

Government Polytechnic, Pune
(An Autonomous Institute of Government of Maharashtra)

Department of Computer Engineering

Level IV - A Curriculum

Auxiliary Courses

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in /CE/EE/ ET/ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Environmental science
Course Code	AU4101
Prerequisite course code and name	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P) C	Examination Scheme				Total Marks
L	T	P		Theory		Practical		
				ESE	PA	ESE	PA	
00	00	02	02	Marks	NA	NA	NA	50
				Exam Duration	-	-	-	-

Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA- Progressive Assessment (Test I, II/Term Work), *- Practical Exam, \$- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;

2. RATIONALE

This is an interdisciplinary course, introduced with an aim to create awareness about environmental issues among the diploma students. The rate Industrialization and Urbanization is very fast, and the country/world is facing the issues like draught, flood, deforestation, increase in earth temperature, pollution and depletion of resources. In view of this the management of resources' and dilution of pollutants is of prime need to keep the environment safe and clean.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- To create environmental awareness for sustainable development.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs

associated with the above-mentioned competency:

1. Create awareness for conservation of natural resources and preserving the Environment.
2. Perform/Contribute in sustainable development.
3. Undertake preventive measures to control different pollutions.
4. Differentiate between Conventional and Non-conventional energy sources.
5. Identify the role of SPCB/CPCB and EPA in Environment protection

5. SUGGESTED PRACTICALS/ EXERCISES

Sr. No.	UNIT No	Practical Exercises (Outcomes in Psychomotor Domain)	RelevantCO	Approximate Hours Required.
1.	NA	Visit to “Kachara Depot (dumping yard) and write a report.	1, 3,5	04*
2.		Identify the Environmental issues and group discussion on the efforts made to increase public awareness and prepare a Report.	1,2,3	04*
3.		Assignment/Report on ecosystem and its components.	2	02
4.		Expert lecture on Role of NGOs and Government in Conserving Environment and write a report on it.	2,3,5	04
5.		Visit to a local area -Environmental assets such as river /forest / grassland / hill / mountain and writing report on it.	1,3	04
6.		Activity based on – “Best out of Waste” (use of waste paper, Plastic, glass bottles, clothe, scrap.)	3	02*
7.		Video Demonstration /Expert Lecture Report on Climate Change and Global warming.	1,2,3, 4,5	02
8.		Write a report on E-waste - 1. Describing E-waste and its type. 2. State its impact/hazards on environment. 3. State importance of E-waste disposal and disposal methods. 4. Comments on how E-waste is handled globally. (Role play can be enacted by each group representing different countries) 5. Description of how India handles e-waste. (Role play can be enacted by a group)	1,2,3	04
9.		Visit to nearby site, using nonconventional energy source (e.g., solar/wind)	4	04
10.		Visit to nearby Poly house and write a report. (Product, financial assistance, limitations, difficulties in operating, any other related information)	2	04
11.		Individual Presentation on Environmental issues and his/her Contribution towards Environment.	12,3, 4,5	04*
12.		Write an assignment on Green House effect, carbon Footprint, carbon trading.	2,3,4	02
13.		Assignment on disposal of medical waste. (To study Incineration.)	3	02

14.		Identify the issues related to the programmes in the institute and write the report. (Here disciplinary or interdisciplinary activity can be carried out)	2,3	04*
15.	NA	Write an assignment on role of Ministry of Environment and Forest Organizational Structure (MOEF) and Central Pollution Control Board (CPCB), State Pollution Control Board (SPCB), Environment Protection Act.	5	04*
16		Complete a micro project based on guidelines provided in Sr.no. 11	1 to 5	04*
		Total Hrs.		32

Practical marked with* are compulsory.

Sr.No.	Performance Indicators	Weightage in %
a.	Observation, collection, and analysis of data	40
b.	Preparation of report	30
c.	Interpretation of result/ observation and conclusion	10
d.	Answer to questions	10
e.	Submission of report in time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

NA

7. THEORY COMPONENTS

The curriculum is activity based. It is expected from teacher to explain to students the scientific theory behind each assignment.

For e. g. - The assignment stating best out of waste does not mean to make only Decorative items from the waste.

In this case it is expected to explain the concept of 4R I.e., reduce, reuse, recycle, and reproduce.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

NA

9. SUGGESTED STUDENT ACTIVITIES

NA

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.

- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).

11. SUGGESTED MICRO-PROJECTS

*Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.*

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Prepare a report on visit to PUC Center.
- b. Visit a nearby RO plant and prepare detail technical report.
- c. Prepare report on Household water filtration unit
- d. Prepare a list of polluted natural resources which are responsible for pollution and collect information on how to damage them.
- e. Collection of Data from Hospital: Collect everyday information on percentage of solid hazardous and toxic waste for two months
- f. Visit of Municipal Effluent Treatment Plant: Visit effluent treatment plant and prepare report on waste management.
- g. Visit of Water Treatment Plant: Visit water treatment plant and prepare report on various units of water treatment and its management.
- h. Preparation of report: Prepare the chart of solid waste management showing effects on environment.
- i. Suggest the remedial measures for the control of pollution of local water source by conduct relevant study
- j. Undertake the Impact study of vehicular pollution on environment.
- k. Visit to “Kachara Depot, (dumping yard) and analyze the waste.
- l. Write a report on “Best out of Waste.
- m. Write a report on Green House effect,

- n. Study of air quality of Pune city.
- o. Study of noise pollution in Pune city.
- p. Study of solid waste management of Pune city.
- q. Study of E-waste management of Pune city.
- r. Study of Environmental Status Report of Pune city prepared by Pune Municipal Corporation.
- s. And any other relevant topic related to course

12. SUGGESTED LEARNING RESOURCES

S.N.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1.	Basic Civil and Environmental Engineering	S.P. Nisture, D. A. Joshi, G.S.Chhawsaria, Pearson	978-1282531819
2.	Basics of Environmental Studies	Anindita Basak, D.L. Manjunath, Pearson	978-8131756072
3.	Global Warming the Hard Science	L.D.Danny Harvey Pearson	978-8131733318
4.	Environmental Studies	Benny Joseph, Tata McGraw Hill	978-9352605170
5.	Renewable Energy	Godfrey Boyle, Oxford Publications	0199261784, 9780199261789
6.	Environmental studies	R. Rajagopalan, Oxford University Press	9780199459759

13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. <http://www.mpcb.gov.in/>
3. <http://www.cpcb.nic.in/>
4. <http://www.envfor.nic.in/>
5. <http://www.neeri.res.in/>

14. PO - COMPETENCY- CO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	2	1	3	1	3
CO2	1	1	2	1	3	1	3
CO3	1	1	2	2	2	1	3
CO4	1	1	2	1	2	1	3
CO5	1	1	2	1	2	1	3

CO	PSO1	PSO2
CO1	--	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	2	1

List of Experts &Faculties Who Contributed for This Curriculum:

S.N.	Name	Designation	Institute / Industry
1.	DR. SMS Shashidhara.	Chairman PBOS	Head Civil Engg. Dept. GOVT. POLYTECHNIC, PUNE
2	Shri. Sanjay Deshpande.	Director, Sanjivani Development	Industry person
3.	Mrs.M.U.Kokate	Faculty from Institute	Head IT. Dept. GOVT. POLYTECHNIC, PUNE
4	Mrs.SeemaV.Kolhe	Faculty from Institute	Lecturer in Civil Engg. GOVT. POLYTECHNIC, PUNE
5	Shri .M.K.Panchawate	Faculty from Institute	Lecturer in Civil Engg. GOVT. POLYTECHNIC, PUNE
6	Mrs. P.M.Zilpe	Faculty from Institute	Lecturer in Electronics Engg. GOVT. POLYTECHNIC, PUNE
7	Mrs. S.S.Chhatwani .	Faculty from Institute	Lecturer in Electronics Engg. GOVT. POLYTECHNIC, PUNE
8	Mrs. M. H. Bilgi	Faculty from Institute	Lecturer in Electrical Engg. GOVT. POLYTECHNIC,Pune

<p>Sign:</p> <p>Name: Mrs.S.V.KOLHE</p> <p>M.K.Panchawate</p> <p>(Course Experts)</p>	<p>Sign:</p> <p>Name: (Dr. S.M.S.Shashidhara) (Former Head of Department)</p> <p>Shri. V G Tambe (HOD, I Shift)</p> <p>Shri. V B Kondawar (HOD II shift)</p>
<p>Sign:</p> <p>Name: U. V. Kokate Dr. S. B. Nikam (Programme head)</p>	<p>Sign:</p> <p>Name: Shri A.S.Zanpure. (CDC In charge)</p>

Government Polytechnic, Pune

'180 OB'– Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Renewable Energy Technologies
Course Code	AU4102
Prerequisite course code and name	NA
Class declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks	
L	T	P		Theory		Practical			
			C	#ESE	PA	*ESE	PA		
				Marks	40	10	NA	NA	50
02	00	00	02	Exam Duration	2Hrs	1/2Hr	----	---	

*Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA- Progressive Assessment (Test I, II/Term Work), *- Practical Exam, \$- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

2. RATIONALE

Electrical energy is an important aspect in all sectors of economic growth of India. Considering the continuously increased demand of electrical energy, the conventional sources of energy are insufficient to meet these demands and hence the use of renewable sources of energy is the need of the hour. Hence these sources must be known to electrical technicians. This course consists of construction, working principle, operation and applications of Solar, Wind, Biomass, Geothermal and Tidal power plants.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Practice of non-conventional energy as power source in electric field. Operate and maintain small Solar plants, Wind power stations, Geothermal plants etc.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

CO1: Know the national scenario of energy production, utilization, consumption and reserves and need of non conventional energy sources.

CO2: Describe construction, working principle, operation and applications of Solar power panel.

CO3: Describe construction, working principle, operation and applications for Wind and Biomass power plants.

CO4: Describe construction, working principle, operation and applications for Geothermal and Tidal energy power plants.

5. SUGGESTED PRACTICALS/ EXERCISES

NA

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

NA

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1: Review of Conventional Sources of Energy Hrs.- 02 Marks- 04	
1a. Classify the conventional energy sources and know their availability in India. 1b. Know the necessity of non-conventional energy sources. 1c. Describe the environmental impact of various energy sources and the need for sustainable development.	1.1 Types of conventional energy sources, Availability and important power plants in India. 1.2 India's production and reserves for Fossil fuels, Water power, Nuclear power. 1.3 Need for non-conventional energy sources. 1.4 Environmental impact of various energy sources, Green building, Sustainable development. Carbon credits and its significance.
UNIT 2: Solar Energy and its Applications Hrs.- 12 Marks- 14	

<p>2a. Know the principle of conversion of solar energy to heat and electrical energy.</p> <p>2b. Know the concept of solar radiation and define the terms used in solar radiation geometry.</p> <p>2c. Explain the principle of electrical power generation by photovoltaic cell with merits and demerits of the system.</p> <p>2d. Identify and describe the various applications based on solar energy.</p>	<p>2.1 Principle of conversion of solar energy into heat and electrical energy, Solar radiation, Solar radiations at earth's surface.</p> <p>2.2 Solar radiation geometry: declination, hour Angle, altitude angle, incident angle, zenith angle, solar azimuth angle.</p> <p>2.3 Solar collectors and their types, Application, Advantages and Limitations.</p> <p>2.4 Solar electric power generation: Solar photovoltaic cell, Solar cell Principle and Working, Application, Advantages and Disadvantages.</p> <p>2.5 Solar water heating, Solar distillation, Solar cooking and furnace</p> <p>2.6 Solar pumping and Green house, Agriculture and industrial process heat.</p> <p>2.7 Space heating, Space cooling.</p>
UNIT 3: Wind Energy and Energy from Biomass Hrs.- 12 Marks- 14	
<p>3a. Know the principle of conversion of wind energy to electrical energy.</p> <p>3b. Describe the advantages and limitations and applications of wind energy.</p> <p>3c. Explain with sketches the working of horizontal and vertical axis wind mills.</p> <p>3d. Know the concept of obtaining energy from biomass through various methods.</p> <p>3e. Identify and describe the various types of biomass power plants.</p>	<p>3.1 Basic principles of wind energy conversion, Power in wing, Available wind power formulation, Power coefficient, and Maximum power</p> <p>3.2 Main considerations in selecting a site for wind mills, Advantages and Limitations of wind energy conversion</p> <p>3.3 Classification of windmills, Construction and working of horizontal and vertical axis wind mills and their comparison</p> <p>3.4 Main applications of wind energy for power generation and pumping</p> <p>3.5 Common species recommended for biomass, methods for obtaining energy from biomass</p> <p>3.6 Classification of biomass: Gasified, Fixed bed and Fluidized</p> <p>3.7 Application of gasifier</p> <p>3.8 Biodiesel production and application</p> <p>3.9 Agricultural waste as biomass, Biomass digester, Comparison of biomass with conventional fuels</p>
UNIT 4: Geothermal and Tidal Energy Hrs.- 06 Marks- 08	
<p>4a. Know the principle of generation of energy from geothermal and tidal source.</p> <p>4b. Identify and describe the various methods of generation of energy from geothermal and tidal source.</p>	<p>4.1 Availability, Forms of geothermal energy: Dry steam, Wet steam, Hot dry rock, Magnetic chamber system</p> <p>4.2 Different geothermal power plants available.</p> <p>4.3 Tidal power, Factors for selection of tidal power plant.</p> <p>4.4 Classification: Single basin, Double basin type.</p> <p>4.5 Tidal power plants in world, Ocean thermal plants</p>

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Review of Conventional Sources of Energy	02	04	-	-	04
II	Solar Energy and its Applications	12	04	04	06	14
III	Wind Energy and Energy from Biomass	12	04	04	06	14
IV	Geothermal Energy and Tidal Energy	06	02	02	04	08
Total		32	14	10	16	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a) To collect information about global and Indian energy market.
- b) One field visit to be conducted to demonstrate application of Solar Energy.
- c) One field visit to be conducted to Wind Mill
- d) To visit a biomass/ biogas plant of municipal waste or elsewhere

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
- c. With respect to item No.8, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- d. Correlate subtopics with power plant system and equipments.
- e. Use proper equivalent analogy to explain different concepts.
- f. Use Flash/Animations to explain various components, operation and working principle.

11. SUGGESTED MICRO-PROJECTS

NA

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication	ISBN No.
1	Non conventional energy resources	Dr. B.H.Khan	Tata McGraw Hill Education, New Delhi	ISBN- 9780070681033
2	Non conventional energy resources	G. D. Rai	Khanna publication	ISBN- 9788174090738
3	Solar Energy	Sukhatme S.P., Nayak J.K.	Tata McGraw, New Delhi	ISBN- 9781259081965
4	Solar Energy	Garg H. ,Prakash J.	McGraw Hill Education, New Delhi	ISBN- 9780074636312
5	India- The energy sector	P.H. Henderson	Oxford University Press	ISBN- 9780195606539
6	Industrial energy conservation	D. A. Ray	Pergaman Press	ISBN- 9780080232744

13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. Website for AkshayUrja News Bulletin www.mnes.nic.in
3. <https://www.bioenergyconsult.com/biomass-energy-systems/>
3. <https://mnre.gov.in/bio-energy>

14. PO - COMPETENCY- CO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	1	1	1	1
CO2	2	2	2	2	2	1	3
CO3	2	2	2	2	2	1	3
CO4	2	2	2	2	2	1	3

CO-PSO	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-
CO2	3	2	2	3
CO3	3	2	2	3
CO4	3	2	2	3

***NOTE:-** The department who will run this course please do the PSO - competency- CO mapping according to your PSOs, as this mapping is done according to EE Engg. dept PSOs

Sign: Name: 1.Shri.B.R.More 2. Mrs.M.H. Bilgi (Course Expert /s)	Sign: Name: (Head of Department)
Sign: Name: (Program Head)	Sign: Name: Shri A.S.Zanpure (CDC Incharge)

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Engineering Economics
Course Code	AU4103
Prerequisite course code and name	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
L	T	P			Theory		Practical		Total Marks
L	T	P	C		#ESE	PA	ESE	PA	50
02	00	00	02	Marks	40	10	--	--	
				Exam Duration	2 Hrs	30Mins	--	--	

Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA- Progressive Assessment (Test I, II/Term Work), *- Practical Exam, \$- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;

2. RATIONALE

This course aims at equipping the students with fundamental knowledge of economics and cost analysis to make them capable of taking economically sound decisions.

3. COMPETENCY

The aim of this course is to address following industry identified competency through various teaching learning experiences:

- **Ability to analyze and decide acceptance or rejection of offers / project proposals based on economic criteria.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Interpret various principles, concepts and applications of Economics in the field of Engineering and technology.
2. Analyze Market Demand.
3. Apply the principles of economics and cost analysis to proposals in engineering and Technology.
4. Read and interpret financial statements and indicators.

5. SUGGESTED PRACTICALS/ EXERCISES

NA

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

NA

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. Introduction to Economics (06hrs, 08marks)	
1a. Define the term Economics. 1b. State the objectives and importance's of engineering Economics. 1c. Differentiate between Micro and macro economics. 1d. Describe the functions of Market economy and Command economy. 1e. List the elements of mixed economy.	1.1 Definitions of economics 1.1.2 Objectives and Importance of engineering economics. 1.1.3 Concept of engineering economics. 1.2 General concepts on micro and macro economics 1.2.1 Market economy, 1.2.2 Command economy 1.2.3 Mixed economy.
UNIT 2 Demand Analysis (06hrs, 08marks)	
2a. List the utility related demand. 2b. State the importance of total and marginal utility. 2c. Explain Law of demand. 2d. Analysis elasticity of demand. 2e. State factors governing the elasticity of demand. 2f. Enlist the techniques and methods for forecasting of demand.	2.1 Utility related demand 2.1.1 Total and marginal utility 2.1.2 Law of diminishing marginal utility 2.1.3 Cardinal and ordinal utility. 2.2 Law of demand 2.2.1 Determinants of demand 2.2.2 Elasticity of demand 2.2.3 Factors governing the elasticity of demand. 2.3 Techniques and methods for forecasting of demand
UNIT 3 Elements of Business/Managerial Economics(12hrs, 12marks)	

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
3a. Define the term cost and cost control. 3b. Enlist the types of costs. 3c. Interpret the lifecycle costs. 3d. Define the term Budgets. 3e. Determine Break even analysis. 3f. Explain in brief application of Linear Programming. 3h. Importance of Time value of money. 3j. Elaborate the methods of cash flow. 3k. Evaluate the Causes of depreciation.	3.1 Cost and Cost Control –Techniques 3.1.1 Types of Costs 3.1.2 Lifecycle costs 3.1.3 Budgets 3.1.4 Break even Analysis 3.2 Capital Budgeting 3.2.1 Application of Linear Programming. 3.3 Time value of money 3.4.1 Simple and compound interest. 3.4.2 Principle of economic equivalence. 3.5 Evaluation of engineering projects and Cost-benefit 3.6. Cash flow- Methods of comparison of alternatives – present worth and future worth method (Revenue dominated cash flow diagram) 3.7 Depreciation-Causes of depreciation 3.8.1 Depreciation straight line method and declining balance method
UNIT 4 National Income, Finance and Banking (08hrs, 12 marks)	
4a. Explain Balance sheet, Book Keeping and Financial reporting. 4b. Mention measurement parameters of national income. 4c. Differentiate between Gross domestic and national production (GNP, GDP). 4d. State the functions of commercial banks and Reserve Bank of India.	4.1. Concept of profit and loss account 4.1.1 opening stock, closing stock, sales, purchases, wages, creditors, debtors, gross profit, net profit 4.2. Concept of Balance sheet, & book keeping 4.2.1. Fixed asset, Current assets, share capital, current liabilities, goodwill, debt, inventories, bill receivable, overheads and expenses. 4.3. Concepts and measurement of national income 4.4. Gross domestic and national production (GNP, GDP). 4.5 Banking- Meaning and functions of commercial banks and Reserve Bank of India.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Economics	06	02	02	04	08
II	Demand Analysis	06	02	02	04	08
III	Elements of Business/Managerial Economics	12	04	04	04	12
IV	National Income, Finance and Banking	08	02	02	08	12
Total		32	10	10	20	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a. Study of datasheet of Cash flow of a firm.
- b. Prepare charts of depreciation by taking different examples.
- c. Case Study-Prepare a comparative statement of of two Engineering projects in respect of investment and profit.(Consider Capital Investment, over head expenses, wages, net profit)
- d. Case study- Prepare a cost sheet for a small scale unit.
(In Cost sheet consider production, selling, overhead cost and profit analysis)

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
- c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- d. Guide student(s) in undertaking micro-projects.
- e. Correlate subtopics with automation.
- f. Use proper equivalent analogy to explain different concepts.
- g. Use Flash/Animations to explain various components, operation and its application
- h. Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

NA

12. SUGGESTED LEARNING RESOURCES

Sr.No.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	"Contemporary Engineering Economics",	Author-Chan S.Park, Publisher-Prentice Hall of India,2011 year.	ISBN- 9780134105598
2	"Engineering Economics and analysis"	Author-Donald.G.Newman, Publisher-Jerome.P.LavelleEngg. Press, Texas, 2010 year.	ISBN- 0824709535
3	"Engineering Economy"	Author-Degarmo, E.P., Sullivan, W.G and Canada, J.R Publisher- Macmillan, New York, 2011 year	ISBN-9780029461396
4	"Engineering Economy"	Author-Zahid A khan: Engineering Economy Publisher-Dorling Kindersley, 2012 year	ISBN-10- 8131763870 ISBN-13-978-8131763872

13. SOFTWARE/LEARNING WEBSITES-

1. <https://online.nmims.edu/>
2. <https://www.quora.com>
3. <https://www.edx.org>

14. PO/PSO - COMPETENCY- CO MAPPING

*NOTE:-THE DEPARTMENT WHO WILL RUN THIS COURSE PLEASE DO THE PSO - COMPETENCY- CO MAPPING ACCORDING TO YOUR PSOs,AS THIS MAPPING IS DONE ACCORDING TO DDGM PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	-	3	3	3
CO2	3	3	3	1	3	3	3
CO3	3	2	2	-	2	3	3
CO4	3	2	2	-	2	2	3

	PSO1	PSO2
CO1	1	1
CO2	2	2
CO3	1	-
CO4	2	2

Sign: Name: Mrs. C.M. Ambikar Sign: Name: N.V. Gondane (Course-Expert)	Sign: Name: Mr. V.G. Tambe (Head of Department)
Sign: Name: Mr. V.G. Tambe (Program Head of Department)	Sign: Name: Mr. A.S. Zanpure (CDC)

Government Polytechnic, Pune

'180 OB'– Scheme

Programme	Diplôma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Ethical Sources and Sustainability
Course Code	AU4104
Prerequisite course code and name	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C	#ESE	PA	ESE	PA		
				Marks	40	10	--	--	50
02	00	00	02	Exam Duration	2Hrs	30mins	--	--	

*Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA- Progressive Assessment (Test I, II/Term Work), *- Practical Exam, \$- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

2. RATIONALE

This course is aimed at creating awareness amongst the students about global level commitment towards sustainable development. The course also creates awareness on ethical manner of production, including the supply chain, the environmental and social impacts of the production process and product as well as the safety and fair deal towards the work force involved at all levels.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Adopt ethical practices and sustainable processes and products in industry.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency

1. Interprets the concept of ethical sourcing and fundamentals of Sustainability.
2. Practice Global Sustainable Development Goals (SDG).
3. Follow ethical and sustainable supply chain.
4. Differentiate traditional and sustainable manufacturing.

5. **SUGGESTED PRACTICALS/ EXERCISES**
NA
6. **MAJOR EQUIPMENT/ INSTRUMENTS REQUIRE**
NA
7. **THEORY COMPONENTS**

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. ETHICAL SOURCING (06hrs, 08marks)	
1.1 Define Ethical Sourcing. 1.2 Explain Basic Eight Principles of Ethical Sourcing. 1.3 State the laws of industrial ethics. 1.4 Explain the policies of industrial ethics.	1.1 Definition-1.1.1 Ethical Sourcing 1.2 Basic Eight Principles 1.3 Policies 1.4 Benefits-Importance of Ethics 1.5 Challenges- Causes of Unethical Behavior 1.5Laws
UNIT 2 SUSTAINABILITY (08hrs,10marks)	
2.1 Define Sustainability and Ethical Sourcing and Sustainability. 2.2 Explain the principles of sustainability. 2.3 Explain the need and challenges of environmental sustainability. 2.4 Compare Social sustainability and economic sustainability. 2.5 Explain the agenda of 2030 sustainable development goals.	2.1 Definition-2.1.1 Sustainability 2.1.2 Ethical Sourcing and Sustainability 2.2 Twelve green engineering principles. 2.3 Benefits and Challenges 2.4 Types- 2.4.1 Human Sustainability 2.4.2 Social Sustainability 2.4.3 Economic Sustainability 2.4.4 Environmental Sustainability 2.5 Introduction of Sustainable Development Goals (SDGs)= (Leaving no one behind- Global agenda for 2030- 17 goals, 169 Targets 231 Indicators) [17 Sustainable Development Goals (SDGs)]- Goal1: No Poverty Goal2: Zero Hunger Goal3: Good Health And Well-Being Goal4: Quality Education Goal5: Gender equality Goal6: Clean water and sanitation Goal7: Affordable and clean energy Goal8: Decent work and economic growth Goal9: Industry Innovation and infrastructure Goal10: Reduced in equality Goal11: Sustainable cities and communities Goal12: Responsible consumption and production Goal13: Climate action Goal14: Life below water Goal15: Life on land Goal16: Peace and justice strong institutions Goal17: Partnerships to achieve the goal.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 3 ETHICAL AND SUSTAINABLE SUPPLY CHAIN (10hrs,12marks)	
3.1 State the use of three P's and E's of sustainability. 3.2 Explain the ways to reduce waste by simplifying supply chain processes with appropriate example. 3.3 Comment on existing environmental risks caused by tradition non sustainable manufacturing process. 3.4 Explain the ways decrease fossil fuel consumption by optimizing routes with appropriate example.	3.1 Three P's- 3.1.1 Profit 3.1.2 Planet 3.1.3 People 3.2 Three E's- 3.2.1 Environment 3.2.2 Equity 3.3.3 Economics 3.3 Study of Six Steps for supply- 3.3.1 Reduce waste by simplifying supply chain processes 3.3.2 Ensure ethical sourcing and introduce transparency 3.3.3 Minimize overproduction through efficient supply and demand planning 3.3.4 Decrease fossil fuel consumption by optimizing routes. 3.3.5 Fully utilize containers and transportation to consolidate shipments. 3.3.6 Monitor for existing environmental risks.
UNIT 4 MATERIALS FOR SUSTAINABILITY (08 hrs,10marks)	
4.1 Explain the impact of material selection over environment. 4.2 Explain the factors to be considered for material selection to optimize performance. 4.3 Explain Life cycle assessment with appropriate example. 4.4 Give a note on "Production of green manufacturing materials" with appropriate example. 4.5 Explain the role of 5R's in sustainable development.	4.1 Environmental impact of materials 4.2 life-cycle assessment 4.3 Material selection to optimize performance 4.4 Design 4.5 Evaluation 4.6 Production of green manufacturing materials. 4.7 Role of 5R's for Sustainable Development- 4.7.1 Refuse / Reject 4.7.2 Reduce 4.7.3 Reuse / Repurpose / Rethink 4.7.4 Repair 4.7.5 Recycle

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Ethical Sourcing	06	4	2	2	08
II	Sustainability	08	4	2	4	10
III	Ethical And Sustainable Supply Chain	10	4	4	4	12
IV	Materials For Sustainability	08	2	4	4	10
Total		32	14	12	14	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

a. Select any topic and prepare a Power Point Presentation in a group of three to four students covering economic, social and environmental sustainability aspects and give presentation to other students and teacher. (Example- a) Green Construction Techniques, b) Sustainable Energy solutions for manufacturing, c) Recycling, d) Waste Management e) Rainwater conservation)

OR

a. Prepare a write up in a group of three to four students and present it to other students considering Global agenda for 2030- Leaving no one behind i.e. **Sustainable Development Goals (SDGs)** and its 169 Targets 231 Indicators.

b. **Case Study**- Prepare a comparative statement of two Engineering projects in respect to traditional and sustainable manufacturing process considering benefits and challenges.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
- c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- d. Guide student(s) in undertaking micro-projects.
- e. Correlate subtopics with automation.
- f. Use proper equivalent analogy to explain different concepts.
- g. Use Flash/Animations to explain various components, operation and its application
- h. Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

12.

NA

13. SUGGESTED LEARNING RESOURCES

Sr.No.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Sustainable Construction Processes	Steve Goodhew , Wiley-Blackwell, 1 edition 13 April 2016	ISBN:140518759X
2.	Sustainable logistics Supply Chain Management	David.B.Grant , Kogan page 1 st edition 3 March 2015	ISBN:9780749473860
3.	Global Value Chains, Flexibility and Sustainability	Julia Connell, Renu Agarwal Sushil ,Sanjay Dhir ,09 May 2018	ISBN:978-981-10-8929-9
4.	The Handbook of Ethical Purchasing: Principles and Practice	Rob Harrison ,Routledge, 13 oct 2021	ISBN:9781032059952

14. SOFTWARE/LEARNING WEBSITES

1. <https://www.ncbi.nlm.nih.gov/books/NBK64933/>
2. <http://www2.econ.iastate.edu/classes/tsc220/hallam/TypesOfSustainability.pdf>
3. <https://www.woolworthsgroup.com.au/content/Document/Ethical%20Sourcing%20Policy.pdf>
4. <https://www.supplychainbrain.com/blogs/1-think-tank/post/29477-how-to-create-a-more-ethical-and-sustainable-supply-chain>
5. <https://h2mgroup.wordpress.com/2013/06/14/the-three-es-of-sustainability/>
<https://www.cce.ufl.edu/wpcontent/uploads/2012/08/Ethics%20of%20Sustainability%20Textbook.pdf>
6. A global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development: https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202020%20review_Eng.pdf
7. Transforming our World: The 2030 Agenda for Sustainable Development United Nations, 2015-
<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>

15. PO/PSO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	-	3	3	3
CO2	3	3	3	-	3	3	3
CO3	3	2	2	-	2	3	3
CO4	3	2	2	-	2	2	3

	PSO1	PSO2
CO1	-	-
CO2	2	2
CO3	2	2
CO4	-	-

Sign: Name: Ms. S.M. Waghchaure (Course-Expert) Name: Ms. N.V. Gondane (Course-Expert)	Sign: Name: Mr. V. G. Tambe (Head of Department)
Sign: Name: Mr. V. G. Tambe (Program Head of Department)	Sign: Name: Mr. A. S. Zanpure (CDC)

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in Computer Engineering Diploma in Information Technology
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Digital Marketing
Course Code	AU4105
Prerequisite course code and name	NA
Class declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				Total Marks
					Theory		Practical		
L	T	P	C		ESE	PA	\$ESE	PA	
									50
				Marks	NA	NA	25	25	
00	00	02	02	Exam Duration	NA	NA			

*Legends: L- Lecture, P- Practical, T- Tutorial, C- Credits, ESE-End Semester Examination, PA- Progressive Assessment (Test I,II/Term Work) , *- Practical Exam, \$- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

2. RATIONALE

Digital marketing is advertising or promotions of products and services using digital platforms. Digital Marketing is rapidly evolving technology. And social media is ever growing marketing platform for users. The course will help students to improve skills to market their product or service in the digital media. The course will enable students to explore and create something new who wants to be a good entrepreneur or good professional in design and development.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Enhance business using various digital media channels**

4. COURSE OUTCOMES (COs)

The practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Identify advertisement sections of web pages in a website.
2. Install Google analytics on a website.
3. Use Google analytics for reading analytics data.
4. Generate reports for sample web-site
5. Use e-mail marketing tool

5. SUGGESTED PRACTICALS/ EXERCISES

Sr. No	Unit No	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1	NA	Study and prepare a report of a sample web-site with strategic flow for e-commerce/publication etc. (with the use of: HTML, CSS, and JavaScript etc.)	1, 2	4
2		Set up and create account on Google Analytics and install it on a web-site. Study of Google Analytics GUI/IDE for: <ul style="list-style-type: none"> ● Inbound and outbound marketing ● Content marketing ● Website Content optimization 	2	4
3		Study of Search Engine Optimization (SEO) using Digital marketing platform.	2	4
4		(A) Create the tracking id for web-site and track links (B) Analyze website traffic and leads using DM platform/tool	2	4
5		Read Analytics data. Read audience acquisition and behavior statistics	3	4
6		Generate different types of reports through Google Analytics	4	4
7		Study of any email marketing tool (Freeware)	5	4
8		Complete a micro project based on guidelines provided in Sr. No. 11	All Cos	4
			Total Hrs	32

S.No.	Performance Indicators	Weightage in %
a.	Study of web pages and web site	10
b.	Installing and setting up the tool for web site	20
c.	Observations and Recording	20
d.	Interpretation of reports, result and Conclusion	20
e.	Answer to sample questions	20
f.	Submission of term work journal in time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major tools with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr.No.	Major tools Required	Experiment Sr. No.
1	Web browser	All
2	Any Web Server (e.g. Glassfish, Tomcat)	
3	Google Analytics	

7. THEORY COMPONENTS

NA

8. SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

NA

9. SUGGESTED STUDENT ACTIVITIES

Other than the laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of each activity.

- a. Prepare journals based on practical performed in laboratory.
- b. Study of different types of web-sites (ecommerce/ publication/ social media) and advertisements on these web-sites.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- b. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through presentations.
- c. Self-learning through Online tutorials to analyze business data

- d. Use of freeware marketing tools to check for the effectiveness for particular type of websites

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed than three**.

Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Develop and deploy a sample web-site (using CSS, JavaScript, and similar techniques) for given sample commercial requirements. And identify advertising sections among these pages.
- b. Create blog post for educational videos for demonstrating content marketing
- c. Create an account on Google analytics and analyze traffic to the sample website
- d. Create code for tracking ID for sample web site and generate reports through Google analytics

12. SUGGESTED LEARNING RESOURCES

Sr No	Title	Author	Publisher, Edition, Year of publication, ISBN Number
1	Fundamental of digital Marketing	Punneet Singh Bhatia	Pearson India, 2 nd Edition (2019) ● ISBN_109789353434141
2	The Art of SEO	Eric Enge, Stephan Spencer, Jessie Stricchiola	O'Reilly Media ,3 Edition (2015) ● ISBN_10 1491948965 ● ISBN_13 978-1491948965

13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. <https://youtu.be/mXcQ7rVn3ro>
3. <https://youtu.be/gQe7gGGuzeQ>
4. https://www.tutorialspoint.com/digital_marketing/

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	1	3	2	-	1	-
CO2	-	2	1	2	-	-	1
CO3	1	2	3	3	-	1	1
CO4	-	1	2	3	-	1	1
CO5	-	3	3	3	1	1	1

	PSO1	PSO2
CO1	1	2
CO2	1	3
CO3	-	3
CO4	-	3
CO5	1	3

Sign: Name: 1) Mrs. M. G. Yawalkar 2) Mrs. A. S. Paiké 3) Mrs. K. S. Gaikwad 4) Mrs. P. K. Zade (Course Expert /s)	Sign: Name: Mr. U.V. Kokate Dr. S. B. Nikam (Head of Department) (Department of Computer Engineering)
Sign: Name: Mr. U.V. Kokate Dr. S. B. Nikam (Programme Head) (Department of Computer Engineering)	Sign: Name: Mr. A.S. Zanpure (CDC In-charge)

