PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Complaint Curriculum for S.Y.B.Tech.

Engineering with effect from 2023-24

Syllabus of Open Elective Basket common for all the UG Engineering programs

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Compliant Curriculum

With effect from 2024-2025

Semester -III

Distribution	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*			*Total*
			L	*T*	*P*		*ESE*	*ISE*	*ICA*	*OE/ POE*	
PCC											
PCC											
PCC											
CEP/FP											
CEP/FP											
Entrepreneurship	EM-01	Product Development and Entrepreneurship	1	1		02		50	25		75
OE	OE-01	Open Elective-I	2		2	03	70	30	25		**125**
MDM											
VEC	VEC-01	Universal Human Values	1		2	02	50*		25		**75**
		Environmental Science	**1**								

***For VEC-01: MCQ-based examination to be conducted.**

PCC- Programme Core Course, PEC-Programme Elective Course, AEC - Ability Enhancement Course, IKS- Indian Knowledge System, CC- Co-curricular Courses, VSEC-Vocational and Skill Enhancement Course MDM-Multidisciplinary Minor: It should be selected from other UG Engineering Minor Programme.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Compliant Curriculum

With effect from 2024-2025

Semester -IV

Distribution	***Course Code***	***Name of the Course***	***Engagement Hours***			***Credits***	***FA***	***SA***			***Total***
			L	***T***	***P***		***ESE***	***ISE***	***ICA***	***OE/ POE***	
PCC											
PCC											
PCC											
SEC											
Economic/ Management	EM-02	Project Management and Economics	2			02		25	25		50
OE	**OE-02**	Open Elective-II	**2**		**2**	**03**	**70**	**30**	**25**		**125**
MDM											
VEC	**VEC-02**	**Professional Ethics**	**1**		**2**	**02**	**50***		**25**		**75**
		Total									
		Environmental Science	**1**				**40**	**10**			**50**

***For VEC-02: MCQ-based examination to be conducted.**

PCC- Programme Core Course, PEC-Programme Elective Course

AEC- Ability Enhancement Course, IKS- Indian Knowledge System, CC- Co-curricular Courses,

VSEC-Vocational and Skill Enhancement Course MDM - Multidisciplinary Minor: It should be selected from other UG Engineering Minor Programme.

These Courses are open for students of all the UG Engineering Program.

Semester: III List of open elective - I

Sr. No.	List of Open Electives
1.	OE-01A: Advanced Mathematics and Statistics
2.	OE-01B Digital Marketing and E- Commerce
3.	OE-01C Humanities and Social Sciences
4.	OE-01D Industrial and Quality Management
5.	OE-01E Mathematics for Software and Hardware
6.	OE-01F Soft Skills and Personality Development

Semester: IV List of open elective – II

Sr. No.	List of Open Electives
1.	OE-02A Entrepreneurship and Innovation
2.	OE-02B Environmental Sustainability
3.	OE-02C Renewable Energy
4.	OE-02 D Measurement, Instrumentation and Sensors
5.	OE-02E Operation Research
6..	OE-02F Computational Mathematics
7.	OE-02 G Professional Business Communication

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Second Year B. Tech Engineering Semester-I
EM-01 Product Development and Entrepreneurship

Teaching Scheme	**Examination Scheme**
Theory – 1 Hrs./Week, 1 Credit	**Theory- ISE-50Marks**
Tutorial -1 Hr/Week,1Credit	**ICA –** 25 Marks

Course Outcomes:

1. Understand the concept of product development
2. Identify the market strategies
3. Frame the idea and convert it into a concept
4. Identify the TRL, MRL and IRL level of product
5. Demonstrate the business canvas model and lean canvas model
6. Develop the strategies for launching the product in market

Section – I

Unit No. 1: Product development and entrepreneurship **Hrs.04**

a. Product development: Concept and necessity
b. Entrepreneurship: Definition, characteristics of entrepreneur, types of entrepreneurship
c. Market research and fundamentals: Techniques for conducting market research to identify customer needs and market opportunities

Unit No. 2: Ideation and concept development **Hrs. 03**

a. Steps/process of product development
b. Idea generation: Techniques for idea generation, such as brainstorming, mind mapping and general problem identification exercise etc.
c. concept development for the problem identified

Section – II

Unit No. 3: Business fundamentals for entrepreneurs **Hrs.03**

a. Technical readiness level in bracket. TRL market readiness level in bracket. MRL and IRL
b. Business canvas model, Lean canvas model

Unit No. 4: Introduction to IPR for Entrepreneurship **Hours: 04**

a. Developing strategies for launching products to market
b. Resources and risk management: Planning, execution and risk management (financial, technical, market)
c. Market and Sustainability and scalability

Term Work:
Term work should be based on assignments (Case studies) based on above topics.

Reference Books:

a. Product Design for Engineers, By Devdas Shetty, Cengage Learning
b. Product Design, by Kevin Otto, Kristin wood, Pearson Education Inc.
c. Product design and development, by K.T. Ulrich and S.D. Eppinger, Tata McGraw Hill
d. Product Development, by Chitale & Gupta, Tata McGraw Hill
e. Product design & process Engineering by Niebel & deeper, McGraw hill
f. Entrepreneurship, Hisrich, Robert D., Michael Peters and Dean Shepherded, , Tata McGraw Hill, ND
g. Entrepreneurship, , Brace R., and R., Duane Ireland, , Pearson Prentice Hall, New Jersy (USA).
h. Entrepreneurship Development and Small Business Enterprises, Charantimath, Poornima, Pearson Education, New Delhi.

These Courses are open for students of all the UG Engineering Program.

Semester: III List of open elective - I

Sr. No.	List of Open Electives
1.	OE-01A: Advanced Mathematics and Statistics
2.	OE-01B Digital Marketing and E- Commerce
3.	OE-01C Humanities and Social Sciences
4.	OE-01D Industrial and Quality Management
5.	OE-01E Mathematics for Software and Hardware
6.	OE-01F Soft Skills and Personality Development

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-I

OE-01A Advanced Mathematics and Statistics

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2 Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Objectives:

- To introduce the students to solution higher order differential equation.
- To introduce the students to partial differential equations.
- To introduce the student to statistics and probability.
- To introduce the student to fitting of curves, correlation and regression.
- To introduce the student to large sample test and chi-square distribution.

Course Outcomes:

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

- Compute higher order linear differential equations.
- Determine the solution of partial differential equation.
- Compute mean, mode, median and standard deviations of given data.
- Solve problems by binomial, Poisson and normal distribution.
- Compute relationship between variables.
- Use large sample test for testing hypotheses concerning two population means and chi-square test is used to compare observed results with expected results.

Section -I

Unit No. 01: Higher order linear differential equations **6Hrs**

Basic definition, differential operator, complimentary functions, particular integral, Shortcut methods for standard functions like e^{ax}, $\sin(ax+b)$, $\cos(ax+b)$,,x^m, $e^{ax}V$ and xV, Particular integral by general method (without method of variation of parameters) for other functions.

Unit No 02: First Order Partial Differential equations and applications **5 Hrs**

Non – Linear partial differential Equations of Type I $f(p, q) = 0$, Type II $f(p,q,z)=0$, Type III $f_2(p, x)= f_2(q,y)$, Linear partial differential equation by Lagranges method. Solution of partial differential equation by method of separation of variables.

Unit No. 03: Statistics **4Hrs**

Measures of central tendency and dispersion: Mean, median and mode for discrete data, Skewness, Kurtosis Mean, median and mode for grouped data, Histogram, Standard deviation (SD): Discrete data and Grouped data, Quartiles, deciles and percentiles.

Section II

Unit No.04: Fitting of curve, Correlation and Regression **5Hrs**

Fitting of curve- Least squares principle, fitting of straight line, fitting of second degree parabola, significance of a coefficient of correlation, Coefficient of correlation by Karl Pearson's method, Lines of regression of bivariate data.

Unit No. 05: Probability **5Hrs**

Random variable, discrete and continuous random variable, Probability density function, Binomial distributions, Poisson distributions, Normal distributions.

Unit No 06: Test of significance **5Hrs**

Null hypothesis, Alternative hypothesis, Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations, test for ratio of variances - Chi- square distribution, Degrees of freedom Chi-square test of goodness of fit.

- **In Semester Evaluation(ISE):**
  ISE shall be based upon student's performance in minimum two tests & mid-term written test conducted & evaluated at institute level

- **Internal Continuous Assessment (ICA):**
  ICA shall be based on student's performance during the laboratory sessions, minimum 6 assignments and on completion of minimum 8 exercises out of the following exercises:

1. Solve any 5 examples on shortcut method of higher order linear differential equations.
2. Solve any 5 examples on general method of higher order linear differential equations.
3. Solve any 5 examples on Cauchy's Homogeneous and Legendre's Linear Differential equations,
4. Solve any 5 examples on standard forms of PDE.
5. Solve any 5 examples on linear PDE by Lagrange method.
6. Solve any 5 examples on mean, median and mode of grouped data.
7. Solve any 5 examples on SD of grouped data.
8. Solve any 5 examples on Binomial distributions.
9. Solve any 5 examples on Poisson distributions.
10. Solve any 5 examples on Normal distributions.
11. Solve any 5 examples on fitting of second degree parabola.
12. Solve any 5 examples on Coefficient of correlation by Karl Pearson‟s method.
13. Solve any 5 examples on regression lines.
14. Solve any 5 examples on large sample test on single proportion, difference of proportions,
15. Solve any 5 examples on large sample test on single mean, difference of means.
16. Solve any 5 examples on Chi-square distribution.

✓ *Note – Students shall be encouraged to use Scilab, R-programming and other software's forsolving examples*

- **Text Books:**

1. A Text Book of Applied Mathematics, P.N. and J.N. Wartikar, Vol.1, Pune Vidyarthi Griha Prakashan.
2. Advanced Engineering Mathematics, H.K. Dass, S.Chand Publications ,Delhi.
3. Engineering Mathematics (Volume I),ITL Education, Cengage Learning.
4. Engineering Mathematics, Ravish R Singand Mukul Bhatt, Mc Graw Hill.
5. Applied Mathematics-I, II, Kreyzig's, Wiley.
6. A text book of Engineering Mathematics, N.P.Bali and Manish Goyal, LaxmiPublications,2008

- **Reference Books**:

1. Higher Engineering Mathematics (42nd Edition), B.S. Grewal, KhannaPublications ,Delhi.
2. Engineering Mathematics, SrimantaPalandSubodh C.Bhunia, Oxford HigherEducation.
3. Mathematics for Engineering Applications, Kuldip S. Rattan and Naathan W. Klingbeil Wiley.(Modeling and Core Engineering Application)
4. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi, 2010.
5. Statistical Methods, 43rd Edition, Gupta S. P, S. Chand Publication.

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-I

OE-01B Digital Marketing and E-Commerce

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Objectives:

- To make students to understand the important concepts related to Digital Business.
- To acquaint the students with the latest techniques of Digital Business.
- To familiarize the students with the applications of e-commerce.

Section I

Unit 01: Overview of Electronic Commerce and Social Commerce **Hrs.6**

Definition and Major EC Concepts, Electronic Markets and Networks, The Electronic Commerce Field: Growth, Content, Classification, and A Brief History of EC, The Content and Framework of E-Commerce, Classification of EC by the Nature of the Transactions and the Relationships Among Participants, Drivers and Benefits of E-Commerce, Web 2.0, The Major Tools of Web 2.0, Social Media, Social Networks and Social Network Services, Enterprise Social Networks, Social Commerce, The Digital Economy, The Digital Enterprise, The Social Business, EC Business Models, Impacts, and the Future of E-Commerce.

Unit 02: E-Commerce Major Applications: Retailing in Electronic Commerce **Hrs.6**

Products and Services; Internet Marketing and B2C Electronic Retailing, Overview of Electronic Retailing, Size and Growth of the B2C Market, Characteristics and Advantages of Successful E-Tailing, E-Tailing Business Models, Classification of Models by Distribution Channel, Referring Directories, Malls with Shared Services, Other B2C Models and Special Retailing, B2C Social Shopping, Online Travel and Tourism (Hospitality) Services, Characteristics of Online Travel, Online Banking and Personal Finance, E-Banking, Online Banking Capabilities, Pure Virtual Banks, Shopping Portals.

Unit 03: Business-to-Business E-Commerce **Hrs.5**

Basic B2B Concepts and Process, The Basic Types of B2B Transactions and Activities, The Basic Types of B2B E-Marketplaces and Services, Service Industries Online in B2B,The Benefits and Limitations of B2B.

Section II

Unit 04: E-Commerce **Hrs.6**

Mechanisms, Platforms, and Tools and Electronic Commerce Payment Systems**:** Electronic Commerce Mechanisms: An Overview, E-Marketplaces, Customer Shopping Mechanisms: Web stores, Malls, and Portals, The Future: Web 3.0, Web 4.0, and Web 5.0, Changing Retail Landscape, Using Payment Cards Online, Using Payment Cards Online, EC Micropayments, PayPal and Other Third-Party Payment Gateways, Mobile Payments, Digital and Virtual Currencies.

Unit 05: Marketing and Advertising in E-Commerce **Hrs.8**

Marketing and Advertising in E-Commerce; Learning About Online Consumer Behavior, Personalization and Behavioral Marketing, Web Advertising, Online Advertising Methods: From E-Mail to SEO and Video Ads, Mobile Marketing and Advertising, The Information Security Problem, Basic E-Commerce Security Issues and Landscape, Technical Malware Attack Methods: From Virusesto Denial of Service, Nontechnical Methods: From Phishing to Spam and Fraud, Consumer and Seller Protection from Online Fraud.

In Semester Evaluation (ISE):

ISE shall be based upon student's performance in minimum two tests & mid-term written test conducted & Evaluated at institute level

Internal Continuous Assessment (ICA):

ICA shall be based on student's performance during the laboratory sessions, minimum 6 assignments.

Recommended Books

1. Introduction to E Commerce & Social Commerce, Turban E , Whiteside J ,King D, Outland J Springer
2. Electronic Commerce – A Managerial Perspective, Efraim Turban, David King,Dennis Viehland, Jae Lee, Pearson Education.
3. Krishnamurthy S, E-Commerce Management: Text and Cases, Cengage South-Western, 2006.
4. Kenneth C. Laudon and Carol Guercio Traver, E Commerce: Business, Technology, Society, Pearson Education, 3rd Ed.

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-I

OE-01C Humanities and Social Sciences

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Objectives:

- To recognize and appreciate the interconnected nature of psychology, and human behavior
- To analyze the historical and cultural contexts of philosophy and ethics
- To apply interdisciplinary approaches to Sociology and society
- To understand the history and development of science and technology
- To develop critical thinking, and analytical skills through the use of science and technology
- To understand the basic concepts in economics and engineering

SECTION-I

Unit 1: Introduction to Humanities and Social Sciences **06 Hrs.**

Overview of Humanities and Social Sciences: Definition and scope, Interdisciplinary nature and connections between disciplines.

Role of Humanities and Social Sciences in Society: Contribution to understanding human behavior, societal structures, and technological advancements. Application in addressing contemporary challenges.

Unit 2: Psychology and Human Behavior **06Hrs.**

Foundations of Psychology: Historical overview and major theories, Schools of thought: psychoanalytic, behaviorist, humanistic, cognitive, and biological perspectives, Cognition and **Perception**: Memory, attention, and problem-solving, Perceptual processes and their role in human behavior, Social Psychology, Group dynamics, conformity, and social influence, Attitudes, stereotypes, and prejudice.

Developmental Psychology: Lifespan development and key theories, Influence of nature and nurture on human development.

Unit 3: Philosophy and Ethics **5Hrs.**

Introduction to Philosophy: Branches of philosophy, Major philosophical movements and their impact.

Political Philosophy: Government, justice, and political ideologies, Individual rights, freedoms, and social contracts.

Philosophy of Mind: Mind-body problem, Consciousness, free will, and determinism.

Unit 4: Sociology and Society **05 Hrs**

Introduction to Sociology: Basic concepts and theories,
Social Institutions: Family, education, religion, and the economy, Functions and dysfunctions of social institutions.
Social Stratification: Class, race, and gender, inequality, mobility, and global perspectives.
Culture and Society: Definition, elements, and cultural relativism, Pop culture and its impact on Society.

Unit 5: History of Science and Technology **05 Hrs**

Ancient and Medieval Science: Contributions from ancient civilizations, The scientific method in medieval Europe.
Scientific Revolution: Key figures and theories, Impact on worldview and society.
Industrial Revolution and Technological Advancements, Technological innovations in the 18th and 19th centuries, Social and economic consequences of industrialization.

Unit 6: Economics and Engineering **06 Hrs**

Introduction to Economics: Basic economic concepts. Microeconomics vs. macroeconomics and economic systems.
Economic Theories and Thinkers: Classical, Keynesian, and neoclassical economics, Contemporary economic issues and debates.
Engineering Fundamentals: Overview of engineering disciplines, Design, problem-solving, and ethics in engineering.

In Semester Evaluation (ISE):

ISE shall be based upon student's performance in minimum two tests & mid-term written test Conducted & Evaluated at institute level.

Internal Continuous Assessment (ICA):

ICA shall be based on student's performance and minimum 6 assignments.

Reference books

1. Interdisciplinary Studies: An Introduction to the Holistic Approach Author: Allen F. Repko Publisher: SAGE Publications Year: 2012
2. Interdisciplinary Research: Process and Theory, Authors: Allen F. Repko, Rick Szostak Publisher: SAGE Publications Year: 2016
3. Connections: An Introduction to the Economics of Networks, Author: Sanjeev Goyal Publisher: Princeton University Press Year: 2007
4. The Sociological Imagination, Author: C. Wright Mills , Publisher: Oxford University Press Year: 2000
5. The Structure of Scientific Revolutions, Author: Thomas S. Kuhn, Publisher: University of Chicago Press Year: 1996
6. Ethics: History, Theory, and Contemporary Issues, Authors: Steven M. Cahn, Peter Markie, Publisher: Oxford University Press Year: 2017.

7. Introduction to Engineering Ethics, Author: Mike W. Martin, Roland Schinzinger, Publisher: McGraw-Hill Education Year: 2010
8. Philosophy of Mind: A Comprehensive Introduction , Author: William Jaworski, Publisher: Wiley-Blackwell Year: 2011
9. Cognition: Exploring the Science of the Mind Authors: Daniel Reisberg, Paula Hertel
10. Publisher: W. W. Norton & Company Year: 2015
11. A People's History of the United States, Author: Howard Zinn, Publisher: Harper Perennial Modern Classics Year: 2015.

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-I

OE-01D Industrial and Quality Management

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Objectives:

During this course, student is expected to:

1. To give the students an overview of the general functions of Management applicable to Industrial & other organizations.
2. To give the students an overview of the general functions of Management applicable to Industrial & other organizations.
3. To make students aware about different motivational techniques and leadership styles
4. To give the students overview of working of various departments
5. To introduce various statistical process controls to students

SECTION-I

Unit 1: Introduction to Management and Industrial Functions **05 Hrs.**

Nature, purpose & scope of Management. System's approach to Management, Functions of Managers, Social responsibility & Ethics in Managing.

Unit 2: Planning, Organizing and Staffing **05 Hrs.**

Planning: Meaning, Types of plans, steps in planning, planning process, decision making. Organizing: Nature & purpose of organizing, Organization structure, Staffing: Definition, Human resource management & selection, Performance appraisal, Training & development.

Unit 3: Leading and Controlling **5Hrs.**

Leading: Human factors in managing, Motivation, „Carrot & Stick" theory, Maslow's theory of Hierarchy of needs, leadership styles, communication: process. Types- oral, written & nonverbal. Controlling: Process of controlling, control techniques.

Section II

Unit 4: Introduction to Quality **4hrs.**

Definition of Quality, Elements of quality, quality specifications. Factors affecting quality of

design & quality of conformance, quality control, quality costs. Benchmarking.

Unit 5: Total Quality Management **5hrs.**

Quality Gurus, Customer satisfaction, Tools of quality control: Check sheets, graphs, Pareto analysis, cause & effect diagram, Scatter diagram, control charts, Six Sigma.

Unit 6: Statistical Process Control **6hrs.**

Introduction to SPC, Control charts for variable & attributes, interpretation & applications of Xbar, R, P & C charts, sampling plans- types single & double, Operating characteristic curve, (Numerical treatment only on P & C charts and on sampling plans)

Internal Continuous Assessment (ICA):

List of Experiments/Assignments/Case Studies, etc

Minimum 6 assignments based on above topic out of which 2 case studies related to industry organization.

Text Book

Essentials of Management – Koontz Weihrich By TMH
Principles of Management & Administration – D. Chandra Bose. PHI
Statistical Quality Control – M. Mahajan By Dhanpat Rai & Co.
Total Quality Management – Besterfield & Others PHI

Reference Book

1. Principles of Management – Tripathy, Reddy by TMH

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-I

OE-01E Mathematics for Software and Hardware Applications

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Outcomes:

- Compute higher order linear differential equations.
- Solve Laplace transforms of given functions.
- Compute Z- transforms of given functions.
- Determine the numerical solutions of transcendental equations, ordinary differential equations and numerical integrations.
- Solve problems by binomial, Poisson and normal distribution.
- Compute Fourier series and half range Fourier series.

Section-I

Unit 1– Linear Differential Equations with Constant Coefficients **No of lectures – 05**

Basic definition, differential operator, complimentary functions, Particular integral shortcut method for standard functions like , e^{ax} sinax, cosax, x^m ,e^{ax} V, XV , Particular integral general method (without method of variation of parameters) for other functions.

Unit 2–Laplace Transform **No of lectures – 05**

Definition, Laplace Transform of standard functions, Properties First shifting, change of scale, multiplication of powers of t and division by t, Laplace Transform of derivative and integral, Laplace transform of periodic function, Unit step functions and unit Impulse functions, Methods of finding Inverse Laplace transforms by Convolution Theorem only.

Unit 3- Z-Transform **No of lectures – 05**

Z - Transform of elementary Functions, Region of Convergence (ROC), Z-Transform of standard functions, Properties of Z – Transform: Linearity, Change of scale, shifting property, multiplication by k. Inverse Z Transform by binomial expansion, partial fraction expansion and power series method.

Section-II

Unit 4- Numerical Methods **No of lectures – 05**

Newton-Rapshon Method, Newton's iterative formula for obtaining square root only, First order differential equation by Runge – Kutta method (Fourth order), Numerical Integration using -Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule.

Unit 5 - Fourier Series **No of lectures – 05**

Definition, Dirichlet's Conditions, Euler's formula, Fourier series in the interval $(0,2\pi)$, $(-\pi, \pi)$ and in the interval (-l, l) only, Half Range Series: Half range cosine series and Half range sine series

Unit 6 - Fourier Transform **No of lectures – 05**

Fourier integral, Fourier sine and cosine transform complex form of Fourier integral, Fourier sine and cosine inverse Transform.

Internal Continuous Assessment (ICA):

ICA shall be based on student's performance during the laboratory sessions, minimum 6 assignments.

Internal Continuous Assessment (ICA):

ICA shall be based on student's performance during the laboratory sessions, minimum 6 assignments and on completion of minimum 8 exercises out of the following exercises:

1. Solve any 5 examples on shortcut method of higher order linear differential equations.
2. Solve any 5 examples on general method of higher order linear differential equations.
3. Solve any 5 examples on multiplication by powers of t property of Laplace Transform.
4. Solve any 5 examples on division by t property of Laplace Transform.
5. Solve any 5 examples on inverse Laplace Transform by convolution method.
6. Solve any 5 examples of standard functions of z-transform.
7. Solve any 5 examples on properties of z-transform.
8. Solve any 5 examples on inverse Z-transform.
9. Solve any 5 examples on Newton Raphson method.
10. Solve any 5 examples on Runge Kutta method of fourth order.
11. Solve any 5 examples on methods of Numerical Integration.
12. Solve any 5 examples on Fourier Sine and Cosine series.
13. Solve any 5 examples on Half range Fourier series.
14. Solve any 5 examples on Fourier Transform
15. Solve any 5 examples on inverse Fourier Transform.

Text Books:

1) "A textbook of Applied Mathematics Vol II", Vidyarthi Grah Prakashan, Pune, JN and PN Wartikar
2) "Higher Engineering Mathematics" , Khanna Publications, Delhi, B S Grewal
3) "Advanced Engineering Mathematics", Wiley & SMS, Newyork, Kreyzig-John
4) "Numerical Methods", Khanna publications-New Delhi, BSGrewal
5) "Introductory methods of Numerical Analysis"-PHI Learning Publication ,SSShastry
6) "Linear algebra and Its applications", Peasson Education Inc, David C Lay
7) "Linear Algebra", 4th edition,PhI learning Pvt Ltd , Stephenh Friedberg Arnold, JInsel, Lawrence E Spence

Reference Books:

1) "Advanced Engineering Mathematics", Cengage Learning, Peter O'Neil
2) "Higher Engineering Mathematics" , Tata McGraw-Hill Education, BV Ramana
3) "Numerical Methods" SChand Publication, DrPKandasamy
4) "Numerical methods for scientific and engineering computations"-New age International Ltd MKJain,SRKIyengar,RKJain
5) V. Krishnamurthy, V.P. Mainra and J.L. Arora, "An introduction to Linear Algebra" Affiliated East–West press, Reprint 2005.

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Second Year B. Tech Engineering Semester-I

OE-01F Soft Skills and Personality Development

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Outcomes:

1. To understand aspects of effective communication
2. To understand the significance of emotional intelligence in self-growth and building Effective relationships.
3. To develop techniques to manage stress and time effectively
4. To develop interview & presentation skills

Section-I

Unit 1: Communication Skills **7 Hrs**

Understanding Human Communication, Constitutive Processes of Communication, Language as a tool of communication, Barriers to Effective communication, Strategies to Overcome the Barriers.

Unit 2: Emotional Intelligence **6 Hrs**

Importance, concept, Self Awareness, Self-Management, Measure of emotional intelligence, strategies to develop emotional intelligence.

Unit 3: Stress Management & Time Management **8 Hrs**

Stress Management- Concept & Sources of stress, Strategies for preventing and relieving stress.
Time Management- Meaning, characteristics, objectives of Time Management Importance of Time Management Benefits of Time Management Basic Principles of Time Management, Time Management Tools.

Unit 4 : Interview skills & Presentation Etiquettes **9 Hrs**

Interview skills- Types of interviews, in-depth perspectives, Interviewer and Interviewee, Before, During and After the Interview, Tips for Success.
Presentation Etiquettes - Importance of Preparation and Practice; Effective Delivery Techniques, Audience Analysis, Handling Stage Fright, Non-Verbal aspects of Presentation.

Internal Continuous Assessment (ICA):

ICA shall be based on student's performance during the laboratory sessions, minimum 6 assignments.

Reference Books:

1. Tengse, Ajay R. Soft Skills: A Textbook for undergraduates, Orient BlackSwan, 2015
2. Dhanavel, S.P. English and Soft Skills. Hyderabad: Orient BlackSwan, 2021.
3. The seven habits of effective people by Stephen R. Covey Simon , Schuster Publishers,1990
4. Managing Time for a Competitive Edge by Bharti R.L. , S.Chand
5. Psychology and work today *Duane Schultz,Sydney Ellen Schultz.*
6. Bar-On, R., & Parker, J.D.A.(Eds.) (2000). The handbook of emotional intelligence. San Francisco, California: Jossey Bros.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
S. Y. B. Tech. Engineering Semester- III
VEC-01: Universal Human Values

Teaching Scheme	**Examination Scheme**
Theory – 1 Hrs./Week, 1 Credit	**Theory-** ESE-50Marks
Practical - 2 Hr/Week, 1Credit	**ICA –** 25 Marks

Course Outcomes:

Upon completion of this course, students will be able to,

a. Appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
b. Develop holistic perspective towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence.
c. Appreciate the Universal Human Values and movement towards value-based living in a natural way.
d. Highlight ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Section –I

Unit: 1 Course Introduction, Need, Basic Guidelines, Content and Process for Value Education 7Hrs.

a. Understanding the need, basic guidelines, content and process for Value Education
b. Self-Exploration–what is it? - its content and process; "Natural Acceptance" and Experiential Validation- as the mechanism for self- exploration
c. Continuous Happiness and Prosperity- A look at basic Human Aspirations.
d. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority.
e. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
f. Method to fulfill the above human aspirations understanding and living in harmony at various levels

Unit 2: Understanding Harmony in the Human Being - Harmony in Myself 7Hrs

a. Understanding human being as a co-existence of the sentient "I" and the material Body
b. Understanding the needs of Self (I) and Body–Sukh and Suvidha
c. Understanding the Body as an instrument of I (I being the doer, seer and enjoyer)
d. Understanding the characteristics and activities of I and harmony in I
e. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail.
f. Programs to ensure Sanyam and Swasthya

Section -II

Unit 3: Understanding Harmony in Family and Society- Harmony in Human- Human Relationship 8Hrs

a. Understanding Harmony in the family – the basic unit of human interaction
b. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
c. Understanding the meaning of Vishwas; Difference between intention and competence
d. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
e. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
f. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family

Unit 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence 8Hrs.

a. Understanding the harmony in the Nature
b. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability andself-regulation innature
c. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
d. Holistic perception of harmony at all levels of existence

ICA: ICA marks should give on a weekly activity basis, depending upon completed activities and reports.

Text Books

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
2. The teachers manual: R.R Gaur, R Sangal, G P Bagaria, A foundation course inhuman Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010 Briggs, Britain.

Reference Books

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow.Reprinted2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, CommonwealthPurblishers.
3. 3Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits toGrowth, Club of Rome‟s Report, UniverseBooks.

6. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) KrishiTantraShodh,Amravati.
7. A Nagraj, 1998, JeevanVidyaekParichay, Divya Path Sansthan,Amarkantak.
8. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs,Britain.
9. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

Relevant websites, movies and documentaries

a. Value Education websites, http://uhv.ac.in,http://www.uptu.ac.in
b. Story of Stuff, http://www.storyofstuff.com
c. Al Gore, An Inconvenient Truth, Paramount Classics, USA
d. Charlie Chaplin, Modern Times, United Artists, USA
e. IIT Delhi, Modern Technology – the Untold Story
f. Gandhi A., Right Here Right Now, Cyclewala Productions
g. AICTE On-line Workshop on Universal Human Values Refresher Course-I Handouts

UHV-I handouts https://drive.google.com/drive/folders/16eOka8AoBpLGlCDajRvk4MXgfXQWzFCB?usp=sharing

UHV-II handouts https://drive.google.com/drive/folders/15eHkMVguzRBDrb65GFi7jMN6UEP 5JEk1?usp=sharing

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

S. Y. B. Tech. Engineering Semester- III & IV

Environmental Science

Teaching Scheme
Theory – 1 Hrs./Week, 1 Credit

Examination Scheme
Theory- ESE-40Marks
ISE – 10 Marks

Course Outcomes:
Upon completion of this course, students will be able to,

1. Develop public awareness about environment.
2. Explain Conservation of Ecosystem.
3. Explain Conservation of Biodiversity.
4. Select alternative engineering resources for Engineering Practice.
5. Apply techniques to reduce Environmental pollution.
6. Understand the Environmental policies and practices

Section I

Unit 1: Introduction to environmental studies (2 lectures)

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development

Unit 2: Ecosystems (4 lectures)

- What is an ecosystem? Structure and function of ecosystem;
- Energy flow in an ecosystem: food chains, food webs and ecological succession.
- Case studies of the following ecosystems :
  - Forest ecosystem
  - Grassland ecosystem
  - Desert ecosystem
  - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3: Natural Resources: Renewable and Non-•-renewable Resources (5 lectures)

- Land resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-•-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-•-state).
- Energy resources: Renewable and non- renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Section II

Unit 4: Biodiversity and Conservation (6 lectures)

Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots. India as mega-biodiversity nation; Endangered and endemic species of India. Threats to biodiversity: Habitat loss, poaching of wildlife, man- -wildlife conflicts, biological invasions; Conservation of biodiversity: In - situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit 5: Environmental Pollution (6 lectures)

- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

Unit 6: Environmental Policies & Practices (5 lectures)

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act, Air (Prevention, & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit 7: Human Communities and the Environment (5 lectures)

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Unit 8: Field work (3 lectures)

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site-•-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-•-pond, river, dam, pond, ocean / marine etc.

Suggested Readings:

1. Environmental Studies E - Text Book (Marathi and English Medium) Solapur University,2017
2. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
3. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
4. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
5. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
6. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Compliant Curriculum

With effect from 2024-2025

Semester - IV

Distribution	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	*FA*	*SA*			*Total*
			L	*T*	*P*		*ESE*	*ISE*	*ICA*	*OE/ POE*	
PCC											
PCC											
PCC											
SEC											
Economic/ Management	EM-02	Project Management and Economics	2			02		25	25		50
OE	**OE-02**	Open Elective-II	**2**		**2**	**03**	**70**	**30**	**25**		**125**
MDM	**MDM-02**										
VEC	**VEC-02**	**Professional Ethics**	**1**		**2**	**02**	**50***		**25**		**75**
		Total									
		Environmental Science	**1**				**40**	**10**			**50**

***For VEC-02: MCQ-based examination to be conducted.**

PCC- Programme Core Course, PEC-Programme Elective Course

AEC- Ability Enhancement Course, IKS- Indian Knowledge System, CC- Co-curricular Courses,

VSEC-Vocational and Skill Enhancement Course MDM - Multidisciplinary Minor: It should be selected from other UG Engineering Minor Programme.

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur
S. Y. B. Tech. Engineering Semester- IV
EM-02: Project Management and Economics

Teaching Scheme	**Examination Scheme**
Theory – 2 Hrs./Week, 2 Credit	**Theory-** ISE-25Marks
	ICA – 25 Marks

Course Outcomes:

On completion of the course students will be able to:

1. Demonstrate decision making and communication as a member of a team as well as Lead a team for effective management of construction projects.
2. Apply the Optimization techniques for decision making in construction industry.
3. Carry out ABC analysis, Break even analysis and calculate EOQ and Inventory costs for construction project.
4. Demonstrate the decision making abilities based on economics in projects and to appraise alternative projects.

Section I

Unit 1: **(Hrs.6)**

Definition and Functions of Management; Planning: Process of planning, Management by objectives; Organizing: Formal and informal organization, centralization, decentralization, line, line and staff, functional organization; Leading, directing, controlling and coordination; Communication process, motivation.

Unit 2: **(Hrs.5)**

Importance of Decision Making, steps in decision making. Decision under certainty: Linear Programming, Formulation of simple L-P model, Graphical method, Duality. Application of Linear Programming in "Transportation Problems": North-West corner method, Least cost method, Vogel's Approximation method (Only Initial Basic Feasible Solution) and Application of Linear Programming in „Assignment problems".

Unit 3: **(Hrs.04)**

Decision under uncertainty: Wald's, Savage, Horvitz and Laplace criterion of optimism and regret, expected monitory value, Theory of games (dominance pure and mixed strategy).

Section II

Unit 4: **(Hrs.5)**

Inventory control: Introduction, inventory cost, EOQ analysis, ABC analysis, safety stocks. Break even analysis.

Unit 5 **(Hrs.5)**

Engineering economics: Importance, demand and supply, types of costs, Interest-Simple, compound, continuous, and effective interest. Value of money - time and equivalence, Introduction to inflation. Cash flow diagram.

Unit 6 **(Hrs.6)**

Economic comparisons: Discontinuing methods- Present Worth method, equivalent annual cost method, capitalized cost method, Net Present Value, Internal Rate of Return and Benefit Cost ratio.

In Semester Evaluation (ISE)

ISE shall be based upon students‟ performance in minimum three tests conducted and evaluated at institute level.

Internal Continuous Assessment (ICA)

Internal Continuous Assessment (ICA) shall consist of minimum six assignments based on the entire curriculum.

TEXT BOOKS

1. A Textbook of Organizational Behaviour, CB Gupta, S. Chand Publications
2. Construction Engineering & Management, S.C. Sharma & S.V. Deodhar, Khanna Book Publishing
3. Optimization Techniques, S.S. Rao, Wiley Eastern India
4. Operation Research, Hamdy A. Taha, Operation Research, Prentice Hall of India, New Delhi 8th Ed.2011
5. Store Management, Menon K. S., Store Management, McMillan Co. New Delhi, 2nd Ed. 1998.
6. Principles of Construction Management: Roy Pilcher , Tata McGraw Hill Publications.
7. Principles of Engineering Economy- E. L. Grant, W. G. Ireson, R. S. Leavenworth, Wiley International Education, 7th Ed.

REFERENCE BOOKS

1. Total Quality Management, Ponia & Sharma, Khanna Publishing House, Delhi
2. Engineering Management: Industrial Engineering & Management, S.C. Sharma, Khanna Publishing House, Delhi
3. Principles and Practice of Management, Prasad, L.M, Sultan Chand
4. Organizational Behaviour, L.M. Prasad, Sutan Chand and Sons.
5. Handbook of Construction Management, Joy PK, Macmillan
6. Construction Project Management, Jha, Pearson
7. Total Quality Management, Gopal, PHI Publications
8. Industrial Engineering & Operations Management, S.K. Sharma. S.K. Kataria & Sons
9. Principles of Operation Research: Prentice Hall of India, 2nd Ed.1925,Wagner H. M.
10. Operation Research: Shaum‟s outline series, Richard Bronson Govindsami N., Tata McGraw
11. Hill , 2nd Ed.2004
12. Material Management, Gopal Krishnan, Sudeshan,
13. Engineering Economics - L.P. DeGarmo, W.G.Sullivan, J.A.Bantadelli, McMillan India Co. New Delhi, 8th Ed. 1984.
14. Manual of Construction Project Management- S. K. Guha, Thakurti, K. R. Shah, MultiTech Publishers.
15. Management Information System- Gupta R.C., CBS, New Delhi.
16. Value Engineering in the Construction Industry: Dell‟lsola, A. J., Construction Publication Company.

These Courses are open for students of all the UG Engineering Program.

Semester: IV List of open elective – II

Sr. No.	List of Open Electives
1.	OE-02A Entrepreneurship and Innovation
2.	OE-02B Environmental Sustainability
3.	OE-02C Renewable Energy
4.	OE-02 D Measurement, Instrumentation and Sensors
5.	OE-02E Operation Research
6.	OE-02F Computational Mathematics
7.	OE-02 G Professional Business Communication

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-II

OE-02A Entrepreneurship and Innovation

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course outcomes: On the completion of this course, the learner will able to
1. Appreciate and apply the innovation and process of innovation
2. Relate innovation and problem solving
3. Demonstrate application of innovation to techno-entrepreneurship

Section –I

Unit 1: Introduction **6Hrs.**

Innovation, definition and classification. The relationship of innovation and entrepreneurship, creation of competitive advantage based on innovation, economic theories of entrepreneurship, Mangerial and Entrepreneurial Competencies.

Unit 2: Entrepreneurship **6Hrs**

Concept and Need of Entrepreneurship Development- Definition of Entrepreneur, entrepreneurship, Concepts of Entrepreneur, Manager, Intrapreneur / Corporate Entrepreneur– comparative study - Roles, Responsibilities - Entrepreneurship as a career, Entrepreneurship as a style of management, Types of Business and Types of Entrepreneurship.

Unit 3: Innovation Sources **5Hrs.**

Sources of innovation (push, pull, analogies), transfer of technology. Creative methods and approaches used in innovation management. Approaches to management of the innovation process (agile management, Six Thinking Hats, NUF test),7-Sourses of Innovative Opportunities.

Section –II

Unit 4: Innovation Process **5Hrs**

Concept of shifting composition of economy, purpose of Innovation, innovation process, need for continuous learning.

Unit 5: Innovation Strategy **6Hrs**

Types and selection of appropriate strategies
1. **Innovative Strategies**: Types, differences, selection of appropriate strategy.
2. Blue Ocean and Red Ocean Strategic
3. Barriers to innovation in business, innovation failure and its causes

Unit 6: Essential Entrepreneurship Foundations **5Hrs**

Entrepreneurial Opportunities, Entrepreneurial Process and Decision Making , Crafting business models and Lean Start-ups, Organizing Business and Entrepreneurial Finance, Legal and Ethical Considerations, Opportunity Recognition and Idea Generation.

ICA: - Minimum Six Assignment based on the above syllabus.

Textbooks:

1. T. H. Byers, R. C. Dorf, A. Nelson, Technology Ventures: From Idea to Enterprise, McGraw Hill (2013)

2. Blank Steve: The Startup Owner‟s Manual: The Step by Step Guide for Building a Great Company, K&S Ranch.
3. Entrepreneurship: New Venture Creation– David H. Holt.
4. Entrepreneurship: Strategies and Resources.
5. Marc J. Dillinger - The Culture of Entrepreneurship–Brigitte Berger.
6. Innovation and Entrepreneurship–Peter F. Drucker

References

1. Bansal, Rashmi: Stay Hungry Stay Foolish, CIIE, IIM Ahmedabad.
2. Kachru Upendra: India Land of a Billion Entrepreneurs, Pearson.
3. Bagchi, Subroto, (2012). MBA At 16: a Teenager‟s Guide to Business, Penguin Books

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-II

OE-02B Environmental Sustainability

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Outcome: After completion of course, student will be able to:

CO1 demonstrate the principles of environmental management to carryout policy analysis and Prepare environment management plan.

CO2 apply the environmental management practices for infrastructural projects.

CO3 understand the environmental policies.

Section I

Unit 1. Environment and Biodiversity **6 Hrs.**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity–values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

Unit 2. Environmental Pollution **6 Hrs.**

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E- Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.

Unit 3. Sustainability and Management **6Hrs**

Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of Sustainability-from unsustainability to sustainability-millennium development goals, and protocols, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

Section II

Unit 4. Sustainability Practices **6Hrs**

Zero waste and 3R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy Efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization-Socioeconomically and technological change.

Unit: 5 Environmental Management **4Hrs**

Definition of Environmental Management, Principles of Environmental Management, Nature, Scope and Components of Environmental Management, Preparation and Review of Environmental Impact Assessment Report.

Unit: 6 Environmental Policies **5Hrs.**

Environmental Policy Analysis- Macro level and Micro level, Methods of Policy Analysis, steps involved, Environmental Management Plan (EMP), Components of EMP, Preparation of EMP, Environmental Economics, Estimation of Costs and Benefits, Cost-Benefit Analysis, Overview of Environmental Impact Assessment (EIA), Need and Importance, Steps involved, Methods of EIA.

ICA: - Minimum Six Assignment based on the above syllabus.

Text books:

1. Primes on „Environmental Management „, prof. P. Khanna, Multitech publications Co. New Delhi 2001.
2. Assessment and analysis of Environmental management, Shukla S. S., Shrivastva P. R. 1992, commonwealth publishers New Delhi 2003
3. Environmental Impact Assessment, second edition, Larry W. Canter, McGraw-Hill International editions.
4. Environmental Management by Rai R. K. et al Rawat Publications, New Delhi 1992.
5. Environmental Management Law and Administration, Diwan, Prag (Ed), vanity book international, New Delhi 1998.
6. Environmental Management in Petroleum industry, Walvi S. K., Agnihotri A. K., Wiley Eastern Ltd New Delhi 1992.
7. Anubha Kaushik and C. P. Kaushik‟s "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
8. Benny Joseph, „Environmental Science and Engineering‟, Tata McGraw-Hill, New Delhi, 2016.
9. Gilbert M.Masters, „Introduction to Environmental Engineering and Science‟, 2nd edition, Pearson Education, 2004.

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-II

OE-02C Renewable Energy

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course objectives:

- To understand energy scenario, energy sources and their utilization.
- To explore society‟s present needs and future energy demands.
- To Study the principles of renewable energy conversion systems.
- To exposed to energy conservation methods.

Section –I

Unit 1: Introduction: **6Hrs.**

Principles of renewable energy; energy and sustainable development, fundamentals and social implications. worldwide renewable energy availability, renewable energy availability in India, brief descriptions on solar energy, wind energy, tidal energy, wave energy, ocean thermal energy, biomass energy, geothermal energy, oil shale, Introduction to Internet of energy (IOE).

Unit2: **6Hrs.**

Solar Energy: Fundamentals; Solar Radiation; Estimation of solar radiation on horizontal and inclined surfaces; solar radiation Measurements- Pyrheliometers, Pyrometer, Sunshine Recorder. Solar Thermal systems: Flat plate collector; solar distillation; solar pond electric power plant.

Solar electric power generation - Principle of Solar cell, Photovoltaic system for electric power Generation, advantages, Disadvantages and applications of solar photovoltaic system.

Unit 3: **6Hrs.**

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Basic components of wind energy conversion system (WECS); Classification of
WECS- Horizontal axis- single, double and muliblade system, Vertical axis- Savonius and darrieus Types.

Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies- fixed dome; Urban waste to energy conversion; Biomass gasification.

Section –II

Unit 4: Energy Storage **4Hrs.**

Energy Storage Introduction, necessity, specifications of energy storage devices, methods of energy storage

Unit 5: Hydropower Engineering **4Hrs.**

General Layout of a dam based hydroelectric plant, Power Estimation, Classification of Hydropower Plants, Main Parts of Hydropower Station.

Unit 6: Other Energy Sources **5Hrs.**

Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems. Wave Energy: Energy from waves, wave power devices. Ocean Thermal Energy Conversion (OTEC) - Hydrogen Production and Storage- Fuel cell: Principle of working- various types – construction and applications. Energy Storage System- Hybrid Energy Systems.

ICA: -Minimum Six Assignment based on the above syllabus.

Text Books:

1. Koushika M.D., "Solar Energy Principles and Applications", IBT publications, 1988.
2. Mital K.M, "Biogas systems: Priciples and Applications", New Age International Publishers (P) Ltd., 1996
3. Venkata Ramana P and Srinivas S.N., “Biomass Energy Systems”, TERI, 1996.
4. Rai, G.D., "Non-Conventional Sources of Energy", Khanna Publishers, Delhi 1995.
5. Rao S, Parulekar B.B, “Energy Technology – Non conventional, Renewable and Conventional” Khanna Publishers,1999.
6. H.G. Stoll, Least Cost Electrical Utility / Planning, John Wiley & Sons, 1989.

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-II

OE-02D Measurement, Instrumentation and Sensors

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Objectives:

1. To introduce students with the basics of concepts of Measurements.
2. To make to students to understand operation of Analog instruments and Bridges.
3. To make students to understand operation Instrument Transformer & Digital Instruments.
4. To introduce students with the basics of various sensors and its characteristics.
5. To make students familiar with the working principle of different types of sensors.
6. To familiarize students with different sensor technologies and interfacing techniques.

SECTION-I

Unit -1 Basic Concept of Measurement **04 Hrs.**

Standards & their classification, Types of errors, Characteristics of measuring instruments (static & dynamic) - accuracy, linearity, speed of response, repeatability, resolution, reproducibility.

Unit -2 Analog Instruments & Bridges **06 Hrs.**

Types of secondary instrument- indicating, recording, indicating instrument; PMMC, PMMI - Operating principle, torque equation, Measurement of power in AC (Two Wattmeter), Megger, Earth tester, damping methods

DC bridges-Wheatstone's, Kelvin's double bridge for measurement of resistance; AC bridges-Maxwell's, Hey's, Anderson's bridges for inductance measurement, Schering bridges for Capacitance measurement

Unit 3 – Instrument Transformers & Digital Instruments **06 Hrs.**

Construction and theory of instrument transformers (CT & amp; PT), equations for Ratio and phase angle error turns compensation, Digital voltmeter, Types of digital voltmeter, Digital multi-meter, Power factor meter, electronic energy meter, Digital Storage Oscilloscope.

SECTION-II

Unit 4– Sensors Fundamentals and Characteristics **03 Hrs.**

Sensors, Sensor Classification, Units of Measurements, Sensor Characteristics.

Unit 5– Physical Principles of Sensing and Interfacing **07 Hrs.**

Piezoelectric Effect, Hall Effect, Temperature and Thermal Properties of Material, Heat Transfer, Light, Dynamic Models of Sensor Elements, Input Characteristics of Interface Circuits, Analog to Digital Converters, Data Transmission, Batteries for Low Power Sensor.

Unit 6–Applications of Sensors **06 Hrs.**

Occupancy and Motion Detectors, Position, Displacement, and Level, Velocity and Acceleration, Force, Strain, and Tactile Sensors, Pressure Sensors, Humidity and Moisture Sensors, Light Detectors, Temperature Sensors, tachometer.

Internal Continuous Assessment (ICA):

ICA shall consist of at least Eight Experiment/Simulation covering above syllabus but not Restricted to the following:

List of Experiments:

1. Measurement of low resistance by using Kelvin's double bridge
2. Measurement of high resistance by using Whetstone's bridge
3. Measurement of inductance by using Maxwell's bridge
4. Measurement of capacitance by using Schering Bridge
5. To measure the insulation resistance by Megger.
6. C T & P T testing
7. Characterize the temperature sensor (RTD).
8. Characterize the temperature sensor (Thermocouple).
9. To interface Humidity Sensor with Arduino.
10. To interface Light Dependent Resistor (LDR) for detecting light with Arduino.
11. Characterize of LVDT.
12. Characterize the strain gauge sensor

Text Books:

1. Electrical & Electronics Measurements, Dhanpat Rai & Sons 9th Edition, A K Sawhney
2. Electrical Measurements & Measuring Instruments, S chand, 2010 Edition, R K Rajput
3. J. Fraden, Handbook of Modern Sensors: Physical, Designs, and Applications, AIP Press, Springer.
4. Sensors and Actuators Engineering System Instrumentation by Clarence W de Silva

Reference Books:

1. Principles of measurement system", 3rd Edition, Pearson Education 2000, John P Beately
2. D. Patranabis, Sensors and Transducers, PHI Publication, New Delhi

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-II

OE-02E Operation Research

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical–2Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course objectives:

- To formulate the appropriate O.R. model
- To use quantitative techniques in solving there all life problems
- To evaluate alternative courses of actions in actual decision making under conditions of uncertainty.

Course Outcomes:

At the end of this course, student will be able to:

- Understand the scope and applications of operations research in various industries and sectors.
- Apply the relevant algorithms to solve assignment problems
- Optimize transportation routes and distribution plans to minimize costs or maximize profit.
- Apply inventory models to optimize the stock levels and minimize costs.
- Apply sequencing model to optimize service processes and resource utilization.
- Use network techniques in project management

Section –I

Unit 1 : Introduction to OR &L. P. P. **5Hrs.**

History of OR, Definition, OR Models, Applications and limitations, Introduction to L.P.P., Problem formulation, Graphical solution.

Unit 2: Assignment Model **5Hrs.**

Mathematical model, Methods to solve balanced and unbalanced assignment problems, Maximization problems, Assignment with restrictions, Traveling salesman problem.

Unit 3: Transportation Model **4Hrs.**

Mathematical model, Methods to solve balanced and unbalanced transportation problem-NWCR method, LCM method, VAM method (including maximization problem).

Section –II

Unit 4: Inventory control **6Hrs.**

Inventory management techniques, Inventory costs, Economic order quantity, and deterministic models with or without shortages- probabilistic models - Price break model.

Unit 5: Sequencing Models **5Hrs.**

Introduction, sequencing problems, solution to sequencing problems– processing N jobs to one machine, processing N jobs to two machines, processing N jobs to three machines, processing N jobs to M machine.

Unit 5: CPM and PERT Models **5Hrs.**

Fundamentals of CPM / PERT networks, CPM – construction of networks, critical path, forward and Backward pass, floats & their significance.

PERT: Time Estimates, Construction of Networks, Probability of completing projects by scheduled date.

Internal Continuous Assessment (ICA):

List of Experiments/ Assignments/Case Studies, etc.

1. Assignment on L.P.P.
2. Assignment on Assignment model.
3. Assignment on Transportation model.
4. Assignment on Inventory model.
5. Assignment on Sequencing Models.
6. Assignment on CPM and PERT Models.
7. Case study on any one above topic.

Text Book

1. Operations Research by Hillier and Lieberman TMGH.
2. Hamdy Taha,"Operations Research–AnIntroduction",7th editionPHI(2003).
3. S. D. Sharma, "Operation Research",Kedarnath and Rannalt Pub.
4. Hiraand Gupta,"Operation Research",S. Chandand Co.
5. N.D.Vohra,"Quantitative Techniques in Management" ,

Reference Book:

1. Shrinath L.S.:PERT&CPM–Affiliate East West Press
2. Anand Sharma"Quantitative Techniques for decision making "Himalaya publishing house.
3. BillyE. Gillet-"Introduction to Operations Research" TMGH

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-II
OE-02 F Computational Mathematics

Teaching Scheme	Examination Scheme
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Tutorial –1Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Outcomes:

1) Student can solve nonlinear algebraic and transcendental equations.
2) Student can solve simultaneous linear and nonlinear equations.
3) Students can apply numerical methods to solve solution to ordinary differential equations.
4) Students can apply numerical methods to evaluate Numerical definite integrals.
5) Student can compute numerically eigen values and corresponding eigen vectors
6) Student can estimate the value of function for any intermediate value of independent variable.

Section –I

Unit 1: Solution of Algebraic and Transcendental Equations **No of lectures – 07**

Introduction, Basic properties of equations, Newton-Rapshon Method, Multiple roots, Newton's iterative formula for obtaining square root only, System of non-linear equations by Newton- Rapshon method

Unit 2: Solution of linear simultaneous Equations **No of lectures – 07**

Direct Methods-Gauss Elimination Method, method of Factorization, Iterative Methods-Jacobi's method, Gauss –Seidal Method.

Unit 3: Numerical solutions of Ordinary Differential Equations **No of lectures – 06**

First order differential equation by Picards's Method and Runge – Kutta method (Fourth order), Simultaneous firstorder differential equation by Picard's method and Runge – Kutta method (Fourth order)

Section –II

Unit 4: Numerical Integration **No of lectures – 08**

Numerical Integration using Newton's-Cotes's formulae-Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddels rule, Gaussian quadrature, Romberg integration

Unit 5: Numerical Computation of Eigen values and Eigen vectors **No of lectures – 05**

Introduction of Eigen values and Eigen vectors, Numerically largest eigen value by Power method, Eigen values and eigen vectors by Jacobi's Method

Unit 6: Numerical Interpolation **No of lectures – 07**

Introduction, Newton's forward interpolation formula, Newton's backward interpolation formula, Central difference interpolation formula, Lagrange's interpolation formula, divided differences, Newton's divided difference formula.

Internal Continuous Assessment (ICA):

ICA shall consist of minimum six to eight assignments based on entire curriculum

Text Books:

1) B.S. Grewal, Numerical methods, Khanna publication, New Delhi.
2) Fundamental of statistics, S.C.Gupta, Himalaya house publication.
3) "Numerical Methods" S Chand Publication, Dr. P. Kandasamy.

Reference Books:

1) Robert J. Schilling, Sandra L. Harris, Applied Numerical methods for Engineers.
2) M. K. Jain, S. R. K. Iyengar, R. K. Jain, Numerical methods for scientific and engineeringcomputations– New Age International ltd.
3) "Introductory methods of Numerical Analysis"-PHI Learning Publication , S. S. Sastry.

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester-II
OE-02 G Professional Business Communication

Teaching Scheme	**Examination Scheme**
Theory– 2Hrs. /Week, 2Credits	**Theory –ESE**-70Marks
Practical –2 Hrs. /Week, 1 Credit	**ISE**-30Marks
	ICA-25Marks

Course Outcomes:

During this course, student is expected to:

1. To define the concept of Professional Communication.
2. To explain the basic concepts of Professional Communication.
3. To develop the skill of professional presentation.
4. To develop the skill of professional writing.

Section-I

Unit 1: Introduction to Professional Communication **6 Hrs**

:Meaning of Communication
: Elements of Communication
: Process of Communication
: Different Channels of Communication
: Importance of communication in business
: Seven C's of effective communication
: Barriers to communication & Guidelines to overcome those barriers

Unit 2: Types of Communication **9 Hrs**

: Types of communication based on form of message: Verbal & Non-verbal, Non- verbal Codes, Oral & Written, Body language, Graphic communication, Advantages & Disadvantages

: Types of communication based on type of relationship between Sender & Receiver: Formal & Informal/Grapevine, Advantages & Disadvantages

: Types of communication based on flow of information: Vertical: Upward & Downward, Horizontal, Advantages & Disadvantages

Unit 3: Professional Oral Communication **7 Hrs**

: Professional Presentations:
-Concept, Importance, Process/Steps in presentation, Four P's of Professional Presentations

: Commemorative speeches:
-Welcome speech, Farewell speech, Introducing a guest, Vote of thanks

Unit 4: Professional Written Communication **8 Hrs**

: Business Correspondence:
-Style & Structure of Business Letters, Business Letters: Enquiry letter, Quotation; Letters placing Purchase Orders/ Work Orders, Complaint Letter, Adjustment Letters, Sales letter, Collection letters

: Report Writing-
-Concept & Importance, Structure of formal reports, Types of Reports: Accident, Fall in Production, Investigation, Progress

Internal Continuous Assessment (ICA):
ICA shall consist of minimum six to eight assignments based on entire curriculum.

Recommended Books:

1. **Managerial Communication**: Rai, Himalaya Publishing House
2. **Communication**: C. S. Rayudu, Himalaya Publishing House
3. **Effective Technical Communication**: M. Ashraf Rizvi, Tata McGraw Hill
4. **Business Skills**: Nageshwar Rao and Rajendra Das, Himalaya Publishing House
5. **Effective Business Communication**: Murphy, McGraw-Hill Publishing Co.
6. **Business Communication**: Concepts, Cases and Applications – P. D. Chaturvedi, Mukesh Chaturvedi, Pearson Education

P. A. H. Solapur University, Solapur

Second Year B. Tech Engineering Semester- II

VEC-02: PROFESSIONAL ETHICS

Teaching Scheme	**Examination Scheme**
Theory– 1Hrs. /Week, 1Credits	**Theory –ESE**-50Marks
Practical–2Hrs. /Week, 1 Credit	**ICA**-25Marks

Course Outcomes:

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

1. Inculcate the human values in their behavior.
2. Demonstrate the Engineering ethics in their professional practice.
3. Practice the safety and responsibility and professional rights in their professional practice.
4. Incorporate the code of ethics of Global organizations such as ASME, ASCE, and IEEE

Section I

Unit 1: Human Values Morals, Values and Ethics, Integrity, Work Ethics, Service Learning, Civic Virtue, Respect for others, Living Peacefully, Caring, sharing, Honesty, Courage, Valuing Time, Cooperation, Commitment, Empathy, Self-Confidence, Character, spirituality

Unit 2: Engineering Ethics 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.

Section II

Unit 3: Safety, Responsibilities and Rights Safety and Risk, Assessment of safety and Risk, Risk Benefit Analysis and Reducing Risk, The Three Mile Island and Chernobyl Case Studies. Collegiality and Loyalty, Respect for Authority, Collective Bargaining, Confidentiality, Conflicts of Interest, Occupational Crime, Whistle Blowing, Professional Rights – Employee Rights, Intellectual Property Rights (IPR) – Discrimination.

Unit 4: Global Issues Multinational Corporations, Environmental Ethics, Computer Ethics, Weapons Development, Engineers as Managers, Consulting Engineers, Engineers as Expert Witnesses and

Advisors, Sample Code of Ethics of ASME, ASCE, IEEE, Institution of Engineers (India), etc.

ASSIGNMENTS

Students shall complete five assignments, based on the syllabus (One assignment for every unit of the syllabus). In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

TEXT BOOKS

1. Bayles, M.D.: Professional Ethics, California: Wadsworth Publishing Company, 1981.

2. Koehn, D.: The Ground of Professional Ethics, Routledge, 1995.

3. R.S. Naagarazan, A Text Book of Professional Ethics & Human Values, New Age International, 2006.