SEMESTER VII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	CE1701	Estimation,Costing and Valuation Engineering	PC	3	3	0	0	3
2	GE1771	Principles of Management	ES	3	3	0	0	3
3		Professional Elective III	PE	3	3	0	0	3
4		Professional Elective IV	PE	3	3	0	0	3
5		Open Elective*	OE	3	3	0	0	3
6		Online Course**	OL	NPTEL/SWAYAM				3
PRACTICALS								
7	CE1711	Irrigation and Environmental Engineering Drawing	PC	4	0	0	4	2
8	CE1721	Creative andInnovative Project	EEC	4	0	0	4	2
9	CE1722	Field Practices Training	EEC	0	0	0	0	2
			TOTAL	**23**	**15**	**0**	**8**	**24**

SEMESTER VIII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1	CE1821	Project Work	EEC	16	0	0	16	8
			TOTAL	16	0	0	16	8

*****Course from the Curriculum of other UG programmes.

** Students can take online courses in any of the three semesters (5th, 6th, and 7th) for a total of 6 credits, and grades will be awarded in the consolidated mark statement accordingly.

PROFESSIONAL ELECTIVES (PEs)

PROFESSIONAL ELECTIVE III (SEMESTER VII)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1	CE1731	Design of Prestressed Concrete Structures	PE	3	3	0	0	3
2	CE1732	Industrial Structures	PE	3	3	0	0	3
3	CE1733	Prefabricated Structures	PE	3	3	0	0	3
4	CE1734	Structural Dynamics and Earthquake Engineering	PE	3	3	0	0	3
5	CE1735	Advanced Concrete Technology	PE	3	3	0	0	3

GE1771 **PRINCIPLES OF MANAGEMENT**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To give a basic idea about the need of management principles in all kinds of organization
- To understand the managerial functions like planning, organizing, staffing, Directing and controlling
- To gain some knowledge about different structures of organization
- To understand the role played by leader in different levels, and to understand the qualities, skills required for the leader while leading a team globally.
- To gain some knowledge about international management.

UNIT I **INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS** **9**

Definition of Management - Nature, Scope and Functions of Management - Evolution of Management - Contributions of FW Taylor (14 principles of Management), Henri Fayol, Elton Mayo, Roethilisberger, H.A.Simon and P.F Drucker- Management theories - Science or Art – Manager Vs Entrepreneur- types of managers, managerial roles and skills – Evolution of Management –Scientific, human relations , system and contingency approaches –Current trends and issues in Management.

UNIT II **PLANNING** **9**

Nature and purpose of planning - Planning process - Types of planning - Objectives - Setting objectives - Policies - Planning premises - Strategic Management - Planning Tools and Techniques - Decision making steps and process.

UNIT III **ORGANISING** **9**

Nature and purpose - Formal and informal organization - Organization chart - Organization structure - Types - Line and staff authority - Departmentalization - delegation of authority - Centralization and decentralization - Job Design - Human Resource Management - HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV **DIRECTING** **9**

Directing meaning-importance-principles of directing - Motivation - Motivation theories - Motivational techniques - Job satisfaction - Job enrichment - Leadership - types and

theories of leadership - Communication - Process of communication, types of communication and its uses - Barrier in communication - Effective Communication - Communication and IT.

UNIT V CONTROLLING 9

System and process of controlling - Budgetary and non - Budgetary control techniques - Use of computers and IT in Management control - Productivity problems and management - Inventory Management - PERT, CPM - Application - Control and performance - Direct and preventive control.

TOTAL: 45 PERIODS

OUTCOMES

CO1: Explain the trends and challenges of management in global scenario, the different types of organization and its effectiveness.

CO2: Utilize the strategies and policies which are involved in planning, Steps involved in the process of planning and use it for decision.

CO3: Identify the structure, purpose, selection and recruitment process in organizations.

CO4: Explain the various motivational theories and processes of management including its functions

CO5: Compare and contrast the various control techniques.

TEXT BOOKS

1. Harold Koontz and Heinz Weihrich *Essentials of Management*, Tata McGraw Hill, 1998.
2. Stephen P. Robbins and Mary Coulter, *Management*, Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.

REFERENCE BOOKS

1. Robert Kreitner and MamataMohapatra, *Management*, Biztantra, 2008.
2. Stephen A. Robbins and David A. Decenzo and Mary Coulter, *Fundamentals of Management,* Pearson Education, 7th Edition, 2011.

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REGULATIONS - 2021

CHOICE BASED CREDIT SYSTEM

B.E. CIVIL ENGINEERING

CURRICULUM AND SYLLABI FOR SEMESTER III TO IV

SEMESTER III

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	MA2202	Transforms and Numerical Solution of Equations	BS	4	3	1	0	4
2	CE2201	Construction Materials	PC	3	3	0	0	3
3	CE2202	Fluid Mechanics	PC	3	3	0	0	3
4	CE2203	Mechanics of Solids	PC	3	3	0	0	3
5	CE2204	Surveying	PC	3	3	0	0	3
6	GE2201	Design Thinking	EM	3	3	0	0	3
7		Audit Course	AU	3	3	0	0	0
PRACTICALS								
8	CE2205	Computer Aided Building Drawing Laboratory	PC	4	0	0	4	2
9	CE2206	Surveying Laboratory	PC	4	0	0	4	2
10	EM2202	Interpersonal Skills - Listening and Speaking	EM	2	0	0	2	1
			TOTAL	**32**	**21**	**1**	**10**	**24**

SEMESTER IV

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	MA2254	Probability, Statistics and Numerical Methods	BS	4	3	1	0	4
2	CE2251	Applied Hydraulic Engineering	PC	3	3	0	0	3
3	CE2252	Concrete Technology	PC	3	3	0	0	3
4	CE2253	Environmental Engineering	PC	3	3	0	0	3
5	CE2254	Geotechnical Engineering – I	PC	3	3	0	0	3
6	CE2255	Strength of Materials	PC	4	3	1	0	4
7	GE2251	Quantitative Aptitude	EM	1	1	0	0	1
8	AUD110	Tamils and Technology	AU	1	1	0	0	0
PRACTICALS								
9	CE2256	Geotechnical Laboratory	PC	3	0	0	3	1
10	CE2257	Strength of Materials Laboratory	PC	3	0	0	3	1
11	EM2252	An Introduction to Advanced Reading and Writing	EM	2	0	0	2	1
			TOTAL	**30**	**20**	**2**	**8**	**24**

Course Code	Course Name	L	T	P	C
CE2253	ENVIRONMENTAL ENGINEERING	3	0	0	3

Category: Professional Core Course

a. Preamble

This course is to introduce students to various components and design of water supply scheme, water treatment methods, water storage distribution system, sewage treatment, disposal and sewerage system.

b. Course Outcome

After successful completion of the course, the students will be able to

CO. No.	Course Outcome	Knowledge Level
CO1	Understand the various components of water supply scheme, intake structure and design of conveyance system for water transmission	K2
CO2	Understand the process of conventional treatment and design of water process and knowledge about the recent advances in water treatment	K2
CO3	Design and evaluate water distribution system and water supply in buildings.	K3
CO4	Estimate sewage generation and design sewer system including sewage pumping stations.	K3
CO5	Understand the self-purification of streams and sludge and sewage disposal methods, selection of treatment process and design of wastewater treatment system	K2

c. Course Syllabus **Total : 45 Periods**

SOURCE AND CONVEYANCE OF WATER SUPPLY SYSTEMS 9

Planning - Objectives - Population forecasting - Design period - Water demand - Sources and characteristics of water - Source selection - Water quality parameters & significance - Standards – Intake structures - Conveyance - Pipes - Mains design - Pumps - Pump selection.

WATER TREATMENT 9

Objectives - Unit operations and processes - Principles, functions of Chemical feeding, flash mixers, flocculators - Design of sedimentation tanks and sand filters - Disinfection -

Construction, operation and maintenance aspects of water treatment plants - Aeration - Iron and manganese removal, defluoridation and demineralization - Water softening - Desalination - Membrane Systems.

WATER STORAGE AND DISTRIBUTION **9**

Requirements of water distribution - Components - Service reservoirs - Network design - Leak detection methods - Principles of design of water supply in buildings - House service connection - Fixtures and fittings.

PLANNING AND DESIGN OF SEWERAGE SYSTEM **9**

Sources of waste water - Characteristics and composition of sewage - Population equivalent - Sanitary sewage flow estimation - Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage- Storm runoff estimation - Sewer appurtenances - Corrosion in sewers - Prevention and control – Sewage pumping-drainage in buildings - Plumbing systems for drainage

SEWAGE TREATMENT AND DISPOSAL **9**

Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended aeration systems - Trickling filters - Sequencing Batch Reactor(SBR) - UASB – Waste Stabilization Ponds - Other treatment methods - Reclamation and Reuse of sewage – Recent Advances in Sewage Treatment - Discharge standards-sludge treatment - Disposal of sludge

d. Activities

Visit to wastewater treatment plant to know about the realtime working of treatment facility.

e.Learning Resources

Text Books

1. Garg, S.K, 2015, *Environmental Engineering, Vol.I & Vol.II* Khanna Publishers, New Delhi.
2. Modi, P.N., 2016, *Water Supply Engineering, Vol.I & Vol II* Standard Book House, New Delhi.
3. Duggal K.N., 2014, *Elements of Environmental Engineering* S. Chand and Co. Ltd., New Delhi.
4. Punmia, B.C., Jain, A.K., and Jain.A.K.., *Environmental Engineering, Vol I & Vol.II*, Laxmi

Reference Books

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
2. Syed R. Qasimand Edward M. Motley Guang Zhu, 2009, *Water Works Engineering Planning, Design and Operation*, Prentice Hall of India Learning Private Limited, New Delhi.
3. Metcalf and Eddy, 2010, *Waste water Engineering – Treatment and Reuse*, Tata Mc. Graw – Hill Company, New Delhi.
4. Syed R.Qasim, 2010, *Waste water Treatment Plants*, CRCPress, WashingtonD.C.

SEMESTER VII

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	CS1771	Cloud Computing	PC	3	3	0	0	3
2	IT1671	Cryptography and Network Security	PC	3	3	0	0	3
3	GE1671	Total Quality Management	HS	3	3	0	0	3
4	PE5	Professional Elective V	PE	3	3	0	0	3
5	PE6	Professional Elective VI	PE	3	3	0	0	3
6	OE2	Open Elective – II*	OE	3	3	0	0	3
		Online Course**						
PRACTICALS								
7	IT1681	Cryptography and Network Security Laboratory	PC	4	0	0	4	2
8	CS1781	Cloud Computing laboratory	PC	4	0	0	4	2
9	CS1721	Capstone Project	EEC	4	0	0	4	2
			TOTAL	**30**	**18**	**0**	**12**	**24**

SEMESTER VIII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	OL2	Online Course – II**	OL	0	0	0	0	3
PRACTICALS								
2	CS1821	Project work	EEC	16	0	0	16	8
			TOTAL	16	0	0	16	11

***** Course from the Curriculum of other UG programmes.

** Students shall complete online course in this semester. Credits earned will be added in consolidated mark statement.

GE1671 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Learn the concepts of quality and quality management, TQM framework, Barriers and Benefits of TQM.
- Apply the Principles and techniques of Quality Management for real time.
- Understanding the need and importance of quality assurance and certification.

UNIT I INTRODUCTION 9

Concept of Quality and Quality Management- Determinants of quality of product & service-Quality vs. Reliability-- Definition of TQM-- Basic concepts of TQM -- TQM Framework- Barriers to TQM –Benefits of TQM.–Gurus of TQM (Brief introduction)- Quality statements – vision, mission, Policy.

UNIT II PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT 9

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi, Shingeo and Walter Shewhart - Concepts of Quality circle, Japanese 5S principles and 8D methodology.

UNIT III TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT 9

Quality functions development (QFD) – Benefits, Voice of customer, information Organisation, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) – requirements of reliability, failure rate, FMEA stages, design, process and documentation-Taguchi techniques.

UNIT IV STATISTICAL QUALITY CONTROL 9

Juran’s concept of quality cost-components of Quality Cost- Statistical Quality Control – Inspection, Sampling, Sample Size, Sampling Plan, AQL, OC curve, Producer Risk, Consumer Risk, AOQ, AOQL, Control Charts & Control Limits – X, R & S charts and their application- causes of variations – Assignable & Random; Runs-Test, Chart-Sensitivity Test and Run-Sum Test; Normal-Distribution curve and concept of Six Sigma.

UNIT V QMS- QUALITY MANAGEMENT SYSTEM 9

Introduction-Benefits of ISO Registration-ISO 9000 Series of Standards-Sector-Specific Standards - AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements-Implementation-Documentation-Internal Audits-Registration-ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001-Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOMES

CO1: Apply TQM concepts in a selected enterprise

CO2: Apply TQM principles in a selected enterprise

CO3: Explain Taguchi's techniques, Performance Measures, QFD and HOQ.

CO4: Explain Six Sigma concept and apply Traditional tools, new tools and Benchmarking for statistical quality control.

CO5: Confirm quality standards and implementing QMS in business organization.

TEXT BOOKS

1. Suganthi L & Anand Samuel, 2004, *Total Quality Management*, Prentice Hall Publications.
2. Dale H Besterfiled, Carol B Michna, Glen H Besterfield, Mary B Sacre, Hemant Urdhwareshe & Rashmi Urdhwareshe, 2013, *Total Quality Management*, Revised 3rd ed, Indian Reprint, 6th Impression, Pearson Education Asia.

REFERENCE BOOKS

1. Rose JE, 1997, *Total Quality Management,* S Chand & Co.
2. Kiran DR, 2016, *Total Quality Management: Key concepts and case studies*, Butterworth – Heinemann Ltd.
3. Shridhara Bhat K, 2016, *Total Quality Management: Text and Cases*, 2nd ed, Himalaya Publishing House India.

SEMESTER VII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	ME1701	Principles of Industrial Engineering	PC	3	3	0	0	3
2	ME1702	Robotics	PC	3	3	0	0	3
3		Open Elective – II*	OE	3	3	0	0	3
4		Professional Elective – III	PE	3	3	0	0	3
5		Professional Elective – IV	PE	3	3	0	0	3
6		Professional Elective – V	PE	3	3	0	0	3
7		Online Course – 2**	OL	0	0	0	0	3
PRACTICALS								
8	ME1711	Automation & IOT Laboratory	PC	4	0	0	4	2
9	ME1721	Technical Seminar	EEC	2	0	0	2	1
			TOTAL	**24**	**18**	**0**	**6**	**24**

SEMESTER VIII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1	ME1821	Project Work	EEC	20	0	0	20	10
2		Online Course – 2**						
			TOTAL	20	0	0	20	10

***** Course from the Curriculum of other UG Programme**.**

**The students shall complete the online course in this semester and credits would be added in consolidated mark sheet.

PROFESSIONAL ELECTIVES (PEs)

PROFESSIONAL ELECTIVE III (SEMESTER VII)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1	ME1731	Concepts of Engineering Design	PE	3	3	0	0	3
2	ME1732	Mechatronics and IoT	PE	3	3	0	0	3
3	ME1733	Product Design using Value Engineering	PE	3	3	0	0	3
4	ME1734	Solar Energy Technology	PE	3	3	0	0	3
5	ME1735	Waste management and energy recovery	PE	3	3	0	0	3

ME1701 PRINCIPLES OF INDUSTRIAL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To enable students to understand the fundamental economic concepts for engineering and to learn the techniques of incorporating inflation factor in economic decision making.
- To equip the students about fundamental concept and principles of industrial safety.

UNIT I INTRODUCTION TO ECONOMICS 9

Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics - Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis - V ratio, Elementary economic Analysis.

UNIT II JOINING PROCESSES 9

Value engineering – Function, aims, Value engineering procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor - Uniform gradient series annual equivalent factor, Effective interest rate**.**

UNIT III CASH FLOW AND DEPRECIATION 9

Cash flow- Introduction, Methods of comparison of alternatives -Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method.

Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation-Sum of the years digits method of depreciation-Evaluation of public alternatives- introduction, Examples, Inflation adjusted decisions – Examples on comparison of alternatives and determination of economic life of asset.

UNIT IV INDUSTRIAL SAFETY 9

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire,

guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT V FAULT TRACING 9

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like machine tool, Pump, Air compressor, Internal combustion engine, Boilers and Electrical motors, Types of faults in machine tools and their general causes.

TOTAL: 45 PERIODS

OUTCOMES

CO1: Explain the basic terminologies in Engineering Economics, Elementary Economic Analysis and Value Engineering Procedures.

CO2: Interpret the Value of Money using Interest Formulae and their Applications**.**

CO3: Interpret the Depreciation, Inflation Methods and explain the various Alternatives.

CO4: Explain the fundamental concept and principles of Industrial safety.

CO5: Evaluate faults in various tools, equipment and machines.

TEXT BOOKS

1. Panneer Selvam., 2001, R, *Engineering Economics*, Prentice Hall of India Ltd.
2. L M Deshmukh.,2005, *Industrial Safety Management*, Tata McGraw-Hill Education.

REFERENCE BOOKS

1. Chan S.Park., 2011, *Contemporary Engineering Economics*, Prentice Hall.
2. Donald.G. Newman, Jerome.P.Lavelle., 2010, *Engineering Economics and analysis,*Engg. Press,Texas.
3 Degarmo, E.P., Sullivan, W.G and Canada., J.R, 2011., *Engineering Economy*.

4 Charles D. Reese., 2003, *Occupational Health and Safety Management* A Practical Approach, CRC Press.

5 J Maiti, Pradip Kumar Ray., 2017, *Industrial Safety Management,* 21st Century Perspectives of Asia, Springer.

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CHOICE BASED CREDIT SYSTEM
B.TECH. INFORMATION TECHNOLOGY
CURRICULUM AND SYLLABI FOR SEMESTER III TO IV

SEMESTER III

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	MA2201	Linear Algebra and Boundary Value Problems	BS	4	3	1	0	4
2	IT2201	Computer Organization and Architecture	PC	3	3	0	0	3
3	IT2202	Object Oriented Programming	PC	3	3	0	0	3
4	IT2203	Software Engineering	PC	3	3	0	0	3
5	EC2203	Digital Systems	ES	3	3	0	0	3
6	EE2201	Fundamentals of Electrical and Electronics Engineering	ES	3	3	0	0	3
7	GE2201	Design Thinking	ES	3	3	0	0	3
8		Audit Course	AU	3	3	0	0	0
PRACTICALS								
9	IT2204	Object Oriented Programming Laboratory	PC	4	0	0	4	2
10	EC2204	Digital Systems Laboratory	ES	4	0	0	4	2
			TOTAL	**33**	**24**	**1**	**8**	**26**

Course Code	Course Name	L	T	P	C
GE2201	DESIGN THINKING	3	0	0	3

Category: Employability Enhancement Course

a. Preamble

This course introduces the various principles of design thinking to achieve an effective design and to examine the implementation of the model or process for its successful operation.

b. Course Outcome

After successful completion of the course, the students will be able to

CO. No.	Course Outcome	Knowledge Level
CO1	Describe the basic principles of design and various stages of design thinking for better conceiving of idea and refinement	K2
CO2	Elucidate the concepts of idea generation and refinement	K3
CO3	Apply various prototype models for solving complex problems	K3
CO4	Analyze real-time problems for effective design, implementation and operation	K3
CO5	Device idea/solution towards development of a prototype for a chosen problem of interest	K4

c. Course Syllabus **Total : 45 Periods**

INTRODUCTION TO DESIGN THINKING **9**

Introduction - Product life cycle – Design Ethics – Design Process – Stages in design thinking: Immersion, Analysis and synthesis, Ideation, Prototyping.

IDEA GENERATION AND REFINEMENT **9**

Basic design - directions - Themes of thinking - Inspiration and references - Brainstorming - Value - Inclusion – Sketching - Presenting ideas - Thinking in images - Thinking in signs - Appropriation - Personification - Visual metaphors - Modification - Thinking in words – Words and language - Thinking in shapes - Thinking in proportions - Thinking in color - Outside the Box.

PROTOTYPING **9**

Developing designs - Types of prototype - Prototyping for Designing Complex Systems – The Efficacy of Prototyping under Time Constraints.

IMPLEMENTATION **9**

Format - Materials - Finishing - Media - Scale - Series/Continuity - Emerging Landscapes of Design - Real-Time Design Interaction Capture and Analysis - Enabling Efficient Collaboration in Digital Design - Spaces Across Time and Distance - Software used in Developing in Virtual Environments.

DESIGN THINKING IN VARIOUS SECTORS **9**

Design & Development of Prototypes for Wall Plastering, Rubber shredding, Separation of Corn seeds, Electric vehicles, Smart gates, Burglar alarm, Tyre pressure monitor, Development of Online Voting System, Online Proctoring System, Online Health Monitoring System, IoT based Home Automation and any other problem of interest in your domain.

d. Learning Resources

Text Books

1. Binder, T., De Michelis, G., Ehn, P., Jacucci, G., Linde, P., and Wagner, I., 2011, *Design things*, MIT press.
2. Ambrose, G., and Harris, P., 2009. *Basics Design: Design thinking*, Bloomsbury.

Reference Books

1. Meinel, C., and Leifer, L. (Eds.)., 2011. *Understanding Innovation*, Springer.
2. Plattner, H., Meinel, C., and Leifer, L. (Eds.)., 2010. *Design thinking: understand–improve–apply*, Springer Science & Business Media.
3. Moran, T. P., and Carroll, J. M., 1996. *Design Rationale: Concepts, Techniques, and Use*, L. Erlbaum Associates Inc.
4. Cross, N., 1984. *Developments in Design Methodology*, *Chichester*: Wiley

Web Resources

1. https://www.designsociety.org/download-publication/39626/Design+prototyping+of+systems
2. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

Video Lectures (Nptel or Any Other Video Lectures)

1. https://nptel.ac.in/courses/110/106/110106124/#

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AUDIT COURSES

S.No.	Course Category	Course Code	Course title	L	T	P	C
1.	AUD	AUD101	Constitution of India	3	0	0	0
2.	AUD	AUD102	Value Education	3	0	0	0
3.	AUD	AUD103	Teaching and Learning	3	0	0	0
4.	AUD	AUD104	Stress Relieving Management by Yoga	3	0	0	0
5.	AUD	AUD105	Developing your personality	3	0	0	0
6.	AUD	AUD106	Essence of Indian Knowledge and Tradition	3	0	0	0
7.	AUD	AUD107	Appreciation of Sangam era Tamil Literature	3	0	0	0
8.	AUD	AUD109	Heritage of Tamils	1	0	0	0
9.	AUD	AUD110	Tamils and Technology	1	0	0	0

AUD105	DEVELOPING YOUR PERSONALITY	L	T	P	C
		3	0	0	0

OBJECTIVES:

This course enables the students to

- Acquire Self-Management Skills.
- Strengthen their Soft Skills.
- Develop their habits of success.
- Nurture their emotional intelligence.
- Develop a growth mindset.

UNIT I	AN INTRODUCTION TO SOFT SKILLS	9

Introduction: A New Approach To Learning- Human Perceptions: Understanding People- Types of Soft Skills- Planning And Goal-Setting-Aiming For Excellence-Need Achievement And Spiritual Intelligence.

UNIT II	SELF-MANAGEMENT SKILLS	9

Self-Management- Self Evaluation- Self discipline, -Self criticism - Recognition of one's own limits and deficiencies - Self Awareness- Self Management -SWOT Analysis - Managing self – emotions, ego, pride.

UNIT III	HABITS OF SUCCESS	9

Guiding Principles-Habits: Identifying Good And Bad Habits - Habits: Habit Cycle - Breaking Bad Habits-Using The Zeigarnik Effect For Productivity And Personal Growth.

UNIT IV	EMOTIONAL INTELLIGENCE	9

IQ and EQ-Comparison-Importance of EQ -academic, professional, social, and interpersonal aspects.

UNIT V	DEVELOPING A GROWTH MINDSET	9

Definitions and Types of Mindset-Learning Mindsets-Secrets of developing growth mindset- Transformation of mindset.

TOTAL: 45 PERIODS

OUTCOMES:

After successful completion of the course, the students will be able to:

CO1	Acquire soft skills to realize their potential.
CO2	Personalize Self-Management Skills efficiently.
CO3	Practise Zeigarnik Effect for Personal Growth.
CO4	Understand the various aspects of emotional intelligence.
CO5	Demonstrate a growth mindset.

REFERENCE BOOKS:

1 Ghosh, B.N., 2012. *Managing Soft Skills for Personality Development*, McGraw Hill India, 2012.

2 Goleman, D., 1995. *Emotional Intelligence*, Bantam books.

3 Sherfield, R. M., Montgomery, R.J., and Moody, P, G., 2010. *Developing Soft Skills*. 4th ed. New Delhi: Pearson.

DIGITAL SOURCES:

- http://www.mindtools.com
- http:franklin covey.com
- https://dweck.socialpsychology.org/

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										M		
CO2										M		
CO3										M		
CO4										M		
CO5										M		

H – High; M – Medium; L – Low

KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near VIRUDHUNAGAR).

AUDIT COURSES

S.No.	Course Category	Course Code	Course title	L	T	P	C
1.	AUD	AUD101	Constitution of India	3	0	0	0
2.	AUD	AUD102	Value Education	3	0	0	0
3.	AUD	AUD103	Teaching and Learning	3	0	0	0
4.	AUD	AUD104	Stress Relieving Management by Yoga	3	0	0	0
5.	AUD	AUD105	Developing your personality	3	0	0	0
6.	AUD	AUD106	Essence of Indian Knowledge and Tradition	3	0	0	0
7.	AUD	AUD107	Appreciation of Sangam era Tamil Literature	3	0	0	0
8.	AUD	AUD109	Heritage of Tamils	1	0	0	0
9.	AUD	AUD110	Tamils and Technology	1	0	0	0

AUD101	CONSTITUTION OF INDIA	L	T	P	C
		3	0	0	0

OBJECTIVES:

This course enables the students to

- Teach history and functionality of Indian Constitution.
- Describe the premises informing the twin themes of liberty and freedom from a civil rightsperspective.
- Summarize powers and functions of Indian government.
- Explain structure and functions of local administration.
- Develop an idea about the functionality of the Indian Constitution

UNIT I	INTRODUCTION	9

History of Making of the Indian Constitution-Drafting Committee- (Composition & Working) - Philosophy of the Indian Constitution-Preamble-Salient Features.

UNIT II	CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES	9

Fundamental Rights-Right to Equality-Right to Freedom-Right against Exploitation Right to Freedom of Religion-Cultural and Educational Rights-Right to Constitutional Remedies Directive Principles of State Policy-Fundamental Duties.

UNIT III	ORGANS OF GOVERNANCE	9

Parliament - Composition - Qualifications and Disqualifications-Powers and Functions-Executive President-Governor-Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions-Constitutional amendment provisions.

UNIT IV	LOCAL ADMINISTRATION	9

District's Administration head- Role and Importance-Municipalities- Introduction- Mayor and role of Elected Representative-CEO of Municipal Corporation-Pachayati raj-Introduction- PRI- Zila Pachayat- Elected officials and their roles- CEO ZilaPachayat-Position and role-Block level-Organizational Hierarchy (Different departments)-Village level- Role of Elected and Appointed officials-Importance of grass root management.

UNIT V	FUNCTIONAL ASPECTS	9

Right to information, Right to education, Interpretation of Govt policies, finance-related content, income tax, GST, etc. And their functionalities in students day to day life –Youth Parliament.

TOTAL: 45 PERIODS

OUTCOMES:
After successful completion of the course, the students will be able to:

CO1	Understand history and philosophy of Indian constitution.
CO2	Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
CO3	Understand powers and functions of Indian government
CO4	Understand structure and functions of local administration.
CO5	Understand the functionality of the constitution.

TEXT BOOKS:

1. Basu D. D., 2015. *Introduction to the Constitution of India,* Lexis Nexis.
2. Busi S N, and Ambedkar B. R., 2015. *Framing of Indian Constitution,* 1st Edition.
3. Jain M P., 2014. *Indian Constitution Law*, 7th Edn., Lexis Nexis.
4. The Constitution of India (Bare Act), Government Publication, 1950.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									M			M
CO2									M			M
CO3									M			M
CO4									M			M
CO5									M			M

H – High; M – Medium; L – Low

SEMESTER VII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	CS1771	Cloud Computing	PC	3	3	0	0	3
2	IT1701	Software Project Management Techniques	PC	3	3	0	0	3
3	GE1471	Professional Ethics and Human Values	HS	3	3	0	0	3
4	PE4	Professional Elective – IV[#]	PE	4	2	0	2	3
5	PE5	Professional Elective – V	PE	3	3	0	0	3
6	OE2	Open Elective II[*]	OE	3	3	0	0	3
PRACTICALS								
8	CS1781	Cloud Computing Laboratory	PC	4	0	0	4	2
9	IT1721	Project Development	EEC	4	0	0	4	2
			TOTAL	**27**	**17**	**0**	**10**	**22**

SEMESTER VIII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1	IT1821	Project Work	EEC	16	0	0	16	8
TOTAL				**16**	**0**	**0**	**16**	**8**

***** Course from the Curriculum of other UG programmes.
[#] Theory cum Laboratory Course

PROFESSIONAL ELECTIVES (PEs)

PROFESSIONAL ELECTIVE IV (SEMESTER VII)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1	IT1731	Applied Virtual Reality and Augmented Reality[#]	PE	4	2	0	2	3
2	IT1732	Essentials of .NET Framework[#]	PE	4	2	0	2	3
3	IT1733	Intrusion Detection System and Prevention System[#]	PE	4	2	0	2	3

GE1471 PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	C
3	0	0	3

OBJECTIVES:

This course enables the students to

- Create an awareness on Engineering Ethics and Human Values.
- Instill Moral and Social Values and
- Impart Loyalty and to appreciate the rights of others

UNIT I HUMAN VALUES 9

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation –Commitment – Empathy – Self-confidence – Character – Spirituality – Stress management Techniques.

UNIT II ENGINEERING ETHICS 9

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas –Moral Autonomy – Kohlberg‘s theory – Gilligan‘s theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics –A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk -Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest –Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 9

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development –Engineers as Managers – Consulting Engineers – Engineers as Expert

Witnesses and Advisors - Moral Leadership – Code of Conduct - Corporate Social Responsibility

TOTAL: 45 PERIODS

OUTCOMES

Upon successful completion of course the students will be able to

CO1: Summarize the various Morals, Values, Ethics, Integrity and other Human Values

CO2: Describe the Senses of Engineering ethics, its related Theories and Models of Professional Roles

CO3: Explain the Codes of Ethics for various Engineering Experiments.

CO4: Examine the various Risk, Safety and Risk Benefit Analysis for a Product/Service in an Organization

CO5: Explain the Various Global Issues in Ethics and Review the Responsibilities and Rights of Professionals and Employees in an Organization

TEXT BOOKS

1. Mike W. Martin and Roland Schinzinger, 2017, *Ethics in Engineering*, 4th Edition, McGraw Hill.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, 2004, *Engineering Ethics*, Prentice Hall of India.

REFERENCE BOOKS

1. Charles B. Fleddermann, 2012, *Engineering Ethics*, 4th Edition, Prentice Hall.
2. Charles E. Harris, Michael S. Pritchard, Raw W. James, Elaine E. Englehardt, and Michael J. Rabins, 2019, *Engineering Ethics – Concepts and Cases*, 12th Edition, Cengage Learning.
3. John R Boatright, Jeffery Smith, 2016, *Ethics and the Conduct of Business*, 8th Edition, Pearson Education.
4. Edmund G Seebauer and Robert L Barry, 2001, *Fundamentals of Ethics for Scientists and Engineers*, South Asia Edition, Oxford University Press.

SEMESTER VII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	PT1701	Polymer Composites	PC	3	3	0	0	3
2	PT1702	Rubber Product Manufacturing	PC	3	3	0	0	3
3	GE1773	Total Quality Management	HS	3	3	0	0	3
4		Professional Elective III	PE	3	3	0	0	3
5		Professional Elective IV	PE	3	3	0	0	3
6		Open Elective II*	OE	3	3	0	0	3
PRACTICALS								
7	PT1711	Computer Aided Mold Design Laboratory -II	PC	4	0	0	4	2
8	PT1712	Polymer Blends and Composites lab	PC	4	0	0	4	2
9	PT1721	Mini project	EEC	4	0	0	4	2
			TOTAL	**30**	**18**	**0**	**12**	**24**

SEMESTER VIII

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1		Online course-II	OL	3	3	0	0	3
PRACTICALS								
2	PT1821	Project Work	EEC	8	0	0	16	8
			TOTAL	**11**	**3**	**0**	**16**	**11**

***** Course from the Curriculum of other UG programmes.

PROFESSIONAL ELECTIVES (PEs)

PROFESSIONAL ELECTIVE III (SEMESTER VII)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1	PT1731	Biodegradable Polymers	PE	3	3	0	0	3
2	PT1732	Fiber Technology	PE	3	3	0	0	3
3	PT1733	Plastics Packaging Technology	PE	3	3	0	0	3
4	PT1734	Polymer Structure Property Relations	PE	3	3	0	0	3
5	PT1735	Polymers in Civil and Geopolymer	PE	3	3	0	0	3

GE1773 **TOTAL QUALITY MANAGEMENT**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To enable students to Learn the concepts of quality and quality management, TQM framework, Barriers and Benefits of TQM.
- To enable students to Apply the Principles and techniques of Quality Management for real time
- Understanding the need and importance of quality assurance and certification

UNIT I INTRODUCTION 9

Concept of Quality and Quality Management- Determinants of quality of product & service-Quality vs. Reliability-- Definition of TQM-- Basic concepts of TQM -- TQM Framework- Barriers to TQM –Benefits of TQM.–Gurus of TQM (Brief introduction)- Quality statements – vision, mission, Policy.

UNIT II PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT 9

Overview of the contributions of Deming , Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi, Shingeo and Walter Shewhart - Concepts of Quality circle, Japanese 5S principles and 8D methodology.

UNIT III TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT 9

Quality functions development (QFD) – Benefits, Voice of customer, information Organisation, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) – requirements of reliability, failure rate, FMEA stages, design, process and documentation-Taguchi techniques

UNIT IV STATISTICAL QUALITY CONTROL 9

Juran’s concept of quality cost-components of Quality Cost- Statistical Quality Control – Inspection, Sampling, Sample Size, Sampling Plan, AQL, OC curve, Producer Risk, Consumer Risk, AOQ, AOQL, Control Charts & Control Limits – X, R & S charts and their application- causes of variations – Assignable & Random; Runs-Test, Chart-Sensitivity Test and Run-Sum Test; Normal-Distribution curve and concept of Six Sigma

UNIT V QMS- QUALITY MANAGEMENT SYSTEM 9

Introduction-Benefits of ISO Registration-ISO 9000 Series of Standards-Sector-Specific Standards - AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements-Implementation-Documentation-Internal Audits-Registration-ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001-Benefits of EMS

TOTAL: 45 PERIODS

OUTCOMES

CO1: Ability to apply TQM concepts in a selected enterprise.

CO2: Ability to apply TQM principles in a selected enterprise.

CO3: Ability to understand Taguchi's techniques, Performance Measures,QFD,HOQ .

CO4: Ability to understand Six Sigma and apply Traditional tools, New tools, Benchmarking.

CO5: To confirm quality standards and implementing QMS in business organisation

TEXT BOOKS

1. L. Suganthi & Dr. Anand Samuel*, Total Quality Management*, Prentice Hall, Publications, 2004
2. Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield, MaryB.Sacre, Hemant Urdhwareshe and Rashmi Urdhwareshe, *Total Quality Management*, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013

REFERENCE BOOKS

1. Rose J.E.,*Total Quality Management,* S. Chand & Co., 2016
2. Kiran.D.R, *Total Quality Management: Key concepts and case studies*, Butterworth – Heinemann Ltd, 2016
3. Shridhara Bhat K, *Total Quality Management: Text and Cases,* second edition, Himalaya Publishing House India, 2016

VERTICAL I: INDUSTRIAL BIOTECHNOLOGY

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1	VBT311	Applied Chemical Reaction Engineering	PE	3	3	0	0	3
2	VBT312	Bioreactor Design and Scaleup Process	PE	3	3	0	0	3
3	VBT313	Bioanalytical Techniques and Instrumentation	PE	3	3	0	0	3
4.	VBT314	Nanobiotechnology	PE	3	3	0	0	3
5.	VBT315	Algal Technology	PE	3	3	0	0	3
6.	VBT316	Environmental Biotechnology	PE	3	3	0	0	3
7	VBT317	Intellectual Property Rights in Biotechnology	PE	3	3	0	0	3

VERTICAL II: FOOD AND AGROSCIENCES

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1	VBT321	Plant Tissue Culture and Transformation Techniques	PE	3	3	0	0	3
2	VBT322	Post Harvest Management and Value Addition	PE	3	3	0	0	3
3	VBT323	Agricultural Waste Management	PE	3	3	0	0	3
4.	VBT324	Food Process Engineering	PE	3	3	0	0	3
5.	VBT325	Principles of Food Preservation	PE	3	3	0	0	3
6.	VBT326	Food Quality Testing and Evaluation	PE	3	3	0	0	3
7	VBT327	Food Safety Laws and Regulation	PE	3	3	0	0	3

Course Code	Course Name	L	T	P	C
VBT316	ENVIRONMENTAL BIOTECHNOLOGY	3	0	0	3

Professional Elective

a. Preamble

The course enables the students to

- Develop sustainable solutions to various environmental problems
- Reduce the pollution based on the bioremediation approaches

b. Course Outcome

After successful completion of the course, the students will be able to

CO. No.	Course Outcome	Knowledge Level
CO1	Understand the importance of microbial ecology and impacts of human activities on the environment	K2
CO2	Identify the suitable biodegradation strategies to various environmental pollutions	K3
CO3	Relate the concept of bioremediation in the field of biomining, removal of pesticide and heavy metal contamination.	K3
CO4	Demonstrate the scope for value addition using the principle of microbial technology	K3
CO5	Illustrate the types and process of environmental monitoring	K3

c. Course Syllabus **Total : 45 Periods**

INTRODUCTION **9**

Definition; Basics of ecosystem structure and function; Concepts and importance of microbial ecology in Environmental Biotechnology; Sampling, culture and cultivation of natural microorganisms; Genetically engineered organisms - Merits and demerits; Bio tools for environmental monitoring.

BIODEGRADATION **9**

Principles of Biodegradation, Biodetoxification, Bio-decolorization; Biotechnology of wastewater treatment; Microbial system in waste water stabilization; Biofilms; Bioreactors for industrial effluent treatments; Immobilization technology in waste water treatment; Oil Spill degradation; Reed bed technology; Rhizosphere engineering; Case study - Biodegradation of Agro-chemicals and Microplastics.

BIOREMEDIATION **9**

Bioremediation - concepts, methods and applications of natural attenuation and engineered bioremediation (e.g bioaugmentation and biostimulation); Biotransformation of xenobiotic compound; Bioscrubbers; Biomining of metals; Biopulping; Phytoremediation: Waste water treatment using aquatic plants; Root zone treatment.

BIOTECHNOLOGY AND VALUE ADDITION **9**

Production of value-added products from waste - Single Cell Protein (SCP), Biopolymers, Bioplasticizers, biofuels; Biofertilizers – principle, types, production process; Biopesticides – principle, types, production process; Effective Microorganisms for composting; Biochar; Microbial role in carbon storage and capture (Carbon sequestration).

ENVIRONMENTAL MONITORING **9**

Definition and environmental monitoring process – solid sampling, water sampling, air sampling; Analysis - physical, chemical and biological analysis methods; Bioindicators and Biomarkers; Biosensors – types, principle and instrumentation; Environment Impact Assessment: EIA complete process, Importance of EIA.

d. Activities

Students will visit the waste water treatment plant at college premises to understand the concept of microbial role in biodegradation.

e. Learning Resources

Text Books

1. Chatterji. A.K., *Introduction to Environmental Biotechnology,* Prentice Hall of India Pvt. Ltd., New Delhi, 2003.
2. Miller Jr. G.T., *Environmental Science,* 10th Edn., Thompson Brooks/Cole. United States, 2004.

Reference Books

1. Bhattacharya, B.C., and Ritu Banerjee, *Environmental Biotechnology*, Oxford Press, 2007
2. Agarwal S.K., *Environmental Biotechnology*, APH Publishing Corporation, New Delhi, 1998.