OUTCOME :

- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

MS8003 SOCIOLOGY AND GLOBAL ISSUES L T P C
3 0 0 3

OBJECTIVE:

- To understand the human behaviour in societal context and to know the conceptual tools and methodology for the same.

UNIT I SOCIOLOGICAL PERSPECTIVE 12

Social facts, causes, imagination, science, common sense and levels of organization. Interaction and social organization - frame work, statuses and roles, interaction process, social exchange, network and structure of society.

INDIVIDUAL AND SOCIETY:

Elements of culture, culture interaction and diversity. Dynamics of socialization, social class, agents, and secondary socialization

UNIT II SOCIAL GROUPS 12

Characteristics, dynamics, types, individual commitment and group survival, techniques of formal organization. The effects of urbanization and community, population and society, dynamics of population change. Politics, the state and war, the economy, business and work, social systems, social institution – the family, marriage, education goals, values and dilemmas. Transformation of society - Science and technology, growth, role, process of science, society and technologies. Collective behavior and social movement

UNIT III GLOBAL ISSUES – ENERGY 7

The energy crisis, the effect of the energy crisis in less developed nations, climate change, the energy transition, nuclear power

UNIT IV GLOBAL ISSUES – THE ENVIRONMENT 7

Awakening, the air, the water, the workplace, the use of natural resources.

UNIT V GLOBAL ISSUES – THE TECHNOLOGY 7

Benefits of technology, short term and long term benefits, unanticipated consequences on the use of technology. Inappropriate use of technology, the threat of nuclear weapons.

TOTAL : 45 PERIODS

OUTCOMES:

- Able to study the interactions of people in society
- Understanding the effects of societal history, group behavior studies on families etc
- Relating the sociology with global issues like energy crisis, environmental pollution etc.

TEXT BOOKS:

1. Craig Calhoun, Donald Light and Suzanne Keller, "Sociology", McGraw Hill Professional, New York, 1993.
2. Joan Ferrante, "Sociology – A Global Perspective", Seventh Edition, WADSWORTH Cengage Learning, 2008.
3. John L Seltz, "Global Issues – An Introduction", Black well publishing, Second Edition, 2003.

REFERENCES:

1. James Henslin, "Sociology – A Down-to-Earth Approach, Core Concepts", Pearson Education, Fourth Edition, 2009.
2. John Macionis, Ken Plummer, "Sociology – A Global Introduction", Pearson Education, Fourth Edition, 2009.
3. Michael T, Snarr and D Neil Snarr, "Introducing Global Issues", Third Edition, Lynne Rienner Publishers, Boulder, 2005.

MS8004 DESIGN OF HEAT EXCHANGERS L T P C
3 0 0 3

OBJECTIVES:

- To learn the thermal and stress analysis on various parts of the heat exchangers
- To analyze the sizing and rating of the heat exchangers for various applications

UNIT I INTRODUCTION 9

Types of heat exchangers, shell and tube heat exchangers – regenerators and recuperators - Temperature distribution and its implications - Parts description, Classification as per Tubular Exchanger Manufacturers Association (TEMA)

UNIT II PROCESS DESIGN OF HEAT EXCHANGERS 9

Heat transfer correlations, Overall heat transfer coefficient, analysis of heat exchangers – LMTD and effectiveness method. Sizing of finned tube heat exchangers, U tube heat exchangers, Design of shell and tube heat exchangers, fouling factors, pressure drop calculations.

UNIT III STRESS ANALYSIS 9

Stress in tubes – header sheets and pressure vessels – thermal stresses, shear stresses - types of failures, buckling of tubes, flow induced vibration.

UNIT IV COMPACT AND PLATE HEAT EXCHANGER 9

Types- Merits and Demerits- Design of compact heat exchangers, plate heat exchangers, performance influencing parameters, limitations.

UNIT V CONDENSERS AND COOLING TOWERS 9

Design of surface and evaporative condensers – cooling tower – performance characteristics.

TOTAL: 45 PERIODS

OUTCOME:

- Upon completion of this course, the students can able to apply the mathematical knowledge for thermal and stress analysis on various parts of the heat exchangers components.

TEXT BOOKS:

1. SadikKakac and Hongtan Liu, "Heat Exchangers Selection", Rating and Thermal Design, CRC Press, 2002.
2. Shah,R. K., Dušan P. Sekulić, "Fundamentals of heat exchanger design", John Wiley & Sons, 2003.

REFERENCES:

1. Robert W. Serth, "Process heat transfer principles and applications", Academic press, Elesevier, 2007.
2. Sarit Kumar Das, "Process heat transfer", Alpha Science International, 2005
3. John E. Hesselgreaves, "Compact heat exchangers: selection, design, and operation", Elsevier science Ltd, 2001.
4. Kuppan. T., "Heat exchanger design hand book", New York : Marcel Dekker, 2000.
5. Eric M. Smith, "Advances in thermal design of heat exchangers: a numerical approach: directsizing, step-wise rating, and transients", John Wiley & Sons, 1999.

ME8074	VIBRATION AND NOISE CONTROL	L	T	P	C
		3	0	0	3

OBJECTIVE:

- The student will be able to understand the sources of vibration and noise in automobiles and make design modifications to reduce the vibration and noise and improve the life of the components

UNIT I BASICS OF VIBRATION 9

Introduction, classification of vibration: free and forced vibration, undamped and damped vibration, linear and non linear vibration, response of damped and undamped systems under harmonic force, analysis of single degree and two degree of freedom systems, torsional vibration, determination of natural frequencies.

UNIT II BASICS OF NOISE 9

Introduction, amplitude, frequency, wavelength and sound pressure level, addition, subtraction and averaging decibel levels, noise dose level, legislation, measurement and analysis of noise, measurement environment, equipment, frequency analysis, tracking analysis, sound quality analysis.

UNIT III AUTOMOTIVE NOISE SOURCES 9

Noise Characteristics of engines, engine overall noise levels, assessment of combustion noise, assessment of mechanical noise, engine radiated noise, intake and exhaust noise, engine necessary contributed noise, transmission noise, aerodynamic noise, tire noise, brake noise.

UNIT IV CONTROL TECHNIQUES 9

Vibration isolation, tuned absorbers, un-tuned viscous dampers, damping treatments, application dynamic forces generated by IC engines, engine isolation, crank shaft damping, modal analysis of the mass elastic model shock absorbers.

UNIT V SOURCE OF NOISE AND CONTROL 9

Methods for control of engine noise, combustion noise, mechanical noise, predictive analysis, palliative treatments and enclosures, automotive noise control principles, sound in enclosures, sound energy absorption, sound transmission through barriers

TOTAL: 45 PERIODS

OUTCOMES:

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

CO1 Summarize the Basics of Vibration
CO2 Summarize the Basics of Noise
CO3 Explain the Sources of Automotive Noise
CO4 Discuss the Control techniques for vibration
CO5 Describe the sources and control of Noise

TEXT BOOK:

1. Singiresu S.Rao, "Mechanical Vibrations", 6th Edition, Pearson Education, 2016

REFERENCES:

1. Balakumar Balachandran and Edward B. Magrab, "Fundamentals of Vibrations", 1st Editon, Cengage Learning, 2009
2. Benson H. Tongue, "Principles of Vibrations", 2nd Edition, Oxford University, 2007
3. Bernard Challen and Rodica Baranescu - "Diesel Engine Reference Book", Second Edition, SAE International, 1999.
4. David Bies and Colin Hansen, "Engineering Noise Control – Theory and Practice",4th Edition, E and FN Spon, Taylore & Francise e-Library, 2009
5. Grover. G.T., "Mechanical Vibrations", Nem Chand and Bros., 2009

MS8005 BIOGAS ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

To get exposure on production, processing and application of Biogas.

UNIT I INTRODUCTION 6

Bio-Energy. Overview of biogas technology. Technical status of biogas technology. Economic viability of biogas technology. Diffusion status of biogas technology in developing countries. Biogas technology scenario in India.

MATERIALS FOR BIOMETHANATION AND PRODUCTS OF METHANATION:

Biomass and its availability. Biodegradability. Raw materials for biogas production and their characteristics. Conversion principles. Fermented slurry as fertiliser.

UNIT II BIO-REACTORS 8

Types of bio-reactors- Constant pressure type reactors, Ganesh model, Pragathi model, Astra model, Jwala biogas plant, Batch digester, Manawat digester, German designs, plastic bag digesters, free fabricated steel/plastic digesters, Tunnel type digester, Maya Farms model, Large Farm biogas plants, Anaerobic Contact reactors, Anaerobic Filter reactors

UNIT III DESIGN, SELECTION, CONSTRUCTION AND OPERATION OF BIOGAS PLANTS 9

Design of the digester. Design based on End Use requirements. Scaling of biogas plants - GTZ method - digester sizing for a given end use device efficiency. Optimal design -KVIC. Design of fixedDome type of digesters. Material estimate for fixed dome plants. Selection of type and size of biogas reactors and their specifications. Constructional aspects. Operational problems in biogas plants methods of improving plant productivity. Measuring and test programs

UNIT IV PURIFICATION, SCRUBBING, COMPRESSION AND STORAGE OF BIOGAS **8**

Properties of H2S. Origin of H2S in biogas plants. Effect of H2S on biogas plant and devices. Determination of H2S content in biogas. Methods for removing H2S from biogas. Process techniques. Requirements of absorbent. Desulphurising apparatus. Operation procedures for desulphurization. Scrubbing, storage, transportation.

UNIT V UTILISATION SYSTEMS OF BIOGAS **8**

Biogas as an alternative energy source. Biogas utilization. Biogas burners. Design of biogas burners. Stove models. Lighting mantles. Biogas using stationary power plants. Mobile power plants. Pollution control through anaerobic digestion.

TOTAL : 45 PERIODS

OUTCOMES:

- Knowledge of materials for biogas production and their by products.
- Understanding the working of biogas reactors and bioplants / knowledge in design, construct and operate the biogas plants.
- Visualising the applications biogases in power generation.

TEXT BOOKS:

1. Nijaguna B T, “Biogas Technology”, New Age International Publishers, New Delhi, 2002.
2. Khandelwal K C and Mahdi S S, “ Biogas Technology, Vol. I”, Tata McGraw Hill, 1986.
3. Frank Stephan, “Biogas Technology”, Fachhochschule Koln Hochschule, Bremerhaven, Germany, 1985.

REFERENCES:

1. Helmut Muche/Harald Zimmerman, “The Purification of Biogas”, published by Friedr Vieweg and Sohn, Germany, 1985.
2. Ludwig Sasse, “Biogas Plants”, published by Friedr Vieweg and Sohn, Germany, 1985.
3. Singh J B, Reymond Myles and Anil Dhussa, “Manual on Deenabandhu Biogas Plant”, Tata McGraw Hill, 1987.
4. Tata Energy Research Institute, “Fixed Dome Biogas Plants, A design, Construction and Operation Manual”, 1987.

MS8006 DESIGN OF PRESSURE VESSELS AND PIPING **L T P C 3 0 0 3**

OBJECTIVES:

- To understand the Mathematical knowledge to design pressure vessels and piping
- To understand the ability to carry of stress analysis in pressure vessels and piping

UNIT I INTRODUCTION **3**

Methods for determining stresses – Terminology and Ligament Efficiency – Applications.

UNIT II STRESSES IN PRESSURE VESSELS **15**

Introduction – Stresses in a circular ring, cylinder –Dilation of pressure vessels, Membrane stress Analysis of Vessel – Cylindrical, spherical and, conical heads – Thermal Stresses – Discontinuity stresses in pressure vessels.

UNIT III DESIGN OF VESSELS 15

Design of Tall cylindrical self supporting process columns – Supports for short vertical vessels – Stress concentration at a variable Thickness transition section in a cylindrical vessel, about a circular hole, elliptical openings. Theory of Reinforcement – Pressure Vessel Design.

UNIT IV BUCKLING AND FRACTURE ANALYSIS IN VESSELS 8

Buckling phenomenon – Elastic Buckling of circular ring and cylinders under external pressure – collapse of thick walled cylinders or tubes under external pressure – Effect of supports on Elastic Buckling of Cylinders – Buckling under combined External pressure and axial loading.

UNIT V PIPING 4

Introduction – Flow diagram – piping layout and piping stress Analysis.

TOTAL: 45 PERIODS

OUTCOME:

- Upon completion of this course, the students can able to apply the mathematical fundamental for the design of pressure vessels and pipes. Further they can able to analyse and design of pressure vessels and piping.

TEXT BOOK:

1. John F. Harvey, "Theory and Design of Pressure Vessels", CBS Publishers and Distributors,1987.

REFERENCES:

1. Henry H. Bedner, “Pressure Vessels, Design Hand Book", CBS publishers and Distributors, 1987.
2. Stanley, M. Wales, “Chemical process equipment, selection and Design". Buterworths series in Chemical Engineering, 1988.
3. William. J., Bees, “Approximate Methods in the Design and Analysis of Pressure Vessels and Piping”, Pre ASME Pressure Vessels and Piping Conference, 1997.
4. Sam Kannapan, “Introduction to Pipe Stress Analysis”. John Wiley and Sons, 1985.

IM8691 VALUE ENGINEERING AND PROJECT MANAGEMENT L T P C
3 2 0 4

OBJECTIVE:

- To give a brief account of the value analysis and engineering tool for productivity improvement through project management.

UNIT I VALUE ENGINEERING BASICS 9+6

Origin of Value Engineering, Meaning of value, Definition of Value Engineering and Value analysis, Difference between Value analysis and Value Engineering, Types of Value, function – Basic and Secondary functions, concept of cost and worth, creativity In Value Engineering.

UNIT II VALUE ENGINEERING JOB PLAN AND PROCESS 9+6

Seven phases of job plan, FAST Diagram as Value Engineering Tool, Behavioural and organizational aspects of Value Engineering, Ten principles of Value analysis, Benefits of Value Engineering.

UNIT III PROJECT FORMULATION AND APPRAISAL 9+6

Project Management – An overview, Feasibility and Technical analysis, Marketing feasibility, Financial and Economic feasibility, Formulation of Detailed Project Reports (DPR).