



**PUNYASHLOK AHILYADEVII 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 Studies	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.



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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 Studies	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



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Environmental Studies

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.

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FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Compliant Curriculum

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Semester – IV

<i>Distribution</i>	<i>Course Code</i>	<i>Name of the Course</i>	<i>Engagement Hours</i>			<i>Credits</i>	<i>FA</i>	<i>SA</i>			<i>Total</i>
			<i>L</i>	<i>T</i>	<i>P</i>		<i>ESE</i>	<i>ISE</i>	<i>ICA</i>	<i>OE/POE</i>	
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 Studies	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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S. Y. B. Tech. Engineering Semester- IV

EM-02: Project Management and Economics

Teaching Scheme

Theory – 2 Hrs./Week, 2 Credit

Examination Scheme

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 monetary 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 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''Isola, 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



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Second Year B. Tech Engineering Semester-II

OE-02D Measurement, Instrumentation and Sensors

Teaching Scheme

Theory– 2Hrs. /Week, 2Credits

Practical–2Hrs. /Week, 1 Credit

Examination Scheme

Theory –ESE-70Marks

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



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Second Year B. Tech Engineering Semester- II

VEC-02: PROFESSIONAL ETHICS

Teaching Scheme

Theory– 1Hrs. /Week, 1Credits

Practical–2Hrs. /Week, 1 Credit

Examination Scheme

Theory –ESE-50Marks

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.