Ecosystem, effective email writing, and essay writing techniques.							
CO4	Demonstrate logical thinking, decision-making ability, and personality development skills to enhance employability and professional effectiveness.							
Syllabus:								
Module	Contents							Lecture Hours
I	HCF &LCM Vedic Math							05
II	Number Series, Alphabet Series (Quant) Percentage							05
III	Profit &Loss Coding-Decoding							05
IV	Cubes &Dice SWOT Analysis							05
V	Introduction to Engineering Ecosystem Ages							04
VI	Email writing, Essay writing Logical Thinking Basics							05
Total Lecture Hours							30	
Text Books								
1) Quantitative Aptitude, R.S. Agarwal, S Chand Publications, 2019 Edition.								
2) Verbal & Non-Verbal Reasoning, R.S. Agarwal, S Chand Publications, 2010 Edition.								
3) Wren & Martin (Verbal, Grammar), P.C. Wren, S Chand Publications, 2017 Edition								

Reference Books

- 1) APTIPEDIA (Quantitative, Logical, Verbal Aptitude), FACE, Wiley Publications, 2017 Edition.
- 2) Wiley Quantitative Aptitude, P.A. Anand, Maestro Publications, 2015 Edition
- 3) Verbal Ability, Meenakshi Upadhyay (Arun Sharma Series), McGraw Hill Publications, 2020 Edition.


Member Secretary-BoS
Chairman-BoS
Member Secretary-AC
Chairman-AC

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Course Information:								
Class, Semester		S.Y. B.Tech, Semester - IV					Category	PC
Course Code, Course Title		2FTPC210, Processing of Fruits and Vegetable					Type	LIT1
Prerequisites		2FTPC205, Principles of Food preservation						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study	Credits
		3	-		2		3	4
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	50
Course Outcomes (s) : Upon successful completion of this course, the student will be able to:								
CO1	Describe production, composition, structure, maturity indices, and post-harvest scenario of fruits and vegetables.							
CO2	Explain post-harvest handling, minimal processing, and basic preservation techniques including blanching, canning, juice processing.							
CO3	Apply processing technologies for preparation of fruit and vegetable products such as jam, jelly, squash, ketchup, pickles, and RTS beverages.							
CO4	Analyze storage methods, preservation systems, product quality through experiments and sensory analysis.							
Syllabus:								
Module		Contents						Lecture Hours
I		Production and composition of Fruits and Vegetables Global and Indian scenario of fruits and vegetable production and processing. Scope and types of fruit and vegetable processing industry. Structure, composition, and development of fruits and vegetables. Maturity indices and harvesting importance. Quality evaluation at harvest.						08
II		Post-Harvest Handling and Minimal Processing Harvesting methods, physical characteristics, and grading. Ripening methods and control of ripening. Chemical and biochemical changes post-harvest. Primary processing: washing, sorting, grading, and pack house operations. Minimal processing: Size reduction: peeling, slicing, cubing, cutting. Minimal processing and its applications.						07
III		Processing and Preservation Techniques Basic principle of juice extraction, clarification and preservation. Blanching: Definition, operations, and equipment. Canning: Definition, processing steps, equipment, cans and containers, defects in canned products.						08
IV		Processing Technology of Fruits Technology of Juices, Jams, Marmalades, Jelly, Squashes, RTS, Nector, Syrup, toffee, Leather and other traditional products.						07

V	Processing Technology of Vegetables Preparation of chutney, pickles, syrup, sauce, puree, paste, ketchup, Dried leafy vegetables. Equipment and technology for the above processes.	08
VI	Storage and Preservation Methods Storage of fruit and vegetables - under ambient conditions, cold store, Zero emerge cool chamber, Freezing -Air blast, Fluidized bed and immersion freezer. Controlled and modified atmosphere storage - concepts and methods.	07
Total Lecture Hours		45

List of Experiments with Mapping

Sr. No	Title of the Experiment	CO Mapped
1	Primary processing of selected fruits and vegetables.	1, 2
2	Study and demonstration Canning of fruits	2
3	Preparation and sensory analysis of Jam.	2, 3
4	Preparation and sensory analysis of Jelly.	2, 3
5	Preparation and sensory analysis of marmalade.	2, 3
6	Preparation and sensory analysis of Squash.	2, 3
7	Preparation and sensory analysis of Pickle.	1, 3
8	Preparation and sensory analysis of tomato ketchup.	1, 3
9	Preparation and sensory analysis of Banana or potato wafers.	1, 3
10	Preparation of papain.	1, 3
11	Project-1: Dehydration of grapes.	1, 4
12	Project-2: To prepare and analyze quality of dehydrated powder of any vegetable	1, 4
Total Practical Hours		30

Minimum TEN experiments should be performed from the above list

Text Books

1. Chavan, U.D. and Patil, J.V., Industrial Processing of Fruits and Vegetables, 1st Edition, 2013.
2. Lal, G., Siddappa, G.S. and Tandon, G.L., Preservation of Fruits and Vegetables, 1st Edition, 1959.
3. Pandey, P.H., Post Harvest Technology of Fruits and Vegetables, 1st Edition, 1997.
4. Srivastava, R.P. and Kumar, S., Fruit and Vegetable Preservation: Principles and Practices, 1st Edition, 2002.

References:

1. Chakraverty, A., Mujumdar, A.S., Vijaya Raghavan, G.S. and Ramaswamy, H.S., Handbook of Post Harvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices, 1st Edition, 2003.
2. Cruess, W.V., Commercial Fruit and Vegetable Products, 1st Edition, 2004.
3. Hui, Y.H., Handbook of Fruits and Fruit Processing, 1st Edition, 2006.
4. Hui, Y.H., Chazala, S., Graham, D.M., Murrell, K.D. and Wai-Kit Nip, Handbook of Vegetable Preservation and Processing, 1st Edition, 2004.
5. Rajarathnam, S. and Ramteke, R.S., Advances in Preservation and Processing Technologies of Fruits and Vegetables, 1st Edition, 2011.


Member Secretary-BoS


Coordinator-BoS


Member Secretary-AC


Chairman-AC

Online Learning Resources

1. NPTEL Course on Novel Technologies for Food Processing and Shelf Life Extension – by Hari Niwas Mishra, IIT Kharagpur
https://onlinecourses-archive.nptel.ac.in/noc19_ar01/
2. NPTEL Course on Food Science and Technology – by Hari Niwas Mishra, IIT Kharagpur
https://onlinecourses.nptel.ac.in/noc26_ag05/preview
3. NPTEL Course on Fundamentals of Food Process Engineering – by Jayeeta Mitra, IIT Kharagpur
https://onlinecourses.nptel.ac.in/noc21_ag01/preview
4. NPTEL Course on Thermal Processing of Foods – by R. Anandalakshmi, IIT Guwahati
https://onlinecourses.nptel.ac.in/noc24_ch60/preview



Member Secretary-BOS



Chairman-BOS



Member Secretary-AC



Chairman-AC

 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology							
Course Information:								
Class, Semester		SY. B.Tech, Semester - IV					Category	PC
Course Code, Course Title		2FTPC211- Heat and Mass Transfer					Type	LIT1
Prerequisites		2FTPC203- Unit Operation						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study	Credits
		3	-		2		3	4
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	50
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1		Discuss fundamental heat transfer modes and laws relevant to food processing.						
CO2		Explain conduction and convection principles to analyze heat transfer in food systems.						
CO3		Apply radiation heat transfer and its applications in food processing operations.						
CO4		Evaluate evaporation processes and heat exchangers used in food industries.						
Syllabus:								
Module		Contents						Lecture Hours
I		Basics of Heat Transfer Introduction to heat transfer; Thermal Properties of Materials (Thermal conductivity (k) , Specific heat capacity (Cp) , Density (p) ,Thermal diffusivity (α)),Basic heat transfer mechanisms; Modes of heat transfer (conduction, convection, radiation); General heat transfer laws; Combined heat transfer modes; Applications in the food processing industry; Emerging trends in thermal processing.						08
II		Conduction Theory and mechanism of heat conduction; Fourier's law and derivation; One-dimensional steady-state conduction; Heat conduction with internal heat generation; Heat transfer through plane walls, composite walls, hollow cylinders, and spheres; Critical thickness of insulation; Properties and selection of insulating materials; Applications in food plants and cold storage.						08
III		Convection Fundamentals and classification of convection; Natural convection from vertical plates and horizontal cylinders; Forced convection in laminar and turbulent flow; Heat transfer in pipes and over flat plates; Empirical correlations for heat transfer coefficients (inside tubes, outside tubes, tube bundles, flow past spheres); Dimensionless numbers: Reynolds, Prandtl, Nusselt, Grashof, Graetz, and Peclet numbers; Industrial applications.						08
IV		Radiation Basic concepts of radiation; Radiation laws Stefan-Boltzmann, Kirchhoff, Wien, and Planck; Black body and gray body radiation; Radiation properties emissivity, absorptivity, reflectivity, transmissivity; Radiation heat exchange between surfaces; Applications in food drying, baking, and thermal processing.						08

V	Evaporation Principles of evaporation; Mass and energy balances; Factors affecting evaporation rate; Types of evaporators natural circulation, horizontal and vertical short-tube, long-tube, and forced circulation evaporators; Single and multiple-effect evaporators; Basics of evaporator design; Energy efficiency considerations; Industrial applications in dairy and food concentration.	08
VI	Heat Exchangers Classification of heat exchangers; Double pipe heat exchangers; Individual and overall heat transfer coefficients; Log Mean Temperature Difference (LMTD); Fouling factors and maintenance; Variable overall heat transfer coefficient; Shell-and-tube and plate heat exchangers; Selection criteria for food industry applications.	05
Total Lecture Hours		45

List of Experiment with CO Mapping

Sr. No.	Title of the Experiment	CO Mapped
1	Study of heat transfer analysis during conduction.	1,2
2	Study of heat transfer through composite wall.	1,2
3	Study of thermal conductivity of insulating powder	1,2
4	Study of heat transfer by Natural convection apparatus	1,2
5	Study of heat transfer by Forced convection apparatus	1,2
6	Study of radiation heat transfer through Stefan Boltzmann's apparatus.	3
7	Determination of overall Heat transfer coefficient by using Shell and tube heat exchanger.	4
8	Study of heat transfer rate in plate heat exchanger.	4
9	Determination of heat transfer through agitated vessel apparatus.	1,4
10	Determination of overall Heat transfer coefficient by using Double pipe heat exchanger	4
Total Practical Hours		30

Minimum TEN experiments should be performed from the above list

Text Books

1. Frank P. Incropera, David P. DeWitt, Theodore L. Bergman, Adrienne S. Lavine Fundamentals of Heat and Mass Transfer, Wiley India, 8th Edition, 2018
2. William S. Janna, Engineering Heat Transfer, 3rd Edition, 2018
3. S.P. Venkateshan, Heat Transfer, 3rd Edition, 2021.
4. Jean-Paul Duroudier, Heat Transfer in the Chemical, Food and Pharmaceutical Industries, 1st Edition – 2016.

References:

1. McCabe, Smith & Harriott, Unit Operations of Chemical Engineering, 7th Edition, 2004.
2. Simoes-Moreira & Zavaleta-Aguilar, Heat Transfer: An Engineering Course, 1st Edition, 2025.
3. Donatello Annaratone, Engineering Heat Transfer, 1st Edition, 2018.
4. Herbert Callen, Thermodynamics and an Introduction to Thermo statistics, 2nd Edition, 1985.

Online Learning Resources

1. NPTEL Heat Transfer Course (IIT Bombay)
<https://nptel.ac.in/courses/103101137>
2. Springer Heat Transfer textbook collection
<https://link.springer.com/series/4247/books?page=2&srsltid=AfmBOoodTMj0SVNlsoaZmKZ1F52qvQ9bUJkKgfalLwQ7RORpd9CCI7L>
3. CRC Press Heat Transfer Book Series
<https://www.routledge.com/Heat-Transfer/book-series/CRCHEATTRANS>

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Course Information:									
Class, Semester		SY. B.Tech, Semester - IV					Category	PE	
Course Code, Course Title		2FTPE212 – Professional Elective-I , Food Safety & Quality Management					Type	T1	
Prerequisites		-							
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study		Credits
		3	-		-		3		3
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			40	20	40		-	-	
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:									
CO1		Explain food safety concepts, types of hazards, regulatory frameworks including Food Safety and Standards Authority of India relevant to the food industry.							
CO2		Demonstrate understanding of quality management systems and tools such as GMP, GHP, HACCP, PDCA cycle, and basic Six Sigma principles in food industries.							
CO3		Apply food safety management practices including HACCP implementation and quality control tools in food processing, packaging, and supply chain operations.							
CO4		Analyze food quality parameters (sensory, physical, chemical, and microbiological) and evaluate risks related to contamination, spoilage, and food safety issues.							
Syllabus:									
Module		Contents						Lecture Hours	
I		Introduction to Food Safety and Quality Food safety: Definition, concept and importance; Food quality and food safety concepts; Types of food hazards – Biological (bacteria, viruses, parasites), Chemical (pesticides, additives, toxins), Physical (foreign materials); Food safety issues in India and global scenario; Introduction to food safety regulations and standards (FSSAI – Food Safety and Standards Authority of India).						07	
II		Quality Management Systems Quality management: Definition, principles and importance; Total Quality Management: concept and applications in food industry; Quality Assurance (QA) and Quality Control (QC) – differences and roles; Quality tools – PDCA Cycle (Plan-Do-Check-Act), basics of Six Sigma (defect reduction approach); Documentation, record keeping and standardization in food industries.						08	
III		Food Safety Management Systems Good Manufacturing Practices (GMP): Principles and requirements; Good Hygiene Practices (GHP): Personal hygiene, plant hygiene; Sanitation Standard Operating Procedures (SSOP): Cleaning and sanitation protocols; Hazard Analysis and Critical Control Point (HACCP): Concept, 7 principles, 8 steps in implementation, identification of Critical Control Points (CCPs); Application of HACCP in food industry.						08	

Member Secretary-BoS

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Member Secretary-AC

Chairman-AC

IV	Food Quality Evaluation Sensory evaluation: Definition, importance and methods – Difference tests, Descriptive tests, Affective tests; Physical quality parameters – color, texture, viscosity; Chemical quality parameters – moisture content, pH; Microbiological quality evaluation – microbial load and safety; Instrumental methods for food quality analysis (colorimeter, texture analyzer).	07
V	Food Safety in Processing and Supply Chain Food safety during processing operations; Safety aspects in packaging and storage; Transportation and distribution safety; Traceability systems: Concept and importance; Product recall procedures; Food safety in retail, catering and street food sectors.	07
VI	Emerging Trends in Food Safety Food safety risk analysis: Risk assessment, risk management and risk communication; Food fraud and adulteration: Types and detection; Food safety standards and certifications – FSSAI, ISO 22000 (Food Safety Management System), APEDA and MOFPI; AGMARK, HACCP certification; Role of regulatory bodies (FSSAI); Digital tools in food safety management.	08
Total Lecture Hours		45

Text Books

1. P. J. Fellows, Food Processing Technology: Principles and Practice, 5th Ed., Woodhead Publishing (Elsevier), 2022
2. Srinivasan Damodaran and Kirk L. Parkin, Fennema's Food Chemistry, 5th Ed., CRC Press, 2017
3. W. C. Frazier and D. C. Westhoff, Food Microbiology, 5th Ed., McGraw-Hill Education, 2013
4. Yasmine Motarjemi and Huub Lelieveld, Food Safety Management: A Practical Guide for the Food Industry, 1st Ed., Academic Press (Elsevier), 2014
5. Intez Ali, Food Quality Assurance: Principles and Practices, 1st Ed., CRC Press, 2003

References:

1. Codex Alimentarius Commission (FAO/WHO), General Principles of Food Hygiene (CXC 1-1969, Latest Revision)
2. Ramesh C. Chandan and Arun Kilara, Dairy Processing and Quality Assurance, 2nd Ed., Wiley-Blackwell, 2015
3. William H. Sperber and Richard F. Stier, Principles and Practices for the Safe Processing of Foods, 1st Ed., Elsevier, 2009
4. Food and Agriculture Organization (FAO), Food Safety and Quality Systems in Developing Countries, FAO Publications, Latest Edition

Online Learning Resources

1. NPTEL / SWAYAM Course on Food Safety and Quality Control By Dr. V. Vijaya Lakshmi | The English and Foreign Languages University (EFLU)
https://onlinecourses.swayam2.ac.in/cec23_ag10/preview
2. NPTEL / SWAYAM Course on Food Microbiology and Food Safety By Dr. Tejpal Dhewa | Central University of Haryana
https://onlinecourses.swayam2.ac.in/cec25_ge05/preview

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Course Information:								
Class, Semester		SY. B.Tech, Semester - IV				Category	PE	
Course Code, Course Title		2FTPE213, Professional Elective-I, Nutrition				Type	T1	
Prerequisites		—						
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self Study	Credits	
		3	-		-	3	3	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1	Explain the fundamental concepts of food, nutrition, and their relationship with health processing.							
CO2	Analyze the nutritional requirements for individuals across different age groups.							
CO3	Examine the processes of digestion, absorption, and metabolism of nutrients.							
CO4	Design appropriate therapeutic diets for various diseases.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Basic terms used in study of food and nutrition Understanding relationship between food, nutrition and health Functions of food - Physiological, psychological and social, Nutrient Functions, dietary sources and clinical manifestations of deficiency/excess of the following nutrients: Carbohydrates, lipids and proteins Fat soluble vitamins - A, D, E and K Water soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and Vitamin C Minerals – calcium, iron and iodine, Malnutrition, Potentially toxic substance in human food, Blood constituents.						07	
II	Carbohydrates and Lipids: Role of Carbohydrates, Dietary Fiber, Resistant Starch, Carbohydrates as Prebiotics, Glycemic Index and Load: Importance in dietary planning ,Role of Lipids: Nutritionally important lipids, physiological functions ,Digestion and Absorption of Lipids , Essential Fatty Acids						07	
III	Proteins and Amino Acids: Role of Proteins: Essential/non-essential amino acids, complete/incomplete proteins, limiting amino acid, complementary proteins ,Physiological Functions, Daily Protein Requirements, Digestion, Absorption, and Utilization of Proteins, Protein Deficiency (PEM/PCM), Protein Quality: Concept and estimation methods (in vitro and in vivo).						07	
IV	Micronutrients and Water: Role of Micronutrients: Vitamins and minerals, physiological roles, deficiency diseases, food sources, Factors Affecting Bioavailability and RDA's, Role of Water in Nutrition.						08	

V	Nutrition during different age Groups: The adult years (Above 20 years), Physiological changes, RDA, nutritional guidelines, nutritional concerns and Healthy food choices ,Pregnant woman, Lactating mother, Elderly, Nutrition during childhood (Under20 years) Growth and development, growth reference/standards, RDA, Nutritional guidelines, nutritional concerns and healthy food choices in: Infants, Preschool children, Schoolchildren, Adolescents.	08
VI	Principles of nutrition care: Therapeutic adaptations of the normal diet, Progressive diets – clear fluid, full fluid, soft and regular, Clinical features and nutritional management of Infections nutritional management of Type 1 and Type 2 Diabetes Mellitus, Metabolic Syndrome, Hypertension and Coronary Heart Disease, Food allergy and food intolerance, Nutraceuticals and nutrigenomics, personalized diet.	08
Total Lecture Hours		45
Text Books		
1. Swaminathan M, Advanced Text Book on Food & Nutrition (Volume I and II) The Bangalore Printing and Publishing Co.Ltd, Bangalore. 2006		
2. Wardlaw, Smith. Contemporary Nutrition: A Functional Approach. 2 nd Edition, 2012		
3. L. K. Mahan and S. Escott-Stump, Textbook of Nutrition and Dietetics, 13th Ed., Phoenix Publishing House Pvt. Ltd., 2013.		
4. K. Khanna, S. Gupta, R. Seth, S. J. Passi, R. Mahna and S. Puri, Dietetics, 4th Ed., Elite Publishing House Pvt. Ltd., 2013.		
References:		
1. J. Mann and S. Truswell, Essentials of Human Nutrition, 2nd Ed., Oxford University Press, 2002.		
2. M. J. Gibney, S. A. Lanham-New, A. Cassidy and H. H. Vorster, Introduction to Human Nutrition, 2nd Ed., Wiley-Blackwell, UK, 2009.		
3. G. W. Taylor, Nutrition and Health, 1st Ed., Taylor & Francis, London, 2002.		
4. J. Mann and S. Truswell, Essentials of Human Nutrition, 2nd Ed., Oxford University Press, 2002.		
Online Learning Resources		
1. NPTEL Sports and Performance Nutrition (IIT Madras) https://onlinecourses.nptel.ac.in/noc24_hs82/preview		
2. NPTEL Nutrition, Therapeutics and Health (NM), IIT Kanpur https://nptel.ac.in/courses/126104004		

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Course Information:								
Class, Semester		SY. B.Tech, Semester - IV					Category	PE
Course Code, Course Title		2FTPE214 –Professional Elective –I, Industrial Microbiology					Type	T1
Prerequisites		2FTPC202-Food Microbiology						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self-Study	Credits
		3	-		-		3	3
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1		Describe the fundamental concepts, Scope, industrial significance of microbiology and microbial applications.						
CO2		Explain the characteristics and industrial applications of industrially important microorganisms.						
CO3		Apply principles of fermentation and microbial growth kinetics in industrial production processes.						
CO4		Demonstrate upstream and downstream processing operations used in industrial microbiology.						
CO5		Analyze quality control systems, and regulatory practices for industrial microbial products to ensure product quality and safety.						
Syllabus:								
Module		Contents						Lecture Hours
I		Industrial Microbiology – Overview & Strain Development: Scope and importance of industrial microbiology (food, pharma, biotech industries), Primary and secondary metabolites, Characteristics of industrially important microorganisms, Screening and selection of industrial strains, Strain improvement techniques: mutation and basic genetic approaches.						07
II		Industrial Microorganisms and Culture Maintenance ,Industrial microorganisms: Bacteria: <i>Bacillus</i> , <i>Lactobacillus</i> Actinomycetes: <i>Streptomyces</i> , Yeasts: <i>Saccharomyces cerevisiae</i> , Molds: <i>Aspergillus</i> , <i>Penicillium</i> , Functional roles in industrial production, Culture maintenance and preservation: Subculturing, refrigeration, Lyophilization, cryopreservation.						07
III		Fermentation Technology and Bioreactors: Types of fermentation: batch, fed-batch, continuous, Submerged and solid-state fermentation, Basic design and components of bioreactors, Aeration and agitation systems, Monitoring and control (pH, temperature, dissolved oxygen), Scale-up principles.						08
IV		Upstream Processing: Raw materials and media formulation, Sterilization of media and equipment, Inoculum development, Process optimization, Contamination control.						07
V		Downstream Processing and Product Recovery: Biomass separation: filtration, centrifugation, Cell disruption methods, Extraction and purification, Chromatography (basic concept), Product formulation and stabilization.						08

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	Effluent treatment and waste management.	
VI	Industrial Products, Quality Control & Regulations: Production of: Antibiotics (Penicillin), Enzymes (Amylase, Protease), Organic acids (Citric acid, Lactic acid), Alcohol and fermented beverages, Single Cell Protein (SCP), biofertilizers, biopesticides, Quality control and assurance (QA/QC), Good Manufacturing Practices (GMP), Biosafety and industrial safety, Regulatory guidelines (national & international).	08
Total Lecture Hours		45
Text Books		
1. P. F. Stanbury, A. Whitaker and S. J. Hall, Principles of Fermentation Technology, 3rd Ed., Elsevier Butterworth-Heinemann, 2017.		
2. L. E. Casida Jr., Industrial Microbiology, Reprint Ed., New Age International (P) Ltd., 2021.		
3. M. J. Wailes, N. L. Morgan, J. S. Rockey, G. Highton, Industrial Microbiology: An Introduction, Reprint Edition, Wiley-Blackwell, 2020.		
References:		
1. Pauline M. Doran, Bioprocess Engineering Principles, 2 nd Edition (Reprint), Academic Press, 2020		
2. Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton, Prescott's Microbiology, 11th Edition, McGraw-Hill Education, 2020.		
3. Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley, W. Matthew Sattley, Brock Biology of Microorganisms, 16 th Edition, Pearson, 2021.		
4. James M. Jay, Modern Food Microbiology, 7 th Edition (Reprint), Springer, 2020.		
5. William C. Frazier, Dennis C. Westhoff, Food Microbiology, Reprint Edition, Tata McGraw-Hill, 2020.		
Online Learning Resources		
1. NPTEL: https://nptel.ac.in		
2. SWAYAM: https://swayam.gov.in		
3. Coursera: https://www.coursera.org		


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Course Information:								
Class, Semester		SY. B.Tech, Semester - IV					Category	MM
Course Code, Course Title		2FTFP215 – Multidisciplinary Minor-I, Fundamentals of Food Process Engineering					Type	LIT2
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study	Credits
		3	-		2		3	4
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1	Describe the basic concepts of food, including its classification, composition, functions, sources, and perishability.							
CO2	Explain the basic principles and methods of food processing and preservation, including traditional preservation techniques.							
CO3	Explain the basics of food microbiology, including microbial growth, food spoilage, and foodborne diseases.							
CO4	Apply emerging food processing technologies such as Pulse Electric Field (PEF), High Pressure Processing (HPP), ultrasound, membrane processing, and hurdle technology for food preservation.							
CO5	Perform the processing of milk, fruits, and vegetables to prepare value-added food products using suitable processing methods							
Syllabus:								
Module	Contents							Lecture Hours
I	Introduction to Food Food: Definition and Functions, Classification of food groups, sources, types and perishability of foods, Functional food groups-energy yielding, body building and protective foods, Food Pyramid.							07
II	Introduction to Food Processing Food processing: Introduction, Definition, Production and processing scenario of fruits and vegetables in India and World, scope and importance; levels and techniques.							08
III	Food preservation and processing Objectives and techniques of food preservation, methodology, principles and methods of food preservation (Traditional and modern), Preservation by salt and sugar, Methods of food preservation, Scope and benefit of food preservation.							08
IV	Introduction to Food Microbiology Introduction to microbiology and its significance in foods; beneficial organisms; Major groups of microorganisms - bacteria, yeasts, molds and viruses. Causes and types of food spoilage, growth curve, Factors affecting the growth of bacteria – Temperature, Oxygen, pH, Food borne illness: Bacterial & Non-bacterial food borne illness							07
V	Recent methods in processing Pulse Electric Field (PEF), High Pressure Processing (HPP), ultrasound, dielectric heating, ohmic heating; infrared heating; Ultraviolet, Membrane processing, Hurdle technology. etc.							8

VI	Introduction to milk and milk products and Fruits and Vegetables products Chemical composition, types of milk, Use of milk in formulated foods, Technology of milk and milk products (flavored milk, shrikhand, Paneer, Khoa). F&V Products, Jams, Marmalades, Jelly, Squashes, Cordial, RTS, Nector, Syrup, toffee and other traditional products.	7
Total Lecture Hours		45
List of Experiments with CO Mapping		
Sr. No	Title / Topic of the Experiment	CO Mapped
1	Demonstration of various perishable food items and degree of spoilage	1
2	Studies on Blanching of selected food items	2
3	Preservation of food by high concentration of sugar: Preparation of Jam	2
4	Preparation and sensory analysis of Jelly.	4
5	Preparation and sensory analysis of marmalade.	4
6	Sterilization and Disinfection of lab equipments and Glassware	3
7	Preservation of food by using natural preservatives	2
8	Determination of total sugar in food	3
9	Determination of Drying to fruit slices and green leafy vegetables in Tray drier,	2
10	Preparation and sensory analysis of Banana and potato wafers.	4
11	Preparation and sensory analysis of tomato ketchup.	4
Total Practical Hours		30
Minimum TEN experiments should be performed from the above list		
Text Books		
1. N.Shakuntala Manay, M. Shadakshara Swamy, Food facts and Principle, 3 rd , New age international Publications, 2021		
2. P. J. Fellows, Food Processing Technology: Principles and Practice, 4 th , Woodhead Publishing (Elsevier), 2017.		
3. Sukumar De, Outline of Dairy Technology, Latest Reprint (based on 1 st Ed.), Oxford University Press, 2025.		
4. Salunkhe D.K. and Kadam S.S. Handbook of Fruits Science and Technology: Production, Composition, Storage and Processing. CRC press, 1995.		
5. Srinivasan Damodaran, Kirk L. Parkin, Fennema's Food Chemistry, 5 th Edition, CRC Press, 2017.		
References:		
1. Norman N. Potter, Joseph H. Hotchkiss, Food Science, 5 th Edition, Springer, 2012		
2. I.S. Singh, Handbook of Fruit and Vegetable Processing, " , Sinha and Hui, 2010		
3. C. M. D. Man, Principles of Food Preservation, Latest Edition, Springer, 2015		
Online Learning Resources		
1. NPTEL Course on Functional Foods and Nutraceuticals By Dr Rekha Sharma UGC - Malaviya Mission Teacher Training Centre, Rashtrasant Tukadoji Maharaj Nagpur University https://onlinecourses.swayam2.ac.in/cec25_ag06		
2. NPTEL Course on MVP-001: Food Fundamentals and Chemistry By Dr. Mita Sinhamahapatra Indira Gandhi National Open University, New Delhi https://onlinecourses.swayam2.ac.in/nou25_ge83/preview		
3. Coursera-Courses on nutrition, metabolism, food science		

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Course Information:										
Class, Semester		S. Y. B. Tech. Semester - IV					Category	HS		
Course Code, Course Title		2FTHS217, Foreign Language-German					Type	T2		
Prerequisites		-								
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self-Study		Credits	
		2	-		-		2		2	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE		
			-	50	-		-	-		
Course Outcomes (Cos): Upon successful completion of this course, the student will be able to:										
CO1	Apply basic German vocabulary and grammar to construct simple sentences for daily communication.									
CO2	Demonstrate listening and speaking skills by participating in basic conversations, introductions, and routine interactions in German.									
CO3	Read and interpret short German passages, notices, and dialogues to extract relevant information.									
CO4	Write simple German texts such as greetings, self-introductions, short messages, and basic descriptions using appropriate sentence structures.									
CO5	Use German language skills in academic and professional contexts with correct pronunciation and culturally appropriate expressions.									
Syllabus:										
Module		Contents							Lecture Hours	
The German Language Course shall be conducted in three phases: 1. Pre-Term Phase Duration: One Week Mode: Offline Total Hours: Approximately 25 Hours Conducted before commencement of the regular semester. 2. In-Term Phase Duration: During Academic Semester Mode: Offline Total Hours: 30 Hours through Academic Timetable Approximately 20 Hours through Working Saturdays. 3. Post Academic / Online Learning Phase Mode: Online Total Hours: Approximately 25 Hours Sessions may be conducted after regular academic hours or during holidays. 4. Total Learning Hours Total duration of the course shall be approximately 100 Hours. Students completing the required hours and evaluation criteria shall become eligible for beginner-level certification examination. Evaluation : In-Semester Evaluation (ISE) activities may include but limited to: • Oral assessment • Assignments • Practical activities										

- Practical activities
- Online/Offline tests
- Trainer assessment
- Presentations
- Role Play

Note: Trainers shall plan 2-3 ISE activities before the conclusion of teaching for the respective term. The Course Coordinator shall assist the trainers in documenting the activities as per the institutional format requirements



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Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV				Category	HS	
Course Code, Course Title		2FTHS218, Foreign Language - Japanese				Type	T2	
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study		Credits
		2	--		--	2		2
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			--	50	--		--	--
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:								
CO1	Communicate in basic scenarios using familiar everyday expressions to make greetings, introduce themselves and others, and ask or answer questions about personal details.							
CO2	Navigate daily life situations by ordering food, asking for simple directions, using public transportation, and making basic purchases at stores.							
CO3	Discuss routines and interests by talking simply about daily schedules, hobbies, past weekend activities, and future desires such as travel plans.							
CO4	Read and write basic Japanese by recognizing and reading Hiragana, Katakana, and a few high-frequency Kanji used in daily life.							
CO5	Demonstrate understanding of Japanese cultural context by applying basic Japanese social etiquette in workplaces, public spaces, and casual settings.							
Syllabus:								
UNIT	Contents						Lecture Hours	
MODULE 1 - PRE-TERM								
I	Introduction to Japanese Language and Culture • Overview of Japanese language and culture • Japanese writing systems: Hiragana, Katakana, Kanji • Basic pronunciation and phonetics • Greetings according to time of day • Classroom and workplace expressions • Asking for repetition and clarification • Basic etiquette and manners						10	
II	Self-Introduction and Personal Information • Introducing oneself and others • Name, nationality, occupation, and residence • Family members • Languages spoken • Basic sentence patterns • Introduction to Hiragana writing practice						10	

III	Hiragana and Katakana Mastery • Complete Hiragana characters • Complete Katakana characters • Reading and writing practice • Simple words and phrases • Listening and pronunciation exercises • Everyday vocabulary development	10
MODULE 2 - IN-TERM		
IV	Food and Dining • Food and beverage vocabulary • Expressing likes and dislikes • Reading simple menus • Ordering food and drinks • Restaurant conversations • Japanese dining etiquette	10
V	Home, Family and Surroundings • Describing houses and rooms • Household objects and furniture • Family relationships • Location expressions • Counting objects and people • Describing surroundings	10
VI	Daily Life and Time Expressions • Telling time • Days, dates, and months • Daily routines • Operating hours and schedules • Borrowing and lending items • Making simple appointments	10
VII	Hobbies, Interests and Social Interaction • Hobbies and leisure activities • Sports, movies, music, manga, and anime • Inviting friends • Accepting and declining invitations • Expressing preferences and interests • Social conversations	10
MODULE 3 - SELF STUDY		
VIII	Transportation and Navigation • Public transportation vocabulary • Trains, buses, stations, and landmarks • Asking for directions • Giving simple directions • Understanding signs and notices • Travel-related conversations	10

IX	Shopping and Everyday Transactions • Shopping vocabulary • Asking for products and prices • Quantities and measurements • Locating items in stores • Purchasing goods • Customer-service interactions	10
X	Holidays, Experiences and Future Plans • Talking about past weekend activities • Introduction to simple past tense • Expressing wishes and desires • Travel plans and future intentions • Introduction to frequently used Kanji • Course review and consolidation • Speaking role-plays and presentations • Reading and writing assessment	10
Total Lecture Hours		100
Text Books		
1. Irodori : Japanese for life in Japan (A1), The Japan Foundation, 2020		
Reference Books		
1. Marugoto Starter (A1) Katsudoo + Rikai (2 Books set) https://amzn.in/d/076ApBbW		
2. Genki: An Integrated Course in Elementary Japanese Vol. 1 [3rd Edition] https://amzn.in/d/0gXGM2Ef		
3. Minna no Nihongo 1-1&1-2 Main Textbook elementary +Translation & Grammatical with downloadable CDs. https://amzn.in/d/0dyQ9ips		

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Course Information:								
Class, Semester		S. Y. B. Tech. Semester -IV					Category	HS
Course Code, Course Title		2FTHS219, Psychology					Type	T2
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self-Study	Credits
		1	--		--		1	1
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	50	-		-	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:								
CO1	Identify the basic concepts of decision making, emotional intelligence, and procrastination from given real-life situations with appropriate accuracy.							
CO2	Differentiate between effective and ineffective thinking patterns, emotional responses, and time-management behaviors in structured scenarios with logical reasoning.							
CO3	Apply suitable psychological strategies for decision making, emotional regulation, and task management in case-based scenarios.							
CO4	Analyze the influence of cognitive biases, emotions, distractions, and mindset on personal and academic performance.							
CO5	Select appropriate behavioral and self-management techniques from given practical situations to effectively improve focus, interpersonal understanding, and productivity.							
Syllabus:								
Module	Contents							Lecture Hours
I	Smart Thinking & Decision Making 1. What is decision making 2. Importance in engineering/management 3. Common mistakes (3 biases only) 4. Fast Vs Slow thinking 5. Good enough vs perfect decision 6. Six Thinking Hats (application) 7. Individual vs group decision making 8. Growth Mindset vs Fixed Mindset 9. Decision making in real-life situations							05
II	Understanding Emotional Intelligence 1. Understanding emotions and importance 2. EI vs IQ 3. 5 Domains of EI 4. Emotional Intelligence and Personality							03

III	Emotional Regulation & Interpersonal Skills 1. Impulse control (self-regulation) 2. Handling criticism (self-management) 3. Empathy and altruism (social awareness) 4. Assertiveness (relationship management)	03
III	Procrastination 1. Introduction and definition of procrastination 2. Why do we procrastinate 3. Time management myths 4. Distractions and attention 5. Techniques to beat procrastination	04
Total Lecture Hours		15
Reference Books		
1. Thinking, Fast and Slow, Daniel Kahneman, Penguin Books, 2011		
2. Emotional Intelligence: Why It Can Matter More Than IQ, Daniel Goleman, Bantam Books, 1995		
3. Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones”, James Clear, Avery, 2018		
4. Deep Work: Rules for Focused Success in a Distracted World, Cal Newport, Grand Central Publishing, 2016		
5. The Power of Habit: Why We Do What We Do in Life and Business, Charles Duhigg, Random House, 2012		
6. Nudge: Improving Decisions About Health, Wealth, and Happiness, Richard H. Thaler & Cass R. Sunstein, Penguin Books, 2008		
7. The 7 Habits of Highly Effective People, Stephen R. Covey, Free Press, 1989		
NPTEL and Online Resources		
You tube Channels:		
1. https://www.youtube.com/watch?v=D2y1QGC1zMw		
2. https://www.youtube.com/watch?v=33d61cpRf0g		
3. https://www.youtube.com/watch?v=b6FpfGiENPo		
4. https://www.youtube.com/watch?v=YLhGgef7SvA		
5. https://www.youtube.com/watch?v=TOFjyidtp5w		

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Course Information:							
Class, Semester	S.Y.B.Tech, Semester-IV					Category	HS
Course Code, Course Title	2FTHS220, Environmental Studies					Type	T2
Prerequisites	----						
Teaching Scheme (per week)	Lecture	Tutorial	Practical		Self-Study	Credits	
	2	--	-		2	2	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	50	-		-	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:							
CO1	Explain environmental systems, population dynamics, natural resources, and sustainability concepts.						
CO2	Explain the Sustainable Development Goals (SDGs) and their significance in engineering for sustainable development.						
CO3	Apply pollution concepts to identify sources, impacts, and suitable control measures for air, water, soil, and noise pollution.						
CO4	Apply principles of climate change mitigation and adaptation, renewable energy, waste management, and environmental governance to recommend sustainable engineering practices.						
Syllabus:							
Module	Contents						Lecture Hrs.
I	Environmental Systems, Population, and Resource Use: Components of environment and earth systems, Population growth, urbanization, and industrial development, Natural resources: water, energy, land, minerals, Resource depletion, carrying capacity, and environmental stress, Human-environment interactions and sustainability challenges.						05
II	Sustainable Development Goals (SDGs) and Engineering Responsibility: Evolution of sustainable development concept, Overview of 17 Sustainable Development Goals and key targets, Inter linkages among SDGs (water-energy-food-climate nexus), SDGs relevant to engineering disciplines, Role of engineers in achieving SDGs.						05
III	Pollution Science and Environmental Quality: Air pollution: sources, types, impacts, and control overview, Water pollution: indicators, standards, reuse and recycling, Soil pollution: contamination sources and remediation concepts, Noise pollution: sources, measurement, impacts, and mitigation.						05
IV	Climate Change – Science, Mitigation, and Adaptation: Greenhouse effect and climate change science, Evidence of climate change and observed impacts, Mitigation strategies: technology, energy transition, efficiency, Adaptation strategies: climate-resilient infrastructure and planning, Role of engineers in climate action.						05
V	Renewable Energy and Sustainable Technologies: Overview of renewable energy technologies, Solar energy (PV and thermal systems), Wind energy systems, Hydropower, geothermal, ocean energy, Bioenergy and waste-to-energy, Comparative assessment of renewable technologies.						05

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VI	Waste Management, and Environmental Governance: Solid waste management and E-waste management, Life Cycle Assessment (LCA): concept and applications, Environmental policies and legislation (India and global overview), Environmental Impact Assessment (EIA), Ethics and professional responsibility of engineers	05
Total Lecture Hours		30
Text Books:		
1. Singh, J. S., Singh, S. P., Gupta, S. R., and Singh, R. Ecology, Environmental Science and Conservation. 2nd Edition. S. Chand Publishing, 2025.		
2. Bharucha, E. Environmental Studies for Undergraduate Courses. 4th Edition. Universities Press (India) Pvt. Ltd. 2025.		
3. Cunningham, W.P., & Cunningham, M.A., Environmental Science: A Global Concern, 15th Edition, McGraw-Hill Education, New Delhi, 2020.		
4. Rathoure, V.C., Fundamentals of Environmental Studies, 2nd Edition, Tata McGraw-Hill Education, New Delhi, 2019		
5. Singh, J.S., & Singh, S.P., Environmental Science: An Integrated Approach, 5th Edition, Jones & Bartlett Learning, 2019		
6. Kaushik, A., & Kaushik, C.P., Perspectives in Environmental Studies, 5th Edition, New Age International Publishers, New Delhi, 2018.		
References:		
1. Trivedi, R.K., & Goel, P.K., An Introduction to Environmental Biology, 1st Edition, University Book House, Jaipur, 2018.		
2. Odum, E.P., Fundamentals of Ecology, 5th Edition, Cengage Learning, 2017.		
3. Dash, M.C., Fundamentals of Ecology, 4th Edition, McGraw-Hill Education, New Delhi, 2016.		
Online Learning Resources		
https://www.youtube.com/watch?v=MtpxOdtS9KU&list=PL3qvHcrYGylu2egw2tipHWODV6eIVC2Gg		
https://niti.gov.in/divisions/division/sustainable-development-goal		
https://sdgs.un.org/goals		
https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_de04		



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Department of Food Technology

ADCEET

Course Information:

Class, Semester	S. Y. B. Tech. Semester - IV					Category	RM
Course Code, Course Title	2FTRM221, Research Methodology					Type	L2
Prerequisites	--						
Teaching Scheme (per week)	Lecture		Tutorial		Practical	Self-Study	Credits
	-		-		2	-	1
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	-	-		50	-

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:

CO1	Utilize fundamental concepts of research, research problems, literature sources, and research methodologies for engineering applications under given research scenarios.
CO2	Apply appropriate research design, sampling techniques, and data collection methods to conduct systematic research studies under given problem statements.
CO3	Analyze research data using qualitative, quantitative, statistical, and hypothesis testing techniques under given research scenarios.
CO4	Develop a technical research article with ethical publication practices, appropriate referencing standards, and quality research guidelines.

Syllabus:

Module	Contents	Lecture Hours
I	Research Fundamentals Meaning and objectives of research, Significance of research, Types of research, Research process, Criteria of Good Research, Importance of Research in Engineering	04
II	Research Problem & Literature Review Meaning of Research Problem, Identification & Formulation of research Problem, Techniques for defining Research Problem, Literature Sources: Journals, Conferences, Patents, Use of Digital Libraries, Literature Review techniques and gap identification.	05
III	Research Design & Methodology Need & Features of Good Research Design, Types of Research Design: Exploratory, Descriptive, Experimental, Sampling Techniques. Data Collection: Types of Data: Primary, Secondary, Methods of Data Collection: Survey, Questionnaire, Interview, Observation, Experimentation	06
IV	Data Analysis & Testing of Hypothesis Types of data: Qualitative and Quantitative, Basic statistical tools: Mean, Median, Standard Deviation, Data representation: Tables, Graphs, Charts, Introduction to analysis tools, Interpretation of results, Hypothesis, Basic concepts concerning testing of hypothesis, Procedure for hypothesis testing, Flow diagram of hypothesis testing, Test of hypothesis, Hypothesis testing of Means, Hypothesis testing for differences between Means.	05

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V	Report Writing Introduction Technical Report Writing and tools (Latex), Significance of report writing, Steps in writing report, Types of reports, Layout and structure of reports, Documentation and Referencing Styles, Presentation Tools & Techniques: Zotero & Mendeley.	04
VI	Research Journals and Publication Ethics Research Journals, Types of Journals, Research Publication Process, Journal Indexing: Meaning and Importance of Journal Indexing, Benefits of Indexed Journals, Major Indexing Databases, (Scopus, Web of Science, Google Scholar, SCI, ESCI, and PubMed), Journal Metrics and Quality Indicators: Impact Factor, h-index, i10-index, CiteScore, SNIP and SJR, Types of Publications, Ethics in Research Publication: Plagiarism and Similarity Index (Turnitin Software), Copyright and Authorship, Duplicate Publication, Clone, Predatory, and Fake Journals, Researcher Profiles and Identifier (ORCID, Researcher ID)	06
Total Lecture Hours		30
Text Books		
1. Research Methodology–Methods and Techniques by C. R. Kothari, Second Edition, New Age International Publishers		
2. Dr. Santosh M Nejakar, Dr. Harish Bendigeri “Research Methodology and Intellectual Property Rights”, ISBN 978-93-5987-928-4, Edition: 2023-24		
Reference Books		
1. Research Methodology Concept and cases By Deepak Chawala and Neena Sondhi		
2. Research Methodology: Step by step guide for beginners, Ranjeet Kumar, 5 th Edition, SAGE Publications		
3. How to Write and Publish a Scientific Paper, Robert A. Day, Barbara Gastel, 8 th Edition: 8th Edition, Cambridge University Press		
NPTEL and Online Resources		
1. https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed28		
2. https://onlinecourses.swayam2.ac.in/e-learning/course/nou26_ge46		

Note: For the smooth and effective execution of this course, the department shall allocate 02 lecture hours in the respective timetables in place of practical hours as per the resolution passed in STT meeting.

ISE Activities

1. Conduct a literature review in the selected domain, identify the research gap, and submit a Literature Review Report.
2. Prepare and submit a Technical Article on the chosen topic based on the literature review.

 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashita - 416301, Dist. :Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Food Technology						
Course Information:							
Class, Semester	S. Y. B. Tech. Semester – IV					Category	MA
Course Code, Course Title	2FTMA222, Aptitude and Reasoning Part - II					Type	T2
Prerequisites	---						
Teaching Scheme (per week)	Lecture	Tutorial			Practical	Self-Study	Credits
	2	-			-	2	-
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	50	-		-	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:							
CO1	Apply quantitative aptitude concepts such as Partnership, Average, and Syllogism to solve numerical and logical problems effectively.						
CO2	Analyze and solve reasoning-based problems involving Seating Arrangements, Puzzles, and Direction Sense using systematic problem-solving approaches.						
CO3	Demonstrate professional communication and employability skills through presentation skills, grooming, body language, group discussions, and interview techniques for effective participation in hiring processes.						
CO4	Develop career readiness skills by preparing professional resumes, optimizing LinkedIn profiles, and applying networking strategies such as cold calling for internship and job opportunities.						
Syllabus:							
Module	Contents					Lecture Hours	
I	Partnership Average					05	
II	Seating Arrangements Puzzles					05	
III	Syllogism Direction					05	
IV	Presentation Skills Grooming & Body Language					05	
V	Resume Writing LinkedIn Cold Calling					05	
VI	Group Discussion Interview					05	
					Total Lecture Hours	30	
Text Books							
1) Quantitative Aptitude, R.S. Agarwal, S Chand Publications, 2019 Edition.							
2) Verbal & Non-Verbal Reasoning, R.S. Agarwal, S Chand Publications, 2010 Edition.							
3) Wren & Martin (Verbal, Grammar), P.C. Wren, S Chand Publications, 2017 Edition							
Reference Books							
1) APTIPEDIA (Quantitative, Logical, Verbal Aptitude), FACE, Wiley Publications, 2017 Edition.							
2) Wiley Quantitative Aptitude, P.A. Anand, Maestro Publications, 2015 Edition							
3) Verbal Ability, Meenakshi Upadhyay (Arun Sharma Series), McGraw Hill Publications, 2020 Edition.							

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Course Information:							
Class, Semester	S. Y. B. Tech. Semester - IV					Category	EL
Course Code, Course Title	2FTEL223, Innovation and Product Development					Type	L2
Prerequisites	–						
Teaching Scheme (per week)	Lecture	Tutorial		Practical	Self-Study	Credits	
	-	-		2	-	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	-	-		50	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:							
CO1	Identify innovative product ideas by observing real-world problems and user needs using creativity and design thinking tools.						
CO2	Apply design thinking techniques to generate and refine innovative solutions for identified engineering or societal problems based on user requirements.						
CO3	Construct functional prototypes and estimate preliminary production costs using appropriate materials, manufacturing methods, and engineering tools.						
CO4	Analyze prototype performance and production feasibility by interpreting testing results, cost data, and scalability requirements.						
CO5	Evaluate intellectual property opportunities, commercialization potential, and production planning based on technical feasibility, market requirements, and economic considerations.						
CO6	Develop a comprehensive entrepreneurial proposal integrating intellectual property protection, commercialization strategy, and production planning for an innovative product.						
Syllabus:							
The Innovation and Product Development course is designed to provide students with experiential learning in innovation, prototyping, product development, and commercialization. The course focuses on identifying real-world problems and transforming innovative ideas into functional prototypes/models/products through systematic design and development processes.							
Students will learn techniques for validating innovative concepts, assessing feasibility and utility, selecting suitable materials, along with a design-thinking approach and developing prototypes/models/products through iterative improvement and performance testing. The course also emphasizes expert reviews, prototype assessment, cost estimation, pricing strategies, and preliminary production planning for scalability.							
Further, students will gain exposure to Intellectual Property Rights (IPR), commercialization processes, and startup development, enabling them to prepare draft proposals for patenting, commercialization, or entrepreneurial ventures based on their innovative solutions.							

INNOVATION AND PRODUCT DEVELOPMENT ACTIVITY PLAN

Sr. No	Innovation Prototype Course Activities	Planned Week
01	Introduction to Innovation and Prototyping	Week 1
02	Revising Design Thinking Approach	Week 2
03	Identifying Innovative Problems (Students & Faculty)	Week 3
04	Validating Innovation: Assessing Utility of a Proposed Concept	Week 4
05	Review No. 1 – by Guides - Innovativeness Assessment - (Final Idea Presentation)	Week 5
06	Planning and Designing the Prototype	Week 6
07	Choosing and Testing Materials for the Prototype	Week 7
08	Building the working Prototype / Model/ Product	Week 8
09	Improving working Prototype / Model/ Product	Week 9
10	Testing the Prototype / Model/ Product Performance	Week 10
11	Review No. 2 – by Expert Panel - Prototype/Model/Product Assessment along with poster	Week 11
12	Estimating Costs & Formulating a Pricing Strategy for Product	Week 12
13	Creating a Preliminary Production Plan for Scaling the Prototype	Week 13
14	Formulating IPR or Commercialization or Start up	Week 14
15	Review No. 3 – Submission of Draft Copy for IPR or Commercialization or Start up	Week 15


 Member Secretary-BoS


 Chairman-BoS


 Member Secretary-AC


 Chairman-AC