

Circular

Open Elective / Semester VII/ AY 2026-27

Date: - 10th July 2026

Open Elective B. Tech (Semester VII)

The B. Tech Final Year students' classes will begin from 13th July, 2026. Students in Final year of B. Tech (Semester VII) should fill a Google form for an open elective during semester VII (from 10th July, 2026 to 12th July, 2026.)

The course name, detailed curriculum, and eligibility criteria for open elective courses to be offered in the semester VII of the Academic Year 2026-27 are listed below.

Google link - <https://forms.gle/u4VaAXKCsYsBrUp9>

Rules:

1. Once selected, the course will not be changed under any circumstances. Therefore, students should be careful while selecting the course
2. In case number of students opting for a particular course is less than 25, the course will be not being offered.
3. Students should not study same course as core course / programme elective and open elective.

Sd/-

Dr. Arvind Deshpande
Dean Academics

Open Electives at Institute Level (B. Tech VII Semester AY 2026-27)

Sr. No	Course Title	Department Offering Elective Course	Students from following Disciplines can Select the Course
1	Sustainability: Industry Perspectives for a Greener World	Chemistry	All Disciplines
2	Deep Learning	MCA	Computer, IT, Electrical, EXTC, Electronics
3	Corporate Leadership	Humanities	All Disciplines
4	Engineers and Society	Humanities	All Disciplines
5	Numerical Optimization	Mathematics	All Disciplines
6	Quantum Computing	Physics	All Disciplines
7	Financial Literacy for Professionals	-	All Disciplines
8	Entrepreneurship for Engineers	-	All Disciplines
9	Economics of Banking & Finance Markets	NPTEL Courses	All Disciplines
10	Foundations of Accounting & Finance	NPTEL Courses	All Disciplines
11	Developing Soft & Leadership through Indian Knowledge Systems	NPTEL Courses	All Disciplines

Open Elective Course: Sustainability: Industry Perspectives for a Greener World

Course Code:

SN	Course Code	Course Title	L-T-P (Hours/Week)	Credit	TA	MST	ESE	ESE hours
		Sustainability: Industry Perspective for Greener World	3-1-0=4	3	20	30	50	3

Course Outcomes:

After completion of course students will be able:

1. CO1: To describe the concept of sustainability and its importance in the industry.
2. CO2: To examine and interpretate the key factors such as raw materials, process, and energy used in the industry and finding the alternative techniques to reduce the environmental impact.
3. CO3: To calculate the greenhouse gas emissions released from various sources from industry.
4. CO4: To relate the concept of UN SDG goals and its importance in the industry.
5. CO5: To outline the importance of various regulatory compliances and standards with respective to sustainability.

Modules	Description	Contact Hours
Module 1	Overview of various industrial process: Outline of chemical, textile, mechanical, automotive, forging, FMCG industry process. Concept of Industry Revolution along its merits and demerits and its importance towards sustainability. Process management and overview of various parameters such as material, energy and influents and its environmental implications etc.	4
Module 2	Fundamentals of Sustainability: Concept and basics of sustainability, Significance of Sustainability in Industry. The triple bottom line: Environmental, Social and Economic Dimensions and its significance in the industry. Concept of Corporate Sustainability and Sustainable Finance.	6
Module 3	Waste Management and Principles of Circularity: Overview of different types of waste from various industries. Concept of solid and liquid waste management with relevant examples. Recycling, upcycling, and zero waste models: Case studies and demonstration.	8
Module 4	GHG Emissions, Calculation, and its Control Techniques: Introduction to GHG emissions. Classification of GHG emissions: Scope 1, Scope 2, and Scope 3 etc. Basic parameters and emission calculations. Methods of estimating GHG emissions. Introduction to best available techniques along with its merits and demerits.	6
Module 5	ESG Principles, Reporting and Climate Change: Introduction to key concept of Environmental, Social, and Governance (ESG). Climate change and risk assessment. Corporate Carbon Neutrality and Offsetting Programs etc.	8
Module 6	Regulatory and Compliance Management and its Role in Sustainability: Introduction to regulatory and compliance management and its need. Overview of various materials and its impact on health and aquatic hazards. Handling hazardous materials: Green Logistics, Transportation, and its implementation. Responsible Sourcing and Fair-Trade Practices with successful case studies from industry.	6

Programme Name		SEMESTER VII
Course Code		
Course Title	Deep Learning	

PREREQUISITIES

1. Basic Machine Learning and Data mining algorithms
2. Mathematical and statistical Foundations

COURSE OUTCOMES:

1. Demonstrate concepts, architectures and algorithms of Neural Networks to solve real world problems.
2. Identify deep feed-forward networks and different regularization techniques used in Deep Learning.
3. Identify challenges in Neural Network optimization and different optimization algorithms used in Deep learning models
4. Analyze deep learning algorithms which are more appropriate for various types of learning tasks in various domains
5. Apply deep neural networks from building to training models
6. Analyse detection and recognition tasks using convolution/adversarial neural networks

COURSE CONTENT:

ANN Algorithms:

Supervised Learning Network- McCulloch–Pitts Unit and Thresholding logic, Linear Separability, Multi-layer Perceptron Networks, Back-Propagation Network, factors affecting Backpropagation Training, Unsupervised Learning Networks- MaxNet, Mexican Hat Net.

Deep Feed-forward Networks:

Introduction to Deep Learning, Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Other Architectural Considerations, Applications of Deep neural networks.

Regularization:

Regularization for Deep Learning - Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Regularized Linear Regression.

Optimization for Training Deep Models:

Need for Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, and Algorithms with Adaptive Learning Rates-AdaGrad, RMSProp, and Approximate Second-Order Methods-Newton's Method, Conjugate Gradients Method.

Convolutional Networks:

Motivation, Pooling, Convolutional layers, Additional layers, Residual Nets, Applications of deep learning, Application of CNN.

Recurrent and Recursive Nets:

Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder -Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Application of RNN.

Recommended Reading:

1. Deep Learning, Ian Goodfellow, Yoshua Bengio and Aeron Courville, MIT Press, First Edition, 2016.
2. Deep Learning, A practitioner's approach, Adam Gibson and Josh Patterson, O'Reilly, First Edition, 2017.
3. Yoav Goldberg, A Primer on Neural Network Models for Natural Language Processing, 2015 Hands-On Learning with Scikit-Learn and Tensorflow, Aurelien Geron, O'Reilly, First Edition, 2017.
4. Deep Learning with Python, Francois Chollet, Manning Publications Co, First Edition, 2018.
5. Python Machine Learning by Example, Yuxi (Hayden) Liu, First Edition, 2017.
6. A Practical Guide to Training Restricted Boltzmann Machines (link is external), Geoffrey Hinton, 2010.

Open Elective Course: Corporate Leadership

Course Objectives:

- To develop a foundational understanding of leadership in corporate settings.
- To differentiate leadership from management and explore various leadership styles.
- To understand motivational strategies and techniques of directing teams effectively.
- To assess the role of leaders in managing change and crisis situations.

Unit I: Fundamentals of Corporate Leadership

- Meaning of Corporate
- Concept of Vision, Mission, and Values
- Leadership: Definition, Meaning, and Importance
- Leader: Definition, Meaning, and Functions
- Influence – The Core of Leadership: Concept, Elements, Techniques of Influencing
- Are Leaders Born or Made?
- Leadership vs Management
- Leaders' vs Managers

Unit II: Leadership Styles and Theories

- Styles of Leadership: Autocratic, Democratic, Laissez-Faire, Bureaucratic, Charismatic, Transactional, Transformational, People-oriented, Task-oriented
- Theories of Leadership: Trait Theory, Behavioural Theories (Ohio State & Michigan), Contingency Theories (Hersey & Blanchard, Fiedler), Path-Goal Theory, Likert's Styles, Blake & Mouton's Grid
- Types of Leaders: Positive, Negative, Consensus, Formal, Informal, Servant, Innovative, Thought, Visionary, Level Five

Unit III: Motivation, Directing, and Change Leadership

- Motivation: Concept, Types, Strategies
- Morale Building: Advantages of High Morale, Indicators of Low Morale
- Directing: Concept, Principles, Process, Techniques, Issuing Orders, Good Order Characteristics
- Feedback and Feedforward: Concept, Types, Process, Advantages
- Leading Positive Change: Meaning, Framework, Role in Crisis Management
- Case Examples of Leaders

Suggested Readings:

1. Leadership – Daft, Richard L., Cengage Learning India Pvt. Ltd.
2. Leadership – Saxena and Awasthi, Prentice Hall
3. Leadership and Management – Dr. A. Chandra Mohan, Himalaya Publishing House
4. Principles of Management – T. Ramasamy, Himalaya Publishing House
5. Principles of Management – Rupal Jain, Richa Jain, Himalaya Publishing House

Programme Name	Final Year B.Tech. Institute Level Elective	Semester VII
Course Offered by	Humanities and Management	
Course Title	Engineers and Society	

Course Outcomes

Students will be able to:

1. Recognize and manage emotions to influence self and others in a corporate environment.
2. Understand interpersonal dynamics and develop teamwork and leadership skills at the workplace
3. Identify key issues related to environmental sustainability and industrial responsibility.
4. To instill in students a deep awareness of the ethical, social, and environmental responsibilities inherent in the engineering profession.
5. To cultivate critical thinking in students regarding the role of technology in driving sustainable development.
6. Demonstrate an understanding of the importance of gender equity in professional settings and apply principles of equity to promote inclusive and ethical work environments.

Unit	Course Contents	Hours
1.	Emotional Intelligence: Managing Self and others a) Understand and regulate their emotions in high-pressure environments. b) Identifying emotions in others to build strong professional relationships and work effectively in diverse teams. c) Apply emotional intelligence to lead, influence, and collaborate with peers toward shared goals in real-world engineering and workplace scenarios.	15
2.	Understanding the role of Engineers in transforming the environment a) Evaluate the role of engineers in promoting environmental sustainability in modern society. b) Critically examine the impact of consumerism and materialism on environmental degradation. c) Design and propose solutions that support the protection and restoration of natural ecosystems. d) Apply sustainable engineering principles to improve quality of life for current and future generations.	10

Course code	Semester	Credits	Scheme
To be assigned	VII	4	3L + 1T + 0P
Course		Numerical Optimization	

Course Outcomes:

After the completion of course, the student should be able to

1. Understand the fundamental concepts of mathematical programming including linear and nonlinear optimization.
2. Apply numerical optimization techniques to solve unconstrained optimization problems.
3. Analyze constrained optimization problems using optimality conditions and appropriate numerical solution techniques.
4. Model and solve engineering and real-world optimization problems using numerical methods.

Course Content:

Unit	Topics	Hours
1. Fundamentals of Mathematical Programming	Linear Programming: Review of various techniques of linear programming problems, mathematical formulation of optimization problems, classification of optimization problems, convex sets and convex functions, introduction to nonlinear programming.	12
2. Unconstrained Optimization	One-dimensional optimization methods: Fibonacci method, Golden Section method, Bisection method, Newton Method; Higher-dimensional methods: Random search methods, Steepest descent method, Conjugate gradient methods.	12
3. Constrained Optimization	Kuhn-Tucker conditions, Sequential programming approach, Cutting plane methods, Rosen's gradient projection method.	6
4. Penalty and Multiplier Methods	Basic penalty function method, Exterior penalty function method, Interior penalty function method, Augmented Lagrange multiplier method, engineering applications.	6

INTRODUCTION TO QUANTUM COMPUTING

Course Learning Outcomes

1. Understand the fundamental principles of quantum mechanics relevant to quantum computing.
2. Explain the concepts of qubits, quantum gates, and quantum circuits.
3. Understand quantum information and basic quantum algorithms.
4. Identify emerging applications of quantum computing in optimization, machine learning, and cryptography.

UNIT – I: Fundamentals of Quantum Mechanics for Computing

Limitations of classical computing
Classical vs quantum computation
Postulates of quantum mechanics
Representation of quantum states
Dirac notation
Measurement postulate
Superposition principle

UNIT – II: Qubits and Quantum Gates

Qubit representation
Bloch sphere representation
Multi-qubit systems
Quantum gates: Pauli gates (X, Y, Z), Hadamard gate, Phase gate, T gate
Multi-qubit gates: Controlled-NOT (CNOT), SWAP gate
Universal quantum gates
Quantum circuit representation

Unit -- III: Quantum Information

Quantum Entanglement
Bell States
No-Cloning Theorem
Quantum Teleportation
Superdense Coding
Quantum Key Distribution

UNIT – IV: Quantum Algorithms

Introduction to quantum algorithms (overview)
Quantum parallelism
Deutsch and Deutsch–Jozsa algorithms
Grover's search algorithm
Quantum Fourier Transform
Shor's factoring algorithm

UNIT – V: Applications of Quantum Computing

Quantum cryptography and quantum key distribution
Quantum communication and teleportation
Optimization problems using quantum computing
Emerging quantum technologies and future directions

Course - Financial Literacy for Professionals

Course Outcomes (COs)

On successful completion, the student will be able to:

CO	Outcome Statement
CO 1	Interpret personal and organisational financial statements, including Balance Sheets, Profit & Loss accounts, and Cash Flow Statements.
CO 2	Compute income-tax liability, identify applicable deductions, and file basic ITR forms relevant to salaried and self-employed professionals.
CO 3	Analyse capital-expenditure proposals, loan structures, and procurement options using financial appraisal tools (NPV, IRR, Payback Period).
CO 4	Construct a personal financial plan encompassing budgeting, insurance, provident-fund, and investment portfolio appropriate to a young professional.
CO 5	Evaluate financial proposals, business plans, and clinic/start-up budgets by identifying risks, assumptions, and financial viability.

Module 1: Foundations of Financial Literacy

- Financial literacy and its relevance to engineering and medical professionals
- Key concepts: assets, liabilities, net worth, and cash flow
- Reading and interpreting the Balance Sheet, P&L, and Cash Flow Statement
- The Indian financial ecosystem: RBI, SEBI, IRDAI, and banking structure

Module 2: Taxation for Professionals

- Income-tax basics: heads of income, slabs (old vs. new regime), TDS, Form 16
- Professional tax vs. income tax - relevance for doctors in private practice
- GST fundamentals for medical services, engineering consultancy, and freelance work
- Tax-saving instruments: 80C, 80D, NPS, HRA - practical implications • ITR-1, ITR-3, ITR-4 - which form applies, and when

Module 3: Capital Expenditure and Equipment Finance

- Capital vs. revenue expenditure - the crucial distinction
- Depreciation methods (SLM, WDV) and their implications for equipment-heavy professions
- Loan structuring: EMI computation, reducing-balance interest, total cost of borrowing
- Financial appraisal: NPV, IRR, and Payback Period with professional examples
- Lease vs. buy decisions in medical and engineering contexts

Module 4: Personal Finance and Wealth Planning

- The professional's financial life cycle: from junior roles to senior practice
- Budgeting frameworks: 50-30-20 rule and zero-based budgeting
- Insurance essentials: term life, health, and professional-indemnity cover
- Retirement planning: EPF, PPF, NPS - computation and strategy
- Mutual funds, SIPs, and equity basics - risk profiling for professionals
- Credit scores, personal loans, and home-loan eligibility

Module 5: Entrepreneurial Finance and Business Planning

Theory

- Financial anatomy of a start-up / clinic: capital structure, seed funding, bootstrapping • Break-even analysis: fixed cost, variable cost, contribution margin
- Reading an investor pitch from a financial lens - what investors look for
- Venture capital, angel investing, and government schemes (Startup India, PMKVY)
- Financial due diligence before a partnership or co-founding arrangement

Course - Entrepreneurship for Engineers
Course Learning Outcomes (CLOs)

On successful completion, the student will be able to:

CO	Outcome Statement
CO 1	Conduct customer-discovery interviews, synthesise real insight, and distinguish a validated problem from an untested assumption.
CO 2	Design, test, and iterate a business model and MVP using behavioural evidence - not opinions.
CO 3	Model unit economics, cash runway, and break-even; choose a legal structure and meet core compliance obligations (GST, registrations).
CO 4	Build and run a measurable growth / performance-marketing engine and evaluate a cap table and fundraising model.
CO 5	Assemble a complete venture package - financial model, cap table, investor deck - and pitch it live before a panel.
CO 6	Decide - with evidence and self-knowledge - whether to start, operate, fund, or join a venture.

Module 1: Entrepreneurial Mindset & Opportunity Discovery

Theme: Earn the right to build - fall in love with the problem, not the solution.

Theory

- Effectuation vs. causation; the lean build-measure-learn loop; desirability / viability / feasibility; resilience and the founder's relationship with failure.
- Opportunity sizing: TAM / SAM / SOM; 'why now?'; the difference between a feature, a product and a business.
- How a business makes money - revenue models, margins, bootstrapping vs. outside capital, personal runway.

Module 2: Business Model Design, MVP & the First Sale

Theme: Turn a validated problem into a business model real customers will pay for.

Theory

- Business Model Canvas (9 linked decisions); Value Proposition Canvas; marketplace, subscription, freemium archetypes; competitive positioning and moats.
- MVP types - concierge, Wizard-of-Oz, landing page, prototype; vanity vs. actionable metrics; pivot discipline.
- Pricing strategy - cost-plus vs. value-based vs. competitive; contribution margin; the marketing funnel; sales fundamentals and closing the first sale.

Module 3: Venture Operations, Finance & Compliance

Theme: Make the venture real - operate it lawfully, profitably, and at controlled cost.

Theory

- Process design, bottlenecks and theory of constraints; lean thinking - the seven wastes, Kaizen, quality SOPs.
- Unit economics - CAC, LTV, contribution margin, payback period; 12-18-month bottom-up forecast; burn rate, runway and the startup's most important date.
- Business structures - proprietorship, partnership, LLP, Pvt. Ltd.; GST essentials (registration, input credit, filing); compliance calendar; founder-agreement clauses.

Module 4: Scaling - Team, Growth Marketing & Fundraising

Theme: Turn a working venture into a growing one - build the team, the growth engine, and the case for capital.

Theory

- Founding-team composition, equity splits, founders' agreement; hiring for ambiguity; culture as a system; ESOPs and incentives.
- AARRR growth funnel; performance marketing - paid channels, CAC, ROAS, attribution; cohort-retention analysis; channel-market fit.
- The funding ladder - bootstrapping, angels, seed, VC; pre/post-money valuation; cap table and dilution; term-sheet basics (preference, control); investor narrative.

Module 5: Venture Launch Capstone & the Sustainable Enterprise

Theme: Become the founder - launch something real, defend it under due-diligence pressure, and decide who

you are.

Theory

- Triple bottom line, ESG and stakeholder thinking; social entrepreneurship; ethics in the venture - the lines you won't cross even when profitable.
- Go-to-market execution - sequencing channels, message and offer; launch metrics and the feedback loop; iteration under live conditions; crisis readiness.
- Integration - validate → model → operate → grow → fund → launch → defend; the credible ask (amount, valuation, milestones, use of funds); due-diligence preparation.