

SMEA4004	ENGINEERING ECONOMICS AND COST ANALYSIS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.

UNIT 1 INTRODUCTION**9 HRS**

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

UNIT 2 VALUE ENGINEERING**9 HRS**

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

UNIT 3 CASH FLOW**9 HRS**

Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method, Examples in all the methods.

UNIT 4 REPLACEMENT AND MAINTENANCE ANALYSIS**9 HRS**

Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely – Case study based on replacement and maintenance in automobile components.

UNIT 5 DEPRECIATION**9 HRS**

Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation- Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity method of depreciation, service output method of depreciation- Evaluation of public alternatives- introduction, Examples, Inflation adjusted decisions – procedure to adjust inflation, Examples on comparison of alternatives and determination of economic life of asset.

- Mini project on Production of Automobile parts/vehicle for studying about Engineering Economics and cost analysis

Max. 45 HRS**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1- Understand different cost, selection of materials in engineering economics. CO2- Understand the major capabilities and limitations of cash flow analysis
CO3- Recognise, formulate, analyse and solve cash flow models in practical situations
CO4- Develop the ability to account for time value of money using engineering economy factors
CO5- Implications and importance of considering taxes, depreciation, and inflation
CO6- Apply engineering economic techniques on solving engineering problems

TEXT BOOK

1. PanneerSelvam, R, Engineering Economics, Prentice Hall of India Ltd, New Delhi, 2013.
2. Suma Damodaran, "Managerial Economics", Oxford university press 2006.

REFERENCES

1. Chan S. Park, "Contemporary Engineering Economics", Prentice Hall of India, 2002.
2. Donald. G. Newman, Jerome. P. Lavelle, "Engineering Economics and analysis" Engg. Press, Texas, 2002
3. Degarmo, E. P., Sullivan, W. G. and Canada, J. R., "Engineering Economy", Macmillan, New York, 1984
4. Grant. E. L., Ireson. W. G., and Leavenworth, R. S., "Principles of Engineering Economy", Ronald Press, New York, 1976.
5. Smith, G. W., "Engineering Economy", Iowa State Press, Iowa, 1973.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100
PART A: 10 Questions of 2 marks each – No choice
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks

Exam Duration: 3 Hrs.
20 Marks
80 Marks

SAIC4001	INDUSTRY4.0	L	T	P	Credits	TotalMarks
		2	-	2	2	100

UNIT1 ADVANCED TECHNOLOGY AND ADVANCED MATERIALS

7Hrs.

Advanced electro-optical sensing technology-active, passive multi-spectral and hyper spectral imaging; electronic beamsteering; vacuum technology, surface and coating technology, healthcare technology, Nanotechnology - Nanomechanics, Nanooptoelectronics; energy storage technology-next generation Li-based Batteries, Hydrogen storage, solar photovoltaic's, Flexible electronics. Intellectual Property Rights- case studies governing/pertaining to Materials/Technology.

UNIT2 TRANSFORMING TECHNOLOGIES IN BIOENGINEERING

7Hrs.

Establishment of smart biotechnology factory, Artificial intelligence in Bioprocess technology, Omics – Big data analysis through automation, 3D bio printing for tissue engineering. Simulation tools, RSM and Box model. Cyber physical system based telemedicine, diagnosis and therapeutics through real time biosensors. Bionanotechnology. Intellectual Property rights (IPR): Case Studies.

UNIT3 ADVANCEMENTS IN SUSTAINABLE BUILT ENVIRONMENT

7Hrs.

Introduction – Technological developments in Architectural, Engineering and Construction (AEC) - Building Information Modelling (BIM) using Cloud computing technology and Internet of things (IoT) – Unmanned Aerial Vehicles, sensors – Additive manufacturing in construction – Concrete 3D printing- Materials used - Lightweight and functionally graded structures - Net Zero Energy buildings, Biowaste, Biofiltration pond, Ecosan systems- Recent developments in Waste water Management, Air pollution control, waste disposal - Integration of energy, water and environmental systems for a sustainable development- Emerging Technologies: Robot Highway- Vertical farming - Intellectual Property rights: Case studies.

UNIT4 SMART MANUFACTURING

8Hrs.

Smart factories and interconnection, Smart Manufacturing – automation systems, Additive Manufacturing, Smart grids, Micro Electro Mechanical Systems (MEMS), Stealth technology, Metal Finishing, Self propelled vehicles, e mobility, Green fuels, drones – unmanned aerial vehicles (UAVs), aerodynamics. Robotic Automation and Collaborative Robots – Augmented reality and haptics, engineering cybernetics and artificial intelligence (AI), Disruptive Technologies – Frugal Innovations – Emerging Technologies - Autonomous Robots, Swarm Robot, Modular Robotics, Space craft, Intellectual Property Rights (IPR): Case Studies.

UNIT5 SMART WORLD

8Hrs.

Smart Sensors and IIOT, Smart grid, Hybrid renewable energy systems, Electronics in Smart city, Integration of Sensors in Robots and Artificial Intelligence, 5G Technology, Communication protocols, Human-Machine Interaction, Virtual Reality, Quantum Computing: Changing trends in transistor technology: Processor, Emerging Trends: Deep Space, Swarm Robots, Cyborg, Geofencing, Pervasive Computing, Intellectual Property Rights- Case Studies.

UNIT6 CYBER PHYSICAL SYSTEMS

8Hrs.

Introduction to Cyber Physical Systems (CPS), Architecture of CPS, Data science and technology for CPS, Prototypes of CPS, Emerging applications in CPS including social space, crowd sourcing, health care and human computer interactions, Industrial Artificial Intelligence, Networking systems for CPS applications, Wearable cyber physical systems and applications, Domain applications of CPS: Agriculture, Infrastructure, Disaster management, Energy, Transportation, Intellectual Property Rights (IPR): Case Studies.

Max. 45Hrs.

TEXT/REFERENCE BOOKS

1. William D. Callister, "Materials Science and Engineering, An Introduction, John Wiley and Sons Inc. Singapore, 2001.
2. V. Raghavan, "Physical Metallurgy: Principle and Practice, Prentice Hall India Pvt Ltd, 2006.
3. Flavio Craveiro, Jose Pinto Duarte, Helena Bartolo and Paulo Jorge Bartolo, "Additive manufacturing as an enabling technology for digital construction: A perspective on Construction 4.0", Automation in Construction, Vol. 103, pp. 251-267, 2019.
3. Klaus Schwab, "Fourth Industrial Revolution", Random House USA Inc, New York, USA, 2017.
4. Oliver Grunow, "SMART FACTORY AND INDUSTRY 4.0. The current state of Application Technologies", Studylab Publications, 2016.
5. Alasdair Gilchrist, "INDUSTRY 4.0: Industrial Internet of Things", Apress, 2016.
6. Sang C. Suh, U. John Tanik, John N Carbone, Abdullah Eroglu, "Applied Cyber-Physical Systems", Springer Publications, New York, 2013.