DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.

Dr. BabasahebAmbedkar Technological University
(Established as a University of Technology in the State of Maharashtra)
(Under Maharashtra Act No. XXIX of 2014)
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National Education Policy (NEP) 2020 for the session 2025-26

For

Second Year B.Tech. Food Technology and Management (Affiliation Institutes)

With effect from the Academic Year 2025-2026

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.

B. Tech (Food Technology and Management)

A. Program Educational Objectives (PEOs)

Graduates will able to–

1. Learning objectives for Food Technology and Management focus on developing scientific, managerial, and practical skills to ensure food safety, quality, and sustainability throughout the value chain.

2. Understanding food chemistry and processing, implementing quality assurance and management systems, developing new food products, managing food supply chains, adhering to food laws and regulations, and fostering professional skills like critical thinking and entrepreneurship to solve industry problems.

3. Perceive the limitation and impact of engineering solutions in social, legal, environmental, economic and multidisciplinary contexts.

4. Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

B. Program Outcomes (POs)

Engineering Graduate will be able to–

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, management and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply the setoone ‟sown work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. Program Specific Outcomes (PSO)

Food Technology and management graduates will specifically be able to do in their field.

1. Demonstrate the ability to apply fundamental knowledge of mathematics, science and engineering to identify, formulate, analyze, investigate, and design complex problems in the field of electrical engineering.

2. Demonstrate ability to apply the appropriate techniques and modern engineering tools to manage and solve complex electrical engineering projects, adapt in multi- disciplinary environments, and engage in lifelong learning.

3. Able to propose & implement engineering solutions in the context of the environment, society, economy, and professional ethics and have good communication skills.

B. Tech Second Year Food Technology and management

(Affiliation Institutes)

SEMESTER III											
Sr. No.	**Course Code**	**Course Title**	**Teaching Scheme**			**Marking Scheme**			**Total Marks**	**CR**	**ategory**
			L	**T**	**P**	**CA**	**SE**	**ESE**			
1	25 FTMBSC301	Engineering Mathematics- III	3	0	0	20	20	60	100	**3**	**BSC**
2	25 FTMPCC302	Food Chemistry	3	0	0	20	20	60	100	**3**	**PCC**
3	25 FTMPCC303	Food Microbiology	3	0	0	20	20	60	100	**3**	**PCC**
4	25 FTMPCCL304	Food Chemistry and Food Microbiology Lab	0	0	4	60	0	40	100	**2**	**PCC**
5	25 FTMOE305 A/B/C	**Open Elective-I** A- Fluid Mechanics B- IOT **C**- Renewable Energy Sources	3	0	0	20	20	60	100	**3**	**OE**
6	25 FTMMDM306	**MDM Bucket***	2	0	0	20	20	60	100	**2**	**MDM**
7	25 FTMHSSM307	Innovation and Entrepreneurship	2	0	0	20	20	60	100	**2**	**HSSM**
8	25 FTMVEC308	Universal Human Values	2	0	0	20	20	60	100	**2**	**VEC**
9	25FTMCEP309	Community engineering Project/Field Project (Earn While Learn)	0	0	4	60	0	40	100	**2**	**CEP**
Total			**18**	**0**	**8**				**900**	**22**	

NOTE:*Refer to Multidisciplinary Minor Bucket (MDM)

Course code description: 25 FTMBSC301
25 *– Year (With effect from),* ***FTM****—Food Technology and Management,* ***BSC—****Basic Science Course,*
301-*Semester 3, course sr. no. 1*

L - Lecture, **P / PR** - Practical, **CA** - Continuous Assessment, **TH** - Theory, **MSE -** Mid Semester Examination, **ESE** - End Semester Examination, **CR** - Credit

BSC/ESC: *Basic Science Course/ Engineering Science Course,* ***PCC:*** *Programme Core Course,****OE:*** *Open Elective Other than particular programme,* ***MDM:*** *Multidisciplinary Minor Bucket,* ***HSSM:*** *Humanities Social Science and Management,* ***VEC:*** *Value Education Course,*

SEMESTER IV												
Sr. No.	**Course Code**	**Course Title**	**Teaching Scheme**			**Marking Scheme**			**Total Marks**	**CR**	**Category**
			L	**T**	**P**	**CA**	**MSE**	**ESE**			
1	25FTMPCC401	Principles of Food Processing	3	0	0	20	20	60	100	**3**	**PCC**
2	25FTMPCC402	Food Engineering-I	3	0	0	20	20	60	100	**3**	**PCC**
3	25FTMPCC403	Food Biochemistry and Nutrition	3	0	0	20	20	60	100	**3**	**PCC**
4	25FTMPCCL404	Food Processing and Food Engineering (Lab)	0	0	4	60	0	40	100	**2**	**PCC**
5	25FTMOE405 A/B/C	**Open Elective II** ***A-*** *Heat and mass transfer,* ***B-*** *ICT,* **C-** *Chemical Reaction engineering*	3	0	0	20	20	60	100	**3**	**OE**
6	25FTMMDM406	**MDM Bucket***	2	0	0	20	20	60	100	**2**	**MDM**
7	25FTMVEC407	Constitution of India	1	0	0	50	0	50	50	**1**	**VEC**
8	25FTMVEC408	Life of ChatrapatiShivajiMaharaj	1	0	0	50	0	0	50	**1**	**VEC**
9	25FTMHSSM409	Patents and IPR	1	0	0	60	00	40	100	**1**	**Ent**
10	25FTMHSSM410	A)Modern Indian Language(Marathi) B)Modern Indian Language(Hindi) C)Modern Indian Language (Sanskrit)	1	0	0	20	20	60	100	**1**	**HSSM**
11	25AF1293VS411	Development of laboratory skills	2	0	0	20	20	60	100	**2**	**VSEC**
		Total	**20**	**0**	**4**				**1000**	**22**	

NOTE:*Refer to Multidisciplinary Minor Bucket (MDM)

Course code description: 25 FTMBSC301
25 *– Year (With effect from),* ***FTM****—Food Technology and Management,* ***BSC—****Basic Science Course,*
301-*Semester 3, course sr. no. 1*

L - Lecture, **P / PR** - Practical, **CA** - Continuous Assessment, **TH** - Theory, **MSE -** Mid Semester Examination, **ESE** - End Semester Examination, **CR** - Credit

BSC/ESC: *Basic Science Course/ Engineering Science Course,* ***PCC:*** *Programme Core Course,****OE:*** *Open Elective Other than particular programme,* ***MDM:*** *Multidisciplinary Minor Bucket,* ***HSSM:*** *Humanities Social Science and Management,* ***VEC:*** *Value Education Course,* ***VSEC:*** *Vocational Skill Enhancement Course,* ***Ent:*** *Entrepreneur ship*

Semester III

25 FTMBSC301 Engineering Mathematics-III

Teaching Scheme	Examination Scheme
Lectures Theory:03Hr/Week Credit:03	Internal Assessment:20Marks Mid-Sem Exam: 20 Marks End Sem Exam: 60 Marks

Course Objectives:

1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2. To understand and study the Physics principles behind the developments of engineering materials.

Course Outcome:

After completion of this course, students will be able to:

CO1. Solve higher order linear differential equations using appropriate techniques for modeling and analyzing electrical circuits.

CO2. Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing.

CO3. Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.

CO4. Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.

CO5. Analyze conform al mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.

Unit	Contents	Hrs.
1	**Laplace Transform** Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms -Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n , scale change property, transforms of functions divided byt, transforms of integral of functions, transforms of derivatives ; Evaluation of integrals by using Laplace transform ; Transforms of some special functions-periodic function, Heaviside-unit step function, Dirac delta function.	**9**
2	**Inverse Laplace Transform** Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients.	**9**
3	**Fourier Transform** Definitions–integral transforms; Fourier integral theorem (with out proof); Fourier sine and cosine integrals; Complex form of Fourier integrals ; Fourier sine and cosine trans forms; Properties of Fourier trans forms; Par seval ‟sidentity for Fourier Transforms.	**9**

4	**Partial Differential Equations and Their Applications** Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange‟s linear equations); Method of separation of variables – applications to find solutions of one dimensional heat flow equation and one dimensional wave equation.	**9**
5	**Functions of Complex Variables** Analytic functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form ;Cauchy‟s integral theorem; Cauchy‟s integral formula; Residues; Cauchy‟s residue theorem (All theorems without proofs).	**9**
	Total	**45**
	Text Books: 1. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, New Delhi. 2. Higher Engineering Mathematics by H.K. DasandEr. RajnishVerma,S. Chand & CO. Pvt. Ltd., New Delhi. 3. A course in Engineering Mathematics (Vol III) by Dr. B.B. Singh, Synergy Knowledge ware, Mumbai. 4. Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill Publications, New Delhi. ***Reference Books:*** 1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York. 2. A Text Book of Engineering Mathematics by Peter O ‟Neil, Thomson Asia Pte Ltd., Singapore. 3. Advanced Engineering Mathematics by C.R. Wylie & L.C. Barrett, Tata Mcgraw- Hill Publishing Company Ltd., New Delhi. 4. Integral Transforms and their Engineering Applications by Dr.B.B.Singh, Synergy Knowledge ware, Mumbai. 5. Integral Transforms by I.N. Sneddon, Tata McGraw-Hill, New York.	

25 FTMPCC302 FOOD CHEMISTRY		
Teaching Scheme Lectures Theory:03Hr/Week Credit:	**Examination Scheme** Internal Assessment:20 Marks Mid-Sem Exam: 20 Marks End Sem Exam: 60 Marks	
	Course Objectives 1. Food chemistry course objectives include understanding the chemical composition and properties of food constituents (carbohydrates, proteins, lipids, vitamins, etc.), their physio-chemical changes during processing and	

	storage, and how these affect food quality, safety, and nutrition. 2. Students also learn to apply analytical techniques to identify and quantify these components, understand food additives and contaminants, and relate chemical principles to food industry applications and problem-solving.	
	Course Outcomes **After completion of this course, students will be able to** 1. Students will be able to describe and characterize the chemical, structural, and functional properties of key food components like proteins, lipids, and carbohydrates. 2. They will learn about the chemical composition and properties of major food groups, such as meat, dairy, eggs, and plant products. 3. Course outcomes include discussing the structure, function, and stability of vitamins, minerals, and bio-active compounds. 4. Students identify and explain the chemical reactions responsible for food deterioration and spoilage.	
Units	**TOPICS**	**Hrs,**
1	Introduction: Nature Scope and development of food chemistry, role of food chemist. Moisture in foods: Role and type of water in foods; Functional properties of water; role of water in food spoilage; Types of water, Water activity and sorption isotherm; Molecular mobility and foods stability	7
2	Carbohydrates: Definition, classification and nomenclature. General properties(physical and chemical) of sugar. Reducing and non-reducing sugars. Common monosaccharides, di-saccharides and poly-saccharides. Chemistry of starch, cellulose, gums and mucilage. Crude fibre. Changes of carbohydrates on cooking, modification of carbohydrates,	8
3	Protein: Classification. Amino acid sequence in proteins, pleated sheet and helix structure of proteins. Molecular weight of proteins and ultra-centrifuge separation and purification of proteins. Physical and chemical properties of amino acids. Food proteins and their characteristics. Protein denaturation, modification of protein	8
4	Lipids : Classification. Physical and chemical properties. Oil processing: Refining, hydrogenations, inter esterification, safety use of oils and fats in food formulation; Enzymatic and chemical reactions of fats; Rancidity and its types,	7
5	Vitamins and minerals: Occurance and chemistry, Losses during processing and storage. Flavors and colorants: Chemical compounds responsible for food flavors, odors, and colors, including natural and synthetic sources.	8
6	Food Additives:: Classification, Functions and chemical properties of various food additives. Contaminants and Toxins: Identification and analysis of undesirable substances in food.	7
	• **Total**	**45**
	Reference Books: 1 L.H. Meyer, C.B.S. Publishers, Delhi, 1987 : Food Chemistry 2 Fenamma : Food chemistry 3 de Man: Food Chemistry	

25 FTMPCC303FOOD MICROBIOLOGY			
	Teaching Scheme Lectures Theory:03Hr/Week Credit:03	**Examination Scheme** Internal Assessment:20Marks Mid-Sem Exam: 20 Marks End Sem Exam: 60 Marks	
	Course Objectives 1. Food microbiology course objectives include developing a deep understanding of microbial roles in food spoilage and safety, identifying foodborne pathogens and contaminants, applying food preservation techniques to extend shelf life. 2. Use of microbiological methods to ensure food safety and quality control. 3. Students also learn to analyze the factors influencing microbial growth, control undesirable microorganisms, and integrate knowledge of food safety regulations and management systems into their practice.		
	Course Outcomes 1. Students learn to identify and analyze various foodborne microorganisms and spoilage microbes using different methods, including isolation and detection techniques. 2. Courses focus on understanding the types of food spoilage, the effect of factors like temperature on spoilage, and the various methods and techniques used to preserve food. 3. Students gain knowledge about foodborne illnesses, including infections and intoxications, and the procedures for investigating and preventing them. 4. Outcomes include learning microbiological quality control schemes and management systems, such as Food Safety Management Systems (FSMS).		
Unit	**Topic**		**Hrs.**
1	Introduction to Biology and its branches. Relevance of Microbiology in preservation of foods. Composition of microbial world. Branches of Microbiology. Water Microbiology. Management of toxic industrial wastes. - Physical and chemical methods of control of microorganisms. Microbial integrations. Food industry waste as fermentation substrate.		8
2	Morphology and physiology of virus, bacteria, yeast, molds and algae. Growth, nutrition and reproduction. Isolation and identification of microorganisms. Pure cultures and their characteristics. Sterilization. Maintenance of cultures. Culturing techniques: Batch culturing, Continuous culturing, Fed-batch culturing. Factors affecting growth.		8
3	Mutations: types of mutations, mutagenesis, mutation rate, repair of mutations, phenotypes of bacterial mutants and designation of bacterial Mutation		7
4	Destruction of microorganisms: physical agents and chemical agents, chemotherapeutic agents and chemotherapy, characteristics of antibiotics and mode of action of antibiotics		8
5	Contamination of foods by microorganisms from natural sources, spoilage of different foods – general principles, causes and spoilage and growth of microorganisms in foods. Food intoxicants, mycotoxins. Cood poisoning and food infections-investigation of a food borne disease outbreak. Methods of food Preservation.		7
6	General principles of food hygiene in food handling, personnels, food processing plants. Impurities in water and its treatment. Sanitation facities and procedures in		7

	food processing plants.	
	Total	**45**
	Reference Books: 1. Food Microbiology, by Frazier, Tata McGraw Hill, New Delhi 2. Prescott, Herley, Klein : Microbiology, 2nd Edition, Tata McGraw Hill 3. Microbiology: Pelczar, Chan and Krieg, 5 th Ed. Tata McGraw-Hill New Delhi 4. Fundamentals of Microbiology: Jeffrey C.P., Elsevier Publication, London 2017	

25 FTMPCCL304	**Food Chemistry and Food Microbiology lab**	
	Teaching Scheme Practical :04Hr/Week, Credit 02	**Examination Scheme** Internal Assessment:60 Marks Mid-Sem Exam: 00 Marks End Sem Exam: 40 Marks
	Experiments	**Hrs**
S. No	**Experiments (Food Chemistry)**	**4**
1	Laboratory sample preparation	**4**
2	Determination of moisture content of food samples	**4**
3	Determination of ash content of food samples	**4**
4	Determination of Oil/fat content of food samples	**4**
5	Determination of carbohydrate/starch content of food samples	**4**
6	Determination of Protein content of food samples	**4**
7	Determination of crude fiber content of food samples	**4**
	Experiments (Food Microbiology)	**4**
8	Introduction to equipments commonly used in microbiology laboratory	**4**
9	Use of microscopic techniques for identification, viable count and size measurement of microorganisms	**4**
10	Sterilization of glass wares used in microbiology laboratory	**4**
11	Preparation of culture media	**4**
12	Isolation of microorganisms (Streak plate, pour plate techniques)	**4**
13	Different staining techniques (Gram's staining, spore staining)	**4**
14	Microbial examination of water, air and food utensils	**4**
15	Microbial examination of food (Bread, dairy products)	**4**
	Total	**60**

25 FTMOE305 A Fluid Mechanics

Teaching Scheme	**Examination Scheme**
Lectures Theory:3Hr/ Week Credit:02	Internal Assessment:20Marks Mid-Sem Exam: 20 Marks End Sem Exam: 60 Marks

Course Objective:

1] Understanding of basic physics of fluids. Gaining knowledge to calculate and design engineering applications involving fluid. Understanding of analyzing flow systems in terms of mass, momentum, and energy balance.

Course Outcomes:

After completion of this course, students will be able to understand and apply fundamental principles of fluid properties, pressure, and flow; analyze and solve problems involving fluid statics, dynamics, and conservation laws (mass, momentum, energy); explain and apply theories of laminar and turbulent flow in pipes and boundary layers; and design or evaluate engineering applications such as pipe flow systems and pumps.

	Course Content	**Hrs**
Unit 1:	Fluid Properties and Fluid Statics: Fluid Properties: Definition of fluid, Fluid as a continuum, Properties of fluid, Viscosity, Types of fluid, Compressibility, Surface tension, Capillarity and vapor pressure. Fluid Statics: Pascal's law, Hydrostatic law of pressure, Total Pressure, Centre of Pressure, Buoyancy, Meta center, Condition of Equilibrium of floating and submerged bodies	**10**
Unit 2:	Fluid Kinematics, Eulerian and Langragian approach of fluid flow, Types of flow, Definition of steady, Unsteady, Uniform, Non-uniform, Laminar, Turbulent, Compressible, incompressible, rotational, ir-rotational, flow, 1D-2D flows, Stream line, Streak line, Path line, concept of Velocity, potential & stream, function flow net (no numerical treatment), Continuity equation for steady, Unsteady, Uniform, non-uniform, Compressible, incompressible.	**10**
Unit 3:	Fluid Dynamics, Euler's equation, Bernoulli's equation along a streamline for incompressible flow, Practical, applications of Bernoulli's equation - Pitot tube, Venturi meter, Orifice meter.	**7**
Unit 4:	Forces on Immersed Bodies and Boundary Layer Theory, Forces on Immersed Bodies: Lift and Drag, Drag on a flat plate and on aerofoil. Types of drags, Development of lift. (Magnus effect) stalling condition of aerofoil.	**9**
Unit 5:	Dimensional analysis, Introduction to dimensional analysis, dimensional homogeneity, methods of dimensional analysis- Rayleigh's method, Buckingham's π-theorem, dimensionless numbers.	**9**
Total		**45**

Text Books:

1. P. N. Modi, S. M. Seth, “Fluid Mechanics and Hydraulic Machinery”, Standard Book House, 10th edition, 1991.
2. Robert W. Fox, Alan T. McDonald, “Introduction to Fluid Mechanics”, John Wile and Sons, 5th edition.
3. Fluid Mechanics and Hydraulic Machines, Dr. R. K. Bansal, Laxmi Publication, Delhi, 2005

Reference Books:

1. V. L. Streeter, K. W. Bedford and E. B. Wylie, “Fluid Dynamics”, Tata McGraw-Hill, 9th
edition, 1998.
2. S. K. Som, G.Biswas, “Introduction to Fluid Mechanics and Fluid Machines”, Tata McGraw Hill, 2nd edition, 2003.

25 FTMOE305B Internet Of Things

Teaching Scheme	**Examination Scheme**
Lectures Theory:3Hr/ Week Credit:02	Internal Assessment:20Marks Mid-Sem Exam: 20 Marks End Sem Exam: 60 Marks

Course Objective:

Internet of Things (IoT) course objectives focus on developing practical skills to design, build, and manage connected systems, including understanding basic electronics, programming microcontrollers (like Arduino) and microprocessors (like Raspberry Pi), implementing wireless communication protocols, using cloud platforms for data management, and developing solutions for real-world problems such as home automation and smart infrastructure

Course Outcomes:

Students will be able to learn,

1. Identify and troubleshoot electronic components, assemble circuits on breadboards, use measurement devices, and program microcontrollers like Arduino using embedded C to interface with sensors and actuators.
2. Build low-cost embedded systems and design basic networks for IoT solutions.
3. Develop proficiency in embedded C for microcontrollers and Python for Raspberry Pi-based IoT applications.
4. Understand and utilize wireless IoT technologies like Node MCU and concepts like TCP/IP modeling.
5. Grasp the fundamentals of cloud platforms for deploying and managing IoT applications.
6. Understand data science solutions for IoT analytics scenarios and their application in industrial contexts.

Course Content		
Unit 1:	IoT and Cloud Computing: Introduction, Physical design of IoT, Logical design of IoT, IoT enabling technologies, Domain specific IoTs, IoT design methodology, logical design, IoT physical devices (such as Raspberry Pi, pcDuino, Beaglebone black, Cubieboard), Introduction to cloud computing: cloud models, cloud service examples,cloud-based services & applications, Cloud service and platform	**9**
Unit 2:	Applied Machine to Machine Communication, Introduction to M2M, Description of M2M Market, Segments/Applications – Automotive, Smart Telemetry, Surveillance and Security, M2M Industrial Automation, M2M Terminals and module.	**9**
Unit 3:	Information Systems in Manufacturing, Manufacturing organizations, management, and the networked enterprises, Globalization challenges and opportunities, Dimensions of Information systems, Approaches to study information system, Technical and Behavioral approach, Information Technology Infrastructure.	**9**
Unit 4:	Introduction to Smart Manufacturing, Introduction; Demand-Driven and Integrated Supply Chains; Dynamically Optimized Manufacturing Enterprises (plant + enterprise operations); Real Time, Sustainable Resource Management (intelligent energy demand management, production energy optimization and reduction of GHG), Online Predictive, Modelling, Monitoring, and Intelligent Control of Machining/Manufacturing and Logistics/Supply Chain Processes.	**9**
Unit 5:	Privacy, Security and Governance for Internet of Things, Introduction, Overview of Governance, Privacy and Security Issues, Security, Privacy and Trust in IoT- Data-Platforms for Smart manufacturing, First Steps Towards a Secure Platform, Data Aggregation for the IoT in Smart manufacturing.	**9**
Total		**45**

Text Books:

Bahga and V. Madisetti, Internet of Things, A Hands-on Approach, Create Space Independent PublishingPlatform, 1st edition, 2014, ISBN: 978-0996025515.

Reference Books:

1. Bahga and V. Madisetti, Cloud Computing, A hands-on approach, Create Space Independent Publishing
Platform, 1st edition, 2013, ISBN: 978-1494435141
2. D. Boswarthick, O. Elloumi, and O. Hersent, M2M communications: A systems approach, Wiley, 1st edition, 2012, ISBN: 978-1119994756
3. J. Edward Carryer, et al., Introduction to Mechatronic Design, Prentice Hall, 1st edition,2010, ISBN: 978-8131788257.
4. K. Laudon and J. Laudon, Management Information Systems, 14th edition, Pearson Higher Education,2016, ISBN: 9780136093688.

25 FTMOE305C	Renewable Energy Sources
Teaching Scheme Lectures Theory:3Hr/ Week Credit:02	**Examination Scheme** Internal Assessment:20Marks Mid-Sem Exam: 20 Marks End Sem Exam: 60 Marks

Course Objective:

Course objectives for renewable energy sources include understanding energy systems, analyzing various renewable sources like solar, wind, and biomass, evaluating their environmental and economic aspects, assessing resource potential, and developing solutions for energy challenges to promote sustainable development and grid integration

Course Outcomes:

At the end of the course, students will be able to:

CO1 Explain the difference between renewable and non-renewable energy

CO2 Describe working of solar collectors

CO3 Explain various applications of solar energy

CO4 Describe working of other renewable energies such as wind, biomass, nuclear

Course Content

Unit 1:	Solar Energy Energy resources, Estimation of energy reserves in India, Current status of energy conversion Spectral distribution, Solar geometry, Attenuation of solar radiation in Earth's atmosphere, Measurement of solar radiation, Properties of opaque and transparent surfaces.	**10**
Unit 2:	Solar Collectors Flat Plate Solar Collectors: Construction of collector, material, selection criteria for flat plate collectors, testing of collectors, Limitation of flat plate collectors, Introduction to ETC. Concentrating type collectors: Types of concentrators, advantages, paraboloid, parabolic trough, Heliostat concentrator, Selection of various materials used in concentrating systems, tracking.	**11**
Unit 3:	Solar Energy Applications Air/Water heating, Space heating/cooling, solar drying, and solar still, Photo-voltaic conversion.	**6**
Unit 4:	Wind Energy and Biomass Introduction to wind energy, Types of wind mills, Wind power availability, and wind power development in India. Evaluation of sites for bio-conversion and Introduction to biomass resources, Location of plants, Biomass conversion process.	**10**
Unit 5:	Other Renewable Energy Sources Tidal, Geo-thermal, OTEC, hydro-electric, Nuclear energy	**8**
Total		**45**

Text Books:

1. Chetan Singh Solanki, "Renewable Energy Technologies", Prentice Hall of India, 2008.

2. References:

1. S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", Tata McGraw-Hill Publications, New Delhi,1992.

2. G. D. Rai, "Solar Energy Utilization", Khanna Publisher, Delhi,1992.

25FTMHSSM307	Innovation and Entrepreneurship
Teaching Scheme Lectures Theory:02Hr/ Week Credit:02	**Examination Scheme** Internal Assessment:20Marks Mid-Sem Exam: 20 Marks End Sem Exam: 60 Marks

Course Objective:

1. To cultivate an entrepreneurial mindset and leadership qualities through real-world simulations, role-play, and industry case studies.
2. To develop skills in problem and customer identification using design thinking principles, market analysis, and trend assessment.
3. To gain proficiency in solution design, prototyping, and iteration to create a strong value proposition and align solutions with customer needs.
4. To understand and apply foundational business models, financial planning, and go-to-market strategies, including lean canvas and startup funding options.

Course Outcome:

After completion of this course, students will be able to:

CO1.Developent repreneurial mind-set and attributes

CO2.Apply process of problem-opportunity identification and feasibility assessment through developing a macro perspective of the real market, industries, domains and customers

CO3. Analyse Customer and Market segmentation, estimate Market size.

CO4.Initiate Solutionde sign, Prototype for Proof of Concept. Understand MVP development and validation techniques to determine Product-Market fit.

CO5.Craft initial Business and Revenue models, financial planning and pricing strategy for profitability and financial feasibility of a venture.

Unit	Contents	Hrs.
1	**Entrepreneurship Fundamentals &Context** Meaning and concept, attributes and mindset of entrepreneurial and intrapreneurial leadership, role models in each and their role in economic development. Gamified role play based exploration aligned to one‟s short term career aspiration and ambition. An understanding of how to build entrepreneurial mindset, skillsets, attributes and networks while on campus. Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16 industries to choose from), Venture Activity	6
2	**Problem & Customer Identification** Understanding and analysing the macro Problem and Industry perspective, technological, socio-economic and urbanization trends and their implication on new opportunities. Identifying passion, identifying and defining problem using Design thinking principles. Analysing problem and validating with the potential customer. Iterating problem-customer fit. Understanding customer segmentation, creating and validating customer personas. Competition and Industry trends mapping and assessing initial opportunity. Core Teaching Tool: Several types of activities including: Class, game, Gen AI, Get out of the Building ‟and Venture Activity.	6
3	**Solution design &Prototyping** Understanding Customer Jobs-to-be-done and crafting innovative solution design to map to customer's needs and create a strong value proposition. Developing Problem-solution fitinaniterative manner. Understanding	6

	prototyping and MVP. Developing a feasibility prototype with differentiating value, features and benefits. Initial testing for proof-of- concept and iterate on the prototype. Core Teaching Tool: Venture Activity, no code Innovation tools, Class activity	
4	**Opportunity Assessment and Sizing** Assess relative market position via competition analysis, sizing the market and assess scope and potential scale of the opportunity. Core Teaching Tool: Class and Venture Activity	**6**
5	Business & Financial Model, Go-to-Market Plan Introduction to Business model and types, Lean approach, 9 block lean canvas model, riskiest assumptions to Business models. Importance of Build -Measure – Lean approach Business planning: components of Business plan- Sales plan, People plan and financial plan, Financial Planning: Types of costs, preparing a financial plan for profitability using financial template, understanding basics of Unit economics and analysing financial performance. Introduction to Marketing and Sales, Selecting the Right Channel, creating digital presence, building customer acquisition strategy. Choosing a form of business organization specific to your venture, identifying sources of funds: Debt & Equity, Map the Start-up Lifecycle to Funding Options. Core Teaching Tool: Founder Case Studies–Samaand Securely Share; Class activity and discussions; Venture Activities	**6**
	Total	**30**

Reference Books

01. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha (2020). Entrepreneurship, McGraw Hill, 11th Edition.
02. Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.
03. Osterwalder, A., &Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons
04. Chowdhry Ajay, (2023) Just Aspire: Notes on Technology, Entrepreneurship and the Future.
05. Simon Sinek (2011) Start With Why, Penguin Books limited
06. Brown Tim (2019) Change by Design Revised & Updated: How Design Thinking Transforms Organizations and Inspires Innovation, Harper Business
07. NamitaThapar (2022) The Dolphin and the Shark: Stories on Entrepreneurship, Penguin Books Limited
08. Collins Jim, Porras Jerry, (2004) Built to Last: Successful Habits of Visionary Companies
09. Burlington Bo, (2016) Small Giants: Companies That Choose to Be Great Instead of Big
10. Saras D. Sarasvathy,(2008) Effectuation: Elements of Entrepreneurial Expertise, Elgar Publishing Ltd

25 FTMVEC308	Universal Human Value	
Teaching Scheme LecturesTheory:02Hr/Week Credit:02		**Examination Scheme:** Internal Assessment:20Marks Mid-Sem Exam: 20 Marks End Sem Exam: 60 Marks

Course Objective:

1. To understand the concept to value education and explore self-awareness as a foundation for continuous happiness and prosperity.
2. To promote harmony within one self and between these lf and the body, fostering self-regulation and holistic well-being.
3. To develop an understanding of harmonious relationships in the family and society, based on trust, respect, and universal values.
4. To gain insight into the inter connectedness and mutual fulfillment in nature, fostering a holistic perception of existence and ethical professional practices.

Course Outcome:

After completion of this course, students will be able to:

CO1.Students will demonstrate an understanding of value education and its role in achieving happiness, prosperity, and self-exploration.

CO2.Students will be able to differentiate between the needs of these lf and the body and develop strategies for achieving harmony and self-regulation.

CO3.Students will understand the importance of trust, respect, and values in human relationships, fostering harmony within the family and society.

CO4.Students will recognize the inter connectedness of nature, society, and existence, promoting a holistic approach to life and mutual fulfillment.

CO5.Students will apply ethical principles in professional settings, utilizing humanistic education and strategies for transitioning to a value-based life and profession.

Unit	Contents	Hrs.
1	**Introduction to Value Education** - Understanding Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity–the Basic Human Aspirations - Right Understanding, Relationship and Physical Facility - Happiness and Prosperity–Current Scenario - Method to Fulfil the Basic Human Aspirations	6
2	**Harmony in the Human Being** - Understanding Human being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body - The Body as an Instrument of the Self - Understanding Harmony in the Self - Harmony of the Self with the Body - Programme to Ensure self-regulation and Health	**6**

3	**Harmony in the Family and Society** - Harmony in the Family– the Basic Unit of Human Interaction - Values in Human-to-Human Relationship - „Trust'–the Foundational Value in Relationship - 'Respect'–as the Right Evaluation - Understanding Harmony in the Society - Vision for the Universal Human Order	**6**
4	**Harmony in the Nature (Existence)** - Understanding Harmony in the Nature - Inter connectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature - Realizing Existence as Co-existence at All Levels - The Holistic Perception of Harmony in Existence	6
5	**Implications of the Holistic Understanding–a Look at Professional Ethics** - Natural Acceptance of Human Values - Definitiveness of (Ethical) Human Conduct - AB as is for Humanistic Education, Humanistic Constitution and Universal Human Order - Competence in Professional Ethics - Holistic Technologies, Production Systems and Management Models- Typical Case Studies - Strategies for Transition towards Value-based Life and Profession	**6**
	Total	**30**
	Text Book and Teachers Manual: *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 Teacher's Manual for *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 2ndRevised Edition, Excel Books, New Delhi,2019. ISBN978- 93-87034-53-2 **Reference Books** 1. JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999. 2. Human Values, A.N.Tripathi, New Age Intl. Publishers, New Delhi,2004. 3. The Story of Stuff (Book). 4. The Story of My Experiments with Truth-by Mohandas K. Gandhi 5. Small is Beautiful- E.F Schumacher. 6. Slow is Beautiful-Cecile Andrews 7. Economy of Permanence -JC Kumarappa 8. Bharat Mein Angreji Raj- PanditSunderlal 9. Rediscovering India- by Dharampal 10. Hind Swaraj or Indian Home Rule-by Mohandas K. Gandhi 11. India Wins Freedom- Maulana Abdul KalamAzad Vivekananda- Romain Roll and(English) Gandhi - Romain Rolland (English	

25FTMCEP309 Community engineering Project/Field Project (Earn While Learn)	
TeachingScheme LecturesTheory:04 Hr/Week Credit:02	**Examination Scheme** Internal Assessment:60Marks Mid-Sem Exam: 00 Marks End Sem Exam: 40 Marks

Course Objectives:

The EL provides the students an excellent opportunity to develop analytical and entrepreneurial skills, and knowledge through meaningful hands on experience, confidence in their ability to design and execute project work. The main objectives of EL are:

- To promote professional skills and knowledge through meaningful hands on experience
- To build confidence and to work in project mode
- To acquire enterprise management capabilities

Course Outcomes:

- Students will be boosted with hands-on training and entrepreneurship skills among out-going UG students interested in the field of Agriculture & allied branches.
- Students will undergo special training in frontier areas of Agriculture for undergraduate degree students for establishing an enterprise and its management.
- Students will explore the possibility of expanding scope/ federating students into business group and for industrial sectors.

	Content	**Hrs**
	Students may select one of the following ELP Modules 1. Drying and Dehydrations of fruits and vegetables 2. Fruits and Vegetable Products 3. Beverages and other Innovative Products 4. Spice Products 5. Postharvest management and marketing of Fresh Fruits and Vegetables 6. Egg, Poultry and Meat Processing 7. Bakery Products 8. Grain based Products (Cereal, Legumes/pulses and oilseeds) 9. Chocolate, Confectionary and Snack Products 10. Traditional, Heritage Food Products 11. Milk and Milk products 12. Processing of Fish and Fish Products 13. Functional Foods and Nutraceuticals	
	Total	**60**

Department of Food Technology and Management

Credit Framework under Four-Years UG Engineering Programme with Multiple Entry and Multiple Exitoptions:

- The Four-year Bachelor‟s Multidisciplinary Engineering Degree Programme allows the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per their choices and the feasibility of exploring learning from different institutions.

- The minimum and maximum credit structure for different levels under the Four-year Bachelor's Multidisciplinary Engineering UG Programme with multi pleentry and multiple exit options are as given below:

Credit Framework

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
4.5	One Year UG Certificate in Engg./ Tech.	40	44	2	1
5.0	Two Years UG Diploma in Engg./ Tech.	80	88	4	2
5.5	Three Years Bachelor's Degree in Vocation (B. Voc.) or B. Sc. (Engg./ Tech.)	120	132	6	3
	4-Years Bachelor's degree				

- There are multiple exit options at each level. Student will be given a specific Qualification mentioned in the table depending on the level at which he/she decide to have an exit. Ex. If a student decides to exit after completion of two years (level 5.0) of the program, he will be given a Diploma in Engineering with specific exit condition mentioned in the syllabus of the specific branch. He/she can rejoin the program with the multiple entry option at the level next where he/she chose to exit previously. (Student can join at level 5.5 if successfully completed level 5.0 previously at the time of exit).
- Minimum credit requirements of each level are mentioned in the credit framework table.
- There are 4distinct options available at level 6.0.
- First one is basic level 6.0 option where minimum 160-maximum 176 credits are mandatory which can be completed as per the Semester-wise Credit distribution structure mentioned in the table given below.

  Here, the Bachelor's Engineering Degree in chosen Engg./ Tech. Discipline with multidisciplinary minor (min.160-max.176 Credits) i.e. "**B. Tech in Food Technology and Management Engineering with Computer Engineering**" (160-176 credits) enables students to take up five-six or required additional courses of 14 credits in the

discipline other than Food Technology and Management Engineering distributed over semesters III to VIII. Here in the case of "**B. Tech in Food Technology and Management Engineering with Computer Engineering**" (160-176 credits) student is supposed to take up 50% or more courses to complete the 50% or more credits (from assigned 14 credits) from **Computer Engineering minor bucket**. The remaining courses to complete the assigned 14 credits can be covered from other discipline's minor buckets.

- Remaining three level 6.0 options are the advanced options where the student is given an opportunity to get extra qualification by earning some extra credits (18-20 extra credits). These three options are given below:

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
6.0	(B.E./ B.Tech. or Equivalent) in Engg./ Tech. with Multidisciplinary Minor	160	176	8	4
6.0	4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg./ Tech.- Honors and Multidisciplinary Minor	180	194	8	4
6.0	4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg./ Tech.- Honors with Research and Multidisciplinary Minor	180	194	8	4
6.0	4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg./ Tech.- Major Engg. Discipline with Double Minors (Multidisciplinary and Specialization Minors)	180	194	8	4

- Level 6.0: The **Bachelor's Engineering Degree with Honours**in chosen Major Engg./ Tech. Discipline i.e. in Food Technology and Management with Honours with Multidisciplinary Minor (180-194 credits) enables students of Food Technology and management Engineering to take up five-six additional courses of 18 to 20 credits in the Food Technology and Management discipline distributed over semesters III to VIII. The decision regarding the mechanism of distribution of these 18- 20 credits over semesters III to VIII, which are over and above the min.160-max.176 Credits prescribed for the duration off our years will be taken by Academic Authorities of University. **Student must have CGPA equal to or greater than 7.5 at the end of second semester to go for this option**.
- Level 6.0: The **Bachelor's Engineering Degree with Research** in i.e. in Food Technology and Management Engineering with Research with Multidisciplinary Minor (180-194 credits) enables students of Food Technology and management Engineering to take up a research project of 18 to 20 credits in the Food Technology and Management Engineering discipline distributed over semesters VII to VIII. **Student must have CGPA equal to or greater than 7.5 at the end of sixth semester to go for this option**.
- Level 6.0: The **Bachelor's Engineering Degree in chosen Engg./ Tech. Discipline with Double Minor** (Multidisciplinary and Specialization Minor, 180-194 credits), i.e. "**B. Tech in Food Technology and Management Engineering with *other selected discipline in* Engineering (as MDM) with Specialization Minor in Computer Engineering**" (180-194 credits) enables students to take up five-six additional courses of
  14 credits in the discipline other than Food Technology and Management Engineering (for completion of multidisciplinary minor) and 18 to 20 extra credits in the **Computer Engineering discipline** distributed over semesters III to VIII. Here, the ***other selected discipline* in Engineering should be different from Specialization Minor i.e. Computer Engineering**. This enables students to take up five-six or required additional courses of 18 to 20 credits in the **Computer Engineering** discipline distributed over semesters III to VIII, which are over and above the min.160-max.176 Credits. The decision regarding the mechanism of distribution of these 18-20creditsoversemesters III to VIII, prescribed for the duration of four years will be taken by Academic Authoritiesof University. **Student must have CGPA equal to or greater than 7.5 at the end of second semester to go for this option**.
- Students need to follow the Semester-wise Credit distribution structure for Four Year UG Engineering Program as prescribed in the table given above.
- There are seven vertical categories with specific credits distributed in specific semesters.
- Student can choose a Program Elective Course (PEC) in that specific semester from the given subjects.
- Multidisciplinary courses (MDM) and Open Elective (OE) courses can be chosen from the MDM and OE Buckets depending on students choice. Completion of total credits given in the last column of the table for each vertical is mandatory.
- Students can complete 40% of the courses through online platforms like NPTEL/SWAYAM. The NPTEL SWAYAM course content should be at least 80% similar to the course content in the syllabus.

Semester-wise Credit distribution structure for Four Year UG Engineering Program - One Major, One Minor

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	06-08	08-10		--	--	--	--	--	14-18
Engineering Science Course		10-08	06-04		--	--	--	--	--	16-12
Programme Core Course (PCC)	Program Courses	--	02	08-10	08-10	10-12	08-10	04-06	04-06	44-56
Programme Elective Course (PEC)		--	--	--	--	04	08	02	06	20
Multidisciplinary Minor (MD M)	Multidisciplinary Courses		-	02	02	04	02	02	02	14
Open Elective (OE) Other than a particular program		--	--	04	02	02	--	--	--	08
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	--	02	--	02	--	--	08
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	02	--	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--		02	02	--	--	--	--	04
Indian Knowledge System (IKS)			02		--	--	--	--	--	02
Value Education Course (VEC)		--	--	02	02	--	--	--	--	04
Research Methodology	Experiential Learning Courses	--	--	--	--	--	--		04	04
Comm. Engg. Project (CEP)/Field Project (FP)		--	--	02	--	--	--	-	-	02
Project		--	--	--	--	--	--		04	04
Internship/ OJT		--	---			--	--	12	-	12
Co-curricular Courses (CC)	Liberal Learning Courses	02	02		--	--	--	--	-	04
Total Credits (Major)		**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**160-176**

General Rules and Regulations

1. The normal duration of the course leading to B. Tech degree will be EIGHT semesters.
2. The normal duration of the course leading to M. Tech. degree will be FOUR semesters.
3. Each academic year shall be divided into 2 semesters, each of 20weeks duration, including evaluation and grade finalization, etc. The Academic Session in each semester shall provide for at least 90 Teaching Days, with at least 40 hours of teaching contact periods in a five to six days session per week. The semester that is typically from Mid-July to November is called the ODD SEMESTER, and the one that is from January to Mid-May is called the EVEN SEMESTER. Academic Session

may be scheduled for the Summer Session/Semester as well. For 1st year B. Tech and M. Tech the schedule will be decided as per the admission schedule declared by Government of Maharashtra.
4. The schedule of academic activities for a Semester, including the dates of registration, mid- semester examination, end-semester examination, inter-semester vacation, etc. shall be referred to as the Academic Calendar of the Semester, which shall be prepared by the Dean (Academic), and announced at least TWO weeks before the Closing Date of the previous Semester.
5. The Academic Calendar must be strictly adhered to, and all other activities including co-curricular and/or extra -curricular activities must be scheduled so as not to interfere with the Curricular Activities as stipulated in the Academic Calendar.

Registration:

1. Lower and Upper Limits for Course Credits Registered in a Semester, by a Full- Time Student of a UG/PG Programme:
   A full time student of a particular UG/PG programme shall register for the appropriate number of course credits in each semester/session that is within the minimum and maximum limits specific to that UG/PG programme as stipulated in the specific Regulations pertaining to that UG/PG programme.
2. Mandatory Pre-Registration for higher semesters: In order to facilitate proper planning of the academic activities of a semester, it is essential for the every institute to inform to Dean (Academics) and COE regarding details of total no. of electives offered (Course-wise) along with the number of students opted for the same. This information should be submitted within two weeks from the date of commencement of the semester as per academic calendar.
3. PhD students can register for any of PG/PhD courses and the corresponding rules of evaluation will apply.
4. Under Graduate students may be permitted to register for a few selected Post Graduate courses, in exceptionally rare circumstances, only if the DUGC/DPGC is convinced of the level of the academic achievement and the potential in a student.

Course Pre-Requisites:

1. In order to register for some courses, it may be required either to have exposure in, or to have completed satisfactorily, or to have prior earned credits in, some specified courses.
2. Students who do not register on the day announced for the purpose may be permitted LATE REGISTRATION up to the notified day in academic calendar on payment of late fee.
3. REGISTRATIONINABSENTIAwillbeallowedonlyinexceptionalcaseswiththeapproval of the Dean (Academic) / Principal.
4. A student will be permitted to register in the next semester only if he fulfills the following conditions:
   i) Satisfied all the Academic Requirements to continue with the programme of Studies without termination
   ii) Cleared all Institute, Hostel and Library dues and fines (if any) of the previous semesters;
   iii) Paid all required advance payments of the Institute and hostel for the current semester;
   iv) Not been debarred from register in gon any specific ground by the Institute.

Evaluation System:

1. Absolute grading system based on absolute marks as indicated below will be implemented from academic year 2023-24,from I year B. Tech.

Percentage of marks	Letter Grade	Grade Point
91-100	EX	10.0
86-90	AA	9.0
81-85	AB	8.5
76-80	BB	8.0
71-75	BC	7.5
66-70	CC	7.0
61-65	CD	6.5
56-60	DD	6.0
51-55	DE	5.5
40-50	EE	5.0
<40	EF	0.0

2. Class is awarded based on CGPA of all eighth semester of B. Tech Program.

CGPA for pass is minimum 5.0	
CGPA up to <5.50	Pass class
CGPA≥ 5.50&<6.00	Second Class
CGPA≥ 6.00&<7.5	First Class
CGPA >7.50	Distinction
[Percentage of Marks=CGPA*10.0]	

3. A total of 100 Marks for each theory course are distributed as follows:

Mid Semester Exam (MSE)Marks	20
Continuous Assessment Marks	20
End Semester Examination (ESE)Marks	60

4. A total of 100 Marks for each practical course are distributed as follows

1.	Continuous Assessment Marks	40

2.	End Semester Examination (ESE) Marks	60

- It is mandatory for every student of B. Tech to score a minimum of 40 marks out of 100, M. Tech to score a minimum of 45 marks out of 100 with a minimum of 20marks out of 60 marks in End Semester Examination for theory course.
- This will be implemented from the first year of B. Tech starting from Academic Year 2023-24

5. Description of Grades

EX Grade: An EX grade stands for outstanding achievement.
EE Grade: The EE grade stands for minimum passing grade.
The students may appear for the remedial examination for the subjects he/she failed for the

current semester of admission only and his/her performance will be awarded with EE grade only.

If any of the students remain absent for the regular examination due to genuine reason and the same will be verified and tested by the Dean (Academics) or committee constituted by the University Authority.

FF Grade: The FF grade denotes very poor performance, i.e. failure in a course due to poor performance .The students who have been awarded „FF" grade in a course in any semester must repeat the subject in next semester.

6. Evaluation of Performance

a. Semester Grade Point Average(SGPA)

The performance of a student in a semester is indicated by Semester Grade Point Average (SGPA) which is a weighted average of the grade points obtained in all the courses taken by the student in the semester and scaled to a maximum of 10. (SGPI is to be calculated up to two decimal places). A Semester Grade Point Average (SGPA) will be computed for each semester as follows:

$$SGPA = \frac{[\sum_{i=1}^{n} ci\ gi]}{[\sum_{i=1}^{n} ci]}$$

Where

"n" is the number of subjects for the semester,

"c_i" is the number of credits allotted to a particular subject, and

"g_i"is the grade-points awarded to the student for the subject based on his performance as per the above table.

SGPA will be rounded off to the second place of decimal and recorded as such.

b. Cumulative Grade Point Average (CGPA):

An up to date assessment of the overall performance of a student from the time he entered the Institute is obtained by calculating Cumulative Grade Point Average (CGPA) of a student. The CGPA is weighted average of the grade points obtained in all the courses registered by the student since s/he entered the Institute. CGPA is also calculated at the end of every semester (upto two decimal places).Starting from the first semester at the end of each semester (S), a Cumulative Grade Point Average (CGPA) will be computed as follows:

$$CGPA = \frac{[\sum_{i=1}^{m} ci\ gi]}{[\sum_{i=1}^{m} ci]}$$

Where,

"m" is the total number of subjects from the first semester onwards up to and including the semester S,

"ci" is the number of credits allotted to a particular subject, and

"gi" is the grade-points awarded to the student for the subject based on his/ her performance as per the above table.

CGPA will be rounded off to the second place of decimal and recorded as such.

7. Attendance Requirements:

a. All students must attend every lecture, tutorial and practical classes.

b. To account for approved leave of absence (eg. representing the Institute in sports, games or athletics; placement activities; NCC/NSS activities; etc.) and/or any other such contingencies like medical emergencies, etc., the attendance requirement shall be a minimum of 75% of the classes actually conducted. If the student failed to maintain 75% attendance, he/she will be detained for appearing the successive examination. The Dean (Academics)/ Principal is permitted to give 10% concession for the genuine reasons as such the case may be. In any case the student will not be permitted for appearing the examination if the attendance is less than 65%.

c. The course instructor handling a course must finalize the attendance 3 calendar days before the last day of classes in the current semester and communicate clearly to the students by displaying prominently in the department and also in report writing to the head of the department concerned.

d. The attendance records are to be maintained by the course instructor and he shall show it to the student, if and when required.

8. Transfer of Credits:

The courses credited elsewhere, in Indian or foreign University/Institutions/ Colleges/Swayam Courses by students during their study period at DBATU may count towards the credit requirements for the award of degree. The guidelines for such transfer of credits are as follows:

a. 20% of the total credit will be considered for respective calculations.

b. Credits transferred will be considered for overall credits requirements of the programme.

c. Credits transfer can be considered only for the course at same level i.e UG, PG etc.

d. A student must provide all details (original or attested authentic copies) such as course contents, number of contact hours, course instructor /project guide and evaluation system for the course for which he is requesting a credits transfer. He shall also provide the approval or acceptance letter from the other side. These details will be evaluated by the concerned Board of Studies before giving approval. The Board of Studies will then decide the number of equivalent credits the student will get for such course(s) in DBATU. The complete details will then be forwarded to Dean for approval.

e. A student has to get minimum passing grades/ marks for such courses for which the credits transfers are to be made.

f. Credits transfers availed by a student shall be properly recorded on academic record(s) of the student.

g. In exceptional cases, the students may opt for higher credits than the prescribed.