SYLLABI BOOK

BACHELOR OF TECHNOLOGY
MECHANICAL ENGINEERING

Department of Mechanical Engineering

Faculty of Technology

Dharmsinh Desai University

Nadiad – 387 001, Gujarat, India.

TEACHING SCHEME FOR THE COURSE
B. TECH., MECHANICAL ENGINEERING
(Admission Year_2021)

SEMESTER I

	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	TH	Sess	Prac	TW	Total	Credit
1	MATHEMATICS -I	3	1	0	60	40	0	0	100	4.0
2	THERMODYNAMICS	3	0	2	60	40	50	0	150	4.0
3	BASIC ELECTRICAL ENGG.	3	0	2	60	40	50	0	150	4.0
4	MECHANICS	3	0	2	60	40	0	0	100	4.0
5	COMPUTER PROGRAMMING	2	0	3	40	0	0	50	90	3.5
6	ENVIRONMENTAL STUDIES	2	0	0	40	0	0	0	40	0.0
7	WORKSHOP PRACTICE - I	0	0	2	0	0	50	0	50	1.0
									680	20.5

SEMESTER II

	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	TH	Sess	Prac	TW	Total	Credit
1	MATHEMATICS-II	3	1	0	60	40	0	0	100	4.0
2	ENGINEERING GRAPHICS	3	0	3	60	40	50	0	150	4.5
3	BASIC ELECTRONICS	3	0	2	60	40	50	0	150	4.0
4	MECHANICS OF SOLIDS	3	0	2	60	40	50	0	150	4.0
5	CHEMISTRY	3	0	0	60	0	0	0	60	3.0
6	WORKSHOP PRACTICE - II	0	0	3	0	0	0	50	50	1.5
									660	21

SEMESTER III

	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	TH	Sess	Prac	TW	Total	Credit
1	NUMERICAL TECHNIQUES	3	0	2	60	40	25	25	150	4.0
2	ELECTRICAL MACHINES AND DRIVES	3	0	2	60	40	25	25	150	4.0
3	FLUID MECHANICS	3	0	2	60	40	25	25	150	4.0
4	MATERIAL SCIENCE AND METALLURGY	3	0	2	60	40	25	25	150	4.0
5	KINEMATICS OF MACHINES	3	1	2	60	40	25	25	150	5.0
6	ENGLISH	2	0	2	40	0	0	50	90	3.0
									840	24.0

SEMESTER IV

	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	TH	Sess	Prac	TW	Total	Credit
1	APPLIED THERMODYNAMICS	3	0	2	60	40	25	25	150	4.0
2	ADVANCE SOLID MECHANICS	3	0	2	60	40	25	25	150	4.0
3	MANUFACTURING TECHNOLOGY - I	3	0	4	60	40	25	25	150	5.0
4	DYNAMICS OF MACHINES	3	1	2	60	40	25	25	150	5.0
5	MACHINE DRAWING & INDUSTRIAL DRAFTING	0	0	4	0	0	25	25	50	2.0
6	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	1	0	2	0	0	0	100	100	2.0
7	UNIVERSAL HUMAN VALUES	3	0	0	60	0	0	0	60	3.0
									810	25.0

SEMESTER V

	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	TH	Sess	Prac	TW	Total	Credit
1	MEASUREMENT AND METROLOGY	3	0	2	60	40	25	25	150	4.0
2	HEAT AND MASS TRANSFER	3	0	2	60	40	25	25	150	4.0
3	MANUFACTURING TECHNOLOGY - II	3	0	4	60	40	25	25	150	5.0
4	MACHINE DESIGN - I	3	1	2	60	40	25	25	150	5.0
5	OPEN ELECTIVE - I	3	0	0	60	0	0	0	60	3.0
6	INDUSTRIAL MANAGEMENT & ECONOMICS	2	0	2	40	0	0	50	90	3.0
7	MENDATORY COURSE - 2 (CONSTITUTION OF INDIA OR ESSENCE OF INDIAN KNOWLEDGE TRADITION)	2	0	0	40	0	0	0	40	2.0
									790	26.0

SEMESTER VI

	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	TH	Sess	Prac	TW	Total	Credit
1	MACHINE DESIGN - II	3	1	2	60	40	25	25	150	5.0
2	FLUID MACHINES	3	0	2	60	40	25	25	150	4.0
3	COMPUTER AIDED DESIGN & MANUFACTURING	3	0	2	60	40	25	25	150	4.0
4	PROFESSIONAL ELECTIVE - I	3	0	2	60	40	25	25	150	4.0
5	PROFESSIONAL ELECTIVE - II	3	0	2	60	40	25	25	150	4.0
6	OPEN ELECTIVE - II	3	0	0	60	0	0	0	60	3.0
									810	21

SEMESTER VII

	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	TH	Sess	Prac	TW	Total	Credit
1	FINITE ELEMENT ANALYSIS	3	0	2	40	0	0	50	90	4.0
2	PROFESSIONAL ELECTIVE - III	3	0	2	60	40	25	25	150	4.0
3	PROFESSIONAL ELECTIVE - IV	3	0	2	60	40	25	25	150	4.0
4	OPEN ELECTIVE - III	3	0	0	60	0	0	0	60	3.0
5	OPERATION RESEARCH	3	0	2	60	40	25	25	150	4.0
6	EFFECTIVE TECHNICAL COMMUNICATION	3	0	0	60	0	0	0	60	3.0
7	SEMINAR	0	0	2	0	0	0	100	100	1.0
									760	23.0

SEMESTER VIII

	Subject Title	Teaching Scheme & Credit			Examination Scheme					
		Lect	Tut	Prac	TH	Sess	Prac	TW	Total	Credit
1	PROFESSIONAL ELECTIVE - V	2	0	3	40	0	25	25	90	3.5
2	PROFESSIONAL ELECTIVE - VI	2	0	3	40	0	25	25	90	3.5
3	PROFESSIONAL ELECTIVE - VII	2	0	3	40	0	25	25	90	3.5
4	PROJECT	0	0	4	0	0	0	100	100	2.0
5	INDUSTRIAL TRAINING (8 Weeks)	0	3	12	0	0	150	100	250	9.0
									620	21.5

SUBJECT: MATHEMATICS - I (BS102)

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	0	0	100

DETAILED SYLLABUS

1 CALCULUS: INTEGRAL CALCULUS

Evolutes and involutes, Applications of definite integrals to evaluate surface areas and volumes of revolutions.

2 LINEAR ALGEBRA: MATRICES, VECTORS, DETERMINANTS, LINEAR SYSTEMS:

Matrices, Vectors: Addition and Scalar Multiplication, Matrix Multiplication, Rank of a matrix, Solutions of Linear Systems: Existence, Uniqueness, Determinants, Cramer's Rule, Inverse of a matrix, Eigen values, Eigenvectors, Symmetric, Skew-symmetric, Linear Independence of vectors, Diagonalization.

3 SEQUENCES AND SERIES:

Convergence of sequence and series, Introduction to tests for convergence; Power series, Series for exponential, Trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

4 MULTIVARIABLE CALCULUS (DIFFERENTIATION)

Partial derivatives, Total derivative; Tangent plane and normal line; Taylor series expansion for function of two variables, Jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers, Introduction to Vector Differential Calculus; Directional derivatives, Gradient, Curl and divergence.

LEARNING OUTCOMES:

The students will learn:

- To apply differential and integral calculus to notions of curvature and applications of definite integrals.
- Convergence, divergence, and analysis of sequences and infinite series.
- To develop functions as a Fourier series.
- The essential tools of matrices and linear algebra including linear transformations, eigen values, diagonalization.

TEXT/REFERENCE BOOKS:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40th Edition, 2007.

2. G. B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

5. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

6. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

8. V. Krishnamurthy, V.P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	50*	--	150

* TW marks include Viva based on TW

DETAILED SYLLABUS

1 INTRODUCTION:

Macroscopic versus microscopic view point, thermodynamic systems and control volume, thermodynamic properties, processes and cycles, homogeneous and heterogeneous systems, thermodynamic equilibrium, quasi-static process, pure substance, concept of continuum, temperature and zeroth law of thermodynamics, ideal gas and gas laws

2 ENERGY AND ENERGY TRANSFER:

Forms of energy, energy transfer by heat and work, mechanical forms of work, first law of thermodynamics, energy conversion efficiencies

3 PROPERTIES OF PURE SUBSTANCES:

Pure substance, phases and phase change process, thermodynamic properties, property diagrams, ideal gas equation of state, van der waal equation, virial equation of state

4 ENERGY ANALYSIS OF A CLOSED SYSTEM:

PdV work in various quasi-static processes, energy balance, specific heats, internal energy, enthalpy and specific heats of solids, liquids and ideal gases.

5 ENERGY ANALYSIS OF A OPEN SYSTEM:

Conservation of mass, flow work and energy of a flowing fluid, energy analysis of steady and unteady flow systems.

6 SECOND LAW OF THERMODYNAMICS:

Introduction to second law, thermal energy reservoir, heat engine, refrigerator and heat pump, Clausis and Kelvin-Plank statement, perpetual motion machines, reversible and irreversible processes, Carnot and reversed Carnot cycle, , entropy principle and isentropic process, Tds and Maxwell relation.

7 SEAM BOILERS:

Introduction, classification, mountings and accessories, classification and comparison of boiler draught systems.

8 APPLICATIONS OF THERMODYNAMICS:

Construction and working of pumps, compressors, IC engine- Otto and Diesel engines, vapour compression refrigeration system, vapour absorption refrigeration system.

TEXT/REFERENCE BOOKS:

1. Yunus A. Cengel, Michael A. Boles., "Thermodynamics- An engineering approach", Tata McGraw Hill publishing co. ltd.

2. Nag P.K., "Engineering Thermodynamics", Tata McGraw Hill publishing co. ltd.

3. Smith J.M., Van Ness H.C., Abbott M.M, "Introduction to chemical engineering thermodynamics", McGraw Hill publishing co. Ltd.

4. Sonntag. R.E., Borgnakke, C. and Van Wylen G.J.,"Fundamental of thermodynamics", John Wiley and Sons.

5. Moran M.J. and Shapiro H.N., "Fundamentals of engineering thermodynamics", John Wiley and Sons.

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	50*	--	150

* TW marks include Viva based on TW

DETAILED SYLLABUS

1   D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

2   A.C. CIRCUITS

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

3   TRANSFORMERS

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

4   ELECTRICAL MACHINES

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

5   ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthling. Elementary calculations for energy consumption, power factor improvement. DC-DC buck and boost converters. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

6   SEMICONDUCTORS, DIODES AND APPLICATIONS

Semiconductor Diode - Ideal versus Practical, Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener

Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications; Silicon Controlled Rectifier (SCR) in brief.

TEXT/REFERENCE BOOKS:

1. R. Muthu Subramanian, S. Salivahanan, and K. A. Muraleedharan, Basic Electrical, Electronics and Computer Engineering, 2nd Edition, Tata McGraw Hill
2. V. K. Mehta & Rohit Mehta, Principles of Electronics, 11thEdition, S. Chand & Company
3. B. L. Theraja , A. K. Theraja, Electrical Technology (Vol: II), 23rdEdition, S. Chand & Company
4. D.P. Kothari and I. J. Nagrath, Basic Electrical Engineering, 3rd Edition, Tata McGraw Hill

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	50*	--	150

* TW marks include Viva based on TW

DETAILED SYLLABUS

1   STATICS

Resultant force for 2D and 3D force system, concept of free body diagrams, equilibrium equations for particles and rigid body subjected to 2D and 3D force system, centroid and center of gravity, moment of inertia, Friction

2   DYNAMICS AND VIBRATIONS

Rotational Transformation of scalers and vectors, Newton's Laws for particle motion, Potential Energy function F= - Grad V, conservative and non-conservative forces, Conservation of momentum, angular momentum, collision, energy equation, free harmonic motion, damped harmonic motion, forced oscillation and resonance, kinematics in a coordinate system rotating and translating in a plane.

TEXT/REFERENCE BOOKS:

1.   Engineering Mechanics, M. K. Harbola, 2nd Edition, Cengage Learning, 2013.

2.   Mechanics – J P Den Hartog, Dover Publications, 2003.

3.   Mechanical Vibrations - J P Den Hartog, Dover Publications, 1985.

4.   Theory of Vibrations with Applications – W. T. Thomson, 5th Edition, Pearson Education, 2008.

5.   Engineering Mechanics: Statics (V.1), Dynamics (V.2), J. L. Meriam and L. G. Kraige, 5th edition, Wiley, 2017.

6.   Engineering Mechanics: Statics & Dynamics, Irving H. Shames, 4th edition, Pearson Education, 2005.

7.   Vector Mechanics for Engineers: Statics (V.1), Dynamics (V.2), F. P. Beer and E. R. Johnston, 10th SI edition, McGraw Hill Education, 2017

B. TECH. SEMESTER – I (CH/CL/IC/MH)
SUBJECT: COMPUTER PROGRAMMING (ES113)

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	40	0	50*	--	90

* TW marks include Viva based on TW

DETAILED SYLLABUS

1 INTRODUCTION:

Introduction to components of computer system, Idea of algorithm, Introduction to C, Constants, Variables & Data types in C, Managing input and Output operators.

2 OPERATORS AND EXPRESSIONS:

C Operators: Arithmetic, relational, logical, increment &decrement, assignment and conditional, Arithmetic Expressions & Precedence Rule, Type conversion in C, Mathematical Functions.

3 DECISION MAKING AND BRANCHING:

Decision making with If & If...else statements, goto statements.

4 DECISION MAKING AND LOOPING:

The while statement, the break statement & the do... while loop, the for loop, Jump within loops - Programs.

5 ARRAYS:

Array 1D, 2D, Character Array as String

6 USER DEFINED FUNCTIONS:

Categories of Functions (Including using built in library), Call by Value, Parameter passing to function, Recursion.

7 STRUCTURE:

Defining structure, Assigning value to the structure members, Array of structure

8 POINTER:

Idea of pointer, declaration and Initialization of pointer, passing address as function argument, passing array to function using pointer.

9 FILE HANDLING

(only if time is available, otherwise should be done as part of the lab)

TEXT/REFERENCE BOOKS:

1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.

2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

3. Yashvant Kanetkar, Let Us C, 12th Edition, BPB Publication.

4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
2	0	0	2	0	50	0	0	0	50

DETAILED SYLLABUS:

1   **THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES**

   Definition, scope and importance & Need for public awareness

2   **NATURAL RESOURCES**

Renewable and non-renewable resource: Natural resources and associated problems, Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams, and their effects on forests and tribal people, Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefit and problems, Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies, Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies, Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification, Role of an individual in conservation of natural resources. Equitable use of resources of sustainable lifestyles

3   **ECOSYSTEMS**

Concept of an ecosystem, Structure and function of an ecosystem, producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

4   **BIODIVERSITY AND ITS CONSERVATION**

Introduction definition: Genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels, 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 conservation of biodiversity

5   **ENVIRONMENTAL POLLUTION**

Definition, Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards Solid waste management, causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides

6 SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns. Case studies, Environmental ethics: Issues and possible solutions, Climate change: Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies: Wasteland reclamation, Consumerism and waste products, Environment Protection Act: Air (Prevention and Control of Pollution) Act, Water (Prevention &Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

7 HUMAN POPULATION AND THE ENVIRONMENT
(Population growth, variation among nations, population explosion, Family Welfare Program, environment and human health, human rights, Value education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environmental and human health, Case studies.

8 FIELD WORK

Visit to a local area to document environmental assets (river/forest/grassland/hill/mountain) Visit to a local polluted site - Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystems – pond, river, hill, slopes etc.

TEXT BOOKS/ REFERENCE BOOKS

1. Erach Bharucha Textbook of Environmental Studies; Second Edition, Universities Press: Hyderabad, 2013.

2. Poonia, M. P.; Sharma, S. C. Environmental studies; Khanna Publishing House: New Delhi, 2017.

3. Rajagopalan, R. Environmental Studies; Oxford University Press: India, 2015.

4. Varandani, N. S. Basics of Environmental studies; Lambert Academic Publishing: Germany, 2013.

5. Basak, A. Environmental Studies; Dorling Kindersley: India, 2009.

6. Dhameja, S. K. Environmental studies; S. K. Kataria and Sons: New Delhi, 2007.

7. Rao, C. S. Environmental Pollution Control Engineering; Wiley publishers: New Delhi, 2006.

8. Brunner, R. C. Hazardous Waste Incineration; McGraw Hill: Michigan, 1989.

9. Clark, R. S. Marine Pollution; Clanderson Press Oxford: Bath, 2001.

10. Trivedy, R. K. Handbook of Environmental Laws, Acts, Guidelines, Compliances & standards; B. S. publications: Hyderabad, 2005.

11. Jadhav, H.; Bhosale, V. M. Environmental Protection and Laws; Himalaya Pub. House: Delhi, 1995.

12. Agarwal, K. C. Environmental Biology; Nidi Publ.: Bikaner, 2001.

13. Bharucha, E. The Biodiversity of India; Mapin Publishing: Ahmedabad, India, 2002.

14. Cunningham, W.P.; Cooper; Gorhani, T. H. E.; Hepworth, M.T., Environmental Encyclopedia; Jaico Publ. House: Mumbai, 2001.

15. De, A. K. Environmental Chemistry; Wiley Eastern: New Delhi, 2006.

16. Gleick, H. P. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security; Stockholm Env. Institute Oxford Univ. Press: New York, 1993.

17. Hawkins, R.E., Encyclopedia of Indian Natural History; Bombay Natural History Society: Bombay, 1987.

18. Heywood, V. H.; Waston, R. T. Global Biodiversity Assessment; Cambridge Univ. Press: Cambridge, 1995.

19. Mckinney, M.L.; School, R.M. Environmental Science systems & Solutions; Web enhanced edition: USA, 1996.

20. Miller, T.G. Jr.; Spoolman, S. E. Environmental Science; Cengage learning: Wadsworth, 2014.

21. Odum, E.P. Fundamentals of Ecology; W.B. Saunders: USA, 1971.

22. Rao, M. N.; Datta, A.K. Waste Water treatment; Oxford & IBH Publ.: New Delhi, 1987.

23. Sharma, B. K., Environmental Chemistry; Goel Publ. House: Meerut, 2001.

24. Townsend, C., Harper, J.; Michael, B. Essentials of Ecology; Blackwell: Oxford, 2008.

25. Trivedi, R. K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II; B. S. Publications, Hyderabad, 2010.

26. Trivedi, R. K.; Goel, P. K. Introduction to air pollution; ABD Publishers: Jaipur, 2003.

27. Wanger, K. D., Environmental Management; W.B. Saunders Co. Philadelphia, USA, 1998

B. TECH. SEMESTER – I (CH/CL/IC/MH)
SUBJECT: WORKSHOP PRACTISE - I

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
0	0	0	2	1	0	0	50*	0	50

Reference Code ESC104A
* TW marks include Viva based on TW

LABORTORY WORKS/SCHEDULE:

Lab	Workshop-I
1	Introduction to Workshop, Basic Workshop types
2	Safety requirement in workshop, Safety rules
3	To Understand "5S" Concept for Workplace
4	Demonstration of Tin smithy Tools and it's exercise
5	To make job for Tin smithy shop
6	Demonstration of Plumbing tools, It's accessories.
7	To make job for Plumbing shop
8	Introduction to Fabrication shop, Welding Equipment
9	To make job for Fabrication shop
10	Introduction of Machine shop
11	Introduction and Demonstration of Lathe machine.
12	Introduction and Demonstration of Milling and Radial Drilling m/c

TEXT/ REFERENCE BOOKS

1. Work shop technology, A. K. Hajrachaudhari & S. K. Hajrachaudhari
2. ITB Hand book, Engineering industry training board
3. Work shop Technology Vol. I & II, Gupta & Kaushik

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	0	0	100

DETAILED SYLLABUS

1 **SERIES SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS BY POWER SERIES METHOD:**

Introduction, Validity of series solution of the equation, General Method, Forms of series solution.

2 **PARTIAL DIFFERENTIAL EQUATIONS:**

Basic Concepts, Classification and Solutions of partial differential equations: Lagrange's linear equation of first order, Non-linear equations of first order-Charpit's method, Homogenous linear equations with constant coefficient to find the complementary functions and the particular integral, Introduction to non-homogenous linear equations with constant coefficients, Method of separation of variables.

3 **MULTIVARIABLE CALCULUS (INTEGRATION**

Multiple Integration: Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Introduction to Triple integrals (Cartesian), Vector line integrals, Vector surface integrals, Theorems of Green, Gauss and Stoke's.

4 **LAPLACE TRANSFORM:**

Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions, finding inverse Laplace transform by different methods, Convolution theorem, Evaluation of integrals by Laplace transform, Solving ODE by Laplace Transform method.

TEXT/REFERENCE BOOKS:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40th Edition, 2007.

2. G. B. Thomas and R. L. Finney, Calculus and Analytic geometry,9thEdition, Pearson, Reprint,2002.

3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

4. W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India,2009.

5. S. L. Ross, Differential Equations, 3rd Ed., Wiley India,1984.

6. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India,1995.

7. E. L. Ince, Ordinary Differential Equations, Dover Publications,1958.

8. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill,2004.

9. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2008.

B. TECH. SEMESTER – II (CH/CL/IC/MH)
SUBJECT: ENGINEERING GRAPHICS (ES203)

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	3	6	4.5	60	40	50	0	150

Reference Code ESC102
* TW marks include Viva based on TW

DETAILED SYLLABUS

1 INTRODUCTION TO ENGINEERING DRAWING

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic section curves (Ellipse, Parabola, Hyperbola), Cycloidal Curves (Cycloid, Epicycloid, Hypocycloid), Involutes; Archimedean Spiral

2 SOLID GEOMETRY

Projection of points, projection of lines and their applications. Projection of regular planes such as square, rectangle, triangle, circle, pentagon, hexagon, rhombus. Projection of right and regular solids inclined to both the planes (prisms, pyramids, cylinder and cone)

3 ORTHOGRAPHIC PROJECTIONS

First angle and third angle projection methods, conversion of pictorial views into Orthographic projections with dimensioning, sectional orthographic projection, special sections

4 SECTION OF SOLIDS AND DEVELOPMENT OF SOLIDS

Sections and Sectional Views of Right Angular Solids Covering, Prism, Cylinder, Pyramid, Cone

5 DEVELOPMENT OF SURFACES

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone

6 ISOMETRIC PROJECTIONS

Principles of Isometric projection – Isometric Scale, Isometric projection and view, Conversion of orthographic views to isometric projections and views

7 WORKING ENVIRONMENT OF CAD SOFTWARE

Menu bar, Quick access toolbar, Dashboard/Ribbon, Toolbars, drawing space, Navigation bar (View controls: zoom, pan, orbit,), Command prompt, Status bar, Drawing Area (Background, Crosshairs, Coordinate System), Shortcut Menu, Properties manager.

8 DRAWING CUSTOMIZATION

Setting up the drawing sheet (drawing sheet templates, drawing limits, drawing units etc.), Coordinate system (User coordinate system, Absolute and relative coordinates, Cartesian and Polar coordinates), Modes of drawing (Grid, Snap, Ortho, Osnap, Otrack, Polar tracking, Iso draft, etc.) Formatting (colours, line type, line weight, point style etc.).

9   PREPARING COMPUTER AIDED DRAWING

Exploring various commands with exercises of Orthographic drawing views and Isometric drawing views using different drawing tools, modifying tools, dimensioning tools etc.

10   PLOTTING AND EXCHANGING DRAWING

Printing/Plotting the drawing (page setup, plot area, plot scale, drawing orientation, plot options etc.), Drawing standard (DXF), Generating PDF drawing documents, file management.

TEXT/REFERENCE BOOKS:

1.   Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2.   Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

3.   Shah P. J., (2014) Engineering Graphics, S. Chand Publishing

4.   Luzadder W., Duff J., (1992), Fundamentals of Engineering Drawing, Peachpit Press

5.   Gill P. S., (2009), Engineering Drawing, S. K. Kataria & Sons

6.   Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

B. TECH. SEMESTER – II (CH/CL/IC/MH)
SUBJECT: BASIC ELECTRONICS

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	50	0	150

* TW marks include Viva based on TW

DETAILED SYLLABUS

1 TRANSISTOR & CHARACTERISTICS

Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration

2 FIELD EFFECT TRANSISTOR (FET)

Construction, Characteristics of Junction FET, Depletion and Enhancement type Metal Oxide Semiconductor (MOS) FETs, Introduction to CMOS circuits

3 TRANSISTOR AMPLIFIERS AND OSCILLATORS

Classification, Small Signal Amplifiers – Basic Features, Common Emitter Amplifier, Coupling and Bypass Capacitors, Distortion, AC Equivalent Circuit; Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series Feedback Amplifiers; Oscillators – Classification, RC Phase Shift

4 OPERATIONAL AMPLIFIERS AND APPLICATIONS

Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, op-amp with negative feedback, study of practical op-amp IC 741, and inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator, wein bride oscillator.

5 DIGITAL ELECTRONICS FUNDAMENTALS

Difference between analogy and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification, Logic ICs, Implementation of combinational logic - half and full adder/subtractor, multiplexers, de-multiplexers.

6 SENSORS & SIGNAL CONDITIONING CIRCUITS

Types of sensors – pneumatic, electromagnetic, electronic, smart sensors. Diaphragm, bellows and bourdon tube, Resistive, Capacitive, Inductive, ultrasonic, LVDT, piezoelectric, optoelectronic transducers, thermocouple, RTD and thermistors, Application of sensors for flow, level, temperature and stress measurement, Bridge Circuit, Differential Amplifier, Instrumentation Amplifier

TEXT/REFERENCE BOOKS:

1. Principles of Electronics, 11thEdition By: V. K. Mehta & Rohit Mehta Publisher: S. Chand & Company
2. Electrical & Electronic Measurement & Measuring Instruments, 17th Edition By: A.K. Sawhney Publisher: Dhanpat rai
3. M. M. Mano, "Digital logic and Computer design", Publisher : Pearson Education India.

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	**Tut**	**Prac**	**Total**	**Credits**	**Ext**	**Sess.**	**TW**	**Prac**	**Total**
3	0	2	5	4	60	40	50	0	150

Reference Code ESC205
*TW marks include Viva based on TW

DETAILED SYLLABUS

1 Concept of stress and strain, elasticity, generalized Hooke's law for 3D, concept of isotropy and homogeneity, plane stress and plane strain idealization, axial, volumetric and thermal stresses and strains

2 Transformation of stress and strain at a point, Principal stresses and strains, Mohr's Circle, strain rossete

3 Mechanical properties of metals – elasticity, plasticity, strain hardening, hardness, toughness, fatigue, strain energy

4 Force-strain-deformation analysis for axial load, flexure, shear and torsion

TEXT/REFERENCE BOOKS:

1. Strength of Materials: Part– I and II, Stephen Timoshenko, 3rd Edition, CBS Publisher, 2002.

2. Strength of Materials, Sadhu Singh, 1st Edition, Khanna Book Publishing Company, 2016.

3. Advanced Mechanics of Solid, L. S. Srinath, 3rd Edition, McGraw Hill Publication, 2017.

4. Engineering Mechanics of Solids, E P Popov, 2nd Edition, Prentice Hall India Learning Pvt. Ltd, 2002.

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	**Tut**	**Prac**	**Total**	**Credits**	**Ext**	**Sess.**	**TW**	**Prac**	**Total**
3	0	0	3	3	100	0	0	0	100

Reference Code BSC102

DETAILED SYLLABUS:

1   ATOMIC AND MOLECULAR STRUCTURE

Schrodinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

2   SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

3   INTERMOLECULAR FORCES AND POTENTIAL ENERGY SURFACES

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.

4   USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

5   PERIODIC PROPERTIES

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

6   STEREOCHEMISTRY

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

7   ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecules.

TEXT/REFERENCE BOOKS

1.   University chemistry, by B. H. Mahan

2.   Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

3.   Fundamentals of Molecular Spectroscopy, by C. N. Banwell

4.   Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

5.   Physical Chemistry, by P. W. Atkins (vi)Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

B. TECH. SEMESTER – II (CH/CL/IC/MH)
SUBJECT: WORKSHOP PRACTISE - II

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
0	0	3	3	1.5	0	0	50*	0	150

Reference Code ESC104B
*TW marks include Viva based on TW

LABORTORY WORKS/SCHEDULE:

Lab	Workshop-II
1	Introduction to Carpentry Shop, application of various carpentry tools
2	Demonstration of Carpentry Job 1 & 2
3	To make Job 1 for Carpentry shop
4	To make Job 2 for Carpentry shop
5	Introduction to Black smithy shop and Demonstration of it's job
6	To make Job for Black smithy shop
7	Introduction to Fitting shop, to understand application of various tools of this shop
8	Demonstration of Fitting Job
9	To make job for Fitting shop
10	To make job for Fitting shop
11	Assignment for Carpentry shop
12	Assignment for Fitting shop

TEXT/ REFERENCE BOOKS

1. Work shop technology, A. K. Hajrachaudhari & S. K. Hajrachaudhari
2. ITB Hand book, Engineering industry training board
3. Work shop Technology Vol. I & II, Gupta & Kaushik

B. TECH. SEMESTER – III
SUBJECT: NUMERICAL TECHNIQUES

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	25	25	150

Reference Code BSC202

DETAILED SYLLABUS:

1 ERROR ANALYSIS

Significant figures, accuracy and precision, error definitions, round-off errors, truncation errors, Taylor series, total numerical error, blunders, formulation errors, and data uncertainty

2 ROOTS OF EQUATIONS

Introduction, bracketing methods: bisection method and false-position method, open methods: Newton-Raphson method, Secant and Modified Secant method, roots of polynomials

3 ALGEBRAIC EQUATIONS

Introduction, numerical solutions of linear algebraic equations: Cramer's rule, Gauss elimination method, numerical solution of nonlinear equations: Gauss-Jordan method, LU decomposition, special matrices: tridiagonal matrices analysis, Cholesky decomposition, Iterative methods: Gauss-Seidel method and Jacobi's method

4 CURVE FITTING AND INTERPOLATION

Introduction, least square regression: linear regression, polynomial regression
Introduction, Newton's forward and backward difference interpolation, Lagrange interpolation, inverse interpolation, spline interpolation

5 NUMERICAL DIFFERENTIATION AND INTEGRATION

Introduction, high accuracy differentiation formulas: forward, backward and central difference method, Richardson extrapolation, Newton-Cotes integration formulas: trapezoidal and Simpson's rule.

6 NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS AND PARTIAL DIFFERENTIAL EQUATIONS

Introduction, initial value problems: Euler's method, Heun's method, fourth order Runge-Kutta method, multistep methods: Milne's method and Adam's method
Elliptic equations: Laplace difference equation, Liebmann's iterative method, boundary conditions, parabolic equations: implicit method, explicit method, the Crank Nicolson method

TEXT/REFERENCE BOOKS

1. Numerical Methods for Engineers, Steven C. Chapra, Raymond P. Canale, Tata McGraw Hill
2. Numerical Methods, E Balagurusamy, Tata McGraw Hill
3. Applied Numerical Analysis, Curtis F. Gerald, Patrick O. Wheatley, Addison Wesley, Pearson
4. Numerical Methods in Engineering and Science, Grewal. B.S. and Grewal. J.S., Khanna Publishers, New Delhi
5. Applied Numerical Methods Using MATLAB, W.Y. Yang, W. Cao, T.S. Chung and J. Morris, Wiley India Edition
6. Numerical Methods for Engineers, S. K. Gupta, New Age International Publishers

B. TECH. SEMESTER – III
SUBJECT: ELECTRICAL MACHINES AND DRIVES

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	25	25	150

Reference Code ESC201

DETAILED SYLLABUS:

1 TRANSFORMERS & ITS SWITCHGEARS

General aspects, basic definition, working principle of transformer, types of transformers, transformer construction: core/shell/spiral transformers, transformers on no load & on load, vector diagrams, equivalent circuit, losses and condition for maximum efficiency, all day efficiency, Sumpner's test, conditions for parallel operation, introduction to 3-phase transformer, construction, instrument transformers, Relay, circuit breaker and isolator, fuses

2 ALTERNATOR

Introduction, constructional details, types, armature winding, EMF equation, factor affecting size of alternator, alternator operation on load, voltage regulation, losses and efficiency, parallel operation of alternators, armature reaction, damper winding

3 DC GENERATOR

Classification, working principle of generator, construction of DC Machines, types of DC generator, open circuit characteristic, external characteristic and internal characteristic of DC generator, efficiency and power stages with example, condition for maximum efficiency

4 DC MOTORS

Construction, types, principle of operation, torque equation, losses and efficiency, speed torque characteristics of shunt, series and compound motor, D.C. shunt motor 3–point starter, speed control of D.C. shunt and series motors, Stepper motor, Single line diagrams of DC motors

5 SINGLE PHASE, THREE-PHASE INDUCTION MOTOR & ITS SWITCHGEARS

Construction, principle of operation, production of magnetic field, comparison between three phase and single-phase induction motors, speed and slip, rotor current, relation between rotor copper loss and rotor input, torque of an induction motor, torque slip curve, losses and efficiency, starters for three phase induction motor, speed control of three phase induction motor, single line diagram of induction motor

6 INTRODUCTION TO DRIVES

Introduction to Thyristor, Insulated Gate Bipolar transistors (IGBTs), Power MOSFET, general configuration of a motor drive, matching power electronic converter and motor, thyristor controlled single phase and three phase converter drive, modes of operation, block diagram and DC drive examples

TEXT/REFERENCE BOOKS

1. Power systems, V. K. Mehta, S. Chand publication
2. Principles of power systems, V.K. Mehta, S. Chand publication
3. Electrical Technology- Vol. II, B. L. Theraja, S. Chand publication
4. A course in power systems, J. B. Gupta, S. K. Kataria Publication
5. Electrical power systems, S. L. Upal, Khanna Publishers
6. A course in Electrical Power, P. V. Gupta, M. L. Soni, U. S. Bhatnagar, Dhanpat Rai & Co.
7. Theory & Performance of Electrical Machines, J. B. Gupta, Katson books
8. Power Electronics, P.S. Bimbhra, Khanna Publishers

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	25	25	150

Reference Code ME203A

DETAILED SYLLABUS:

1   FLUID PROPERTIES AND PRESSURE MEASUREMENT

Properties of fluid: Mass Density, specific weight, specific gravity and specific volume, Types of fluid, Newton's law of viscosity, continuum concept of a fluid, viscosity, surface tension and capillarity, vapor pressure, cavitation, compressibility, Pressure, Pascal's law, hydrostatic law, hydrostatic paradox, absolute and gauge pressures, measurement of pressure, manometers: simple and differential manometers

2   FLUID STATICS

Total pressure force and center of pressure, hydrostatic force on submerged surfaces -horizontal, inclined, vertical and curved surfaces, buoyancy, stability of floating body and submerged body, metacenter, analytical method to determine meta-centric height

3   FLUID KINEMATICS

Langrangian approach and Eulerian approach, types of flow, streamline, stream tube, path line and streak line, continuity equation, continuity equation in differential form for cartesian coordinate system, local and convective acceleration, translation, rotation and deformation of fluid element, rotation and vorticity, stream function and velocity potential function, stream lines and equipotential lines, relation between stream function and velocity potential, flow nets

4   FLUID DYNAMICS

Newton's Laws of Motion, Euler's Equation, Bernoulli's Equation, venturimeter, orifice meter and pitot tube, impulse-momentum equation and its application, moment of momentum equation, vortex flow, forced and free vortex flow, equation of motion for vortex flow, equation of forced and free vortex flow, dimensionless parameters and their significance, Dimensional analysis.

5   VISCOUS FLOW

Concepts of laminar and turbulent flows, Reynolds number and Reynold's experiment, exact solution of Navier -Stokes equation for simple flows, relation between shear stress and pressure gradient, concept of developing and fully developed flow, Flow of viscous fluid in circular pipes - Hagen-Poiseuille law, laminar flow between parallel plates for moving and stationary plates

6   FLOW THROUGH PIPES

Loss of energy in pipes, friction factor, Moody's Chart, Darcy Weisbach Equation, major and minor losses in pipes, hydraulic gradient lines and total energy line, pipes connected in series and parallel, equivalent pipe, branched pipes, flow through orifices and mouthpieces

TEXT / REFERENCE BOOKS

1. Fluid Mechanics and Hydraulic Machines, R.K. Bansal, Laxmi Prakashan
2. Fluid Mechanics and Fluid Power Engineering, D.S. Kumar, S. K. Kataria & Sons
3. Fluid Mechanics, Yunus A. Cengel, McGraw Hill Publication
4. Fluids Mechanics, F.M. White, McGraw-Hill Inc
5. Fluid Mechanics and Hydraulic Machines, Sukumar Pati, McGraw-Hill Inc
6. Introduction to Fluid Mechanics and Fluid Machines, S. K. Som., G. Biswas, Tata McGraw Hill Co. Pvt. Ltd

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	25	25	150

Reference Code ME205

DETAILED SYLLABUS:

1 **STRUCTURE OF MATERIALS**

Crystalline structure of solids, crystalline materials vs amorphous materials, concept of unit cell and space lattice, lattice parameters, Miller indices, crystal structure of ferrous and non-ferrous metals, crystal imperfections, atomic packing factors for various cubic systems, Bragg's law

2 **MECHANICAL PROPERTY AND MEASUREMENTS**

Tensile, compression and torsion test, Young's modulus, relations between true and engineering stress-strain curves, generalized Hook's law, yielding and yield strength, ductility, resilience, toughness and elastic recovery, Hardness: Rockwell, Brinell and Vickers and their relation to strength

3 **PHASE DIAGRAM AND IRON-CARBON EQUILIBRIUM DIAGRAM**

Alloys, substitutional and interstitial solid solutions, phase diagrams, interpretation of binary phase diagrams and microstructure development, eutectic, peritectic, peritectoid, and monotectic reactions. Iron- Iron carbide phase diagram and microstructural aspects of ledeburite, austenite, ferrite and cementite, cast iron

4 **STEELS AND HEAT TREATMENTS**

Introduction and purpose of heat treatments, classification of heat treatment processes, annealing, tempering, normalising and spheroidising, isothermal transformation diagram for Fe-C alloys and microstructure development. Continuous cooling curves and interpretation of final microstructure and properties- austempering, martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, vacuum and plasma hardening. Property variation with microstructure, classification and application of steels, transformation product of austenite, TTT and CCT curves, critical cooling rate. Introduction and applications of various case hardening and surface hardening treatments

5 **FERROUS-NON-FERROUS ALLOYS, COMPOSITES & OTHER NON-METALS**

Classification of steels, alloying of steels, properties of various stainless steels and tool steels, designation of steels. Cast irons; grey, white, malleable and spheroidal cast irons. Copper and copper alloys, brasses, equivalent zinc in brasses, season cracking of brasses, aluminium bronzes, tin bronzes, beryllium bronzes, silicon bronzes, copper nickel alloys, aluminium and aluminium alloys, nickel and nickel alloys, bearing materials, Ceramic materials, polymers, composites, particles-

reinforced composites, fiber reinforced composites, Material standards and its equivalency (ISO, ASTM, DIN, JIS).

6   NON-DESTRUCTIVE TESTING

Introduction to non-destructive testing, radiography testing, dye penetration testing, magnetic particle testing, ultrasonic testing, Jominy end quench test, macro-examination, spark test, macro-etching, microscopic examinations, electron microscopy, magnetic testing, chemical analysis of steel and iron, NDT certification and its applicability to industry.

TEXT / REFERENCE BOOKS

1. Material Science & Engineering, V. Raghvan, PHI Learning Pvt Ltd.
2. Introduction to Physical Metallurgy, Sidney H Avner, Tata Mcgraw-Hill
3. Material Science and Engineering, W. Callister, Willey Publication
4. The science and engineering of Materials, Donald Askland and Pradeep Phule, Wadsworth Publishing.
5. Material Science and Metallurgy for Engineers, V.D. Kodgire, Everest Publishing House
6. Elements of Material Science and Engineering, Lawrence Vlack, PEARSON
7. Physical Metallurgy for Engineers, Donald S Clark & Wilbur R Varney, East-west press pvt Ltd.

B. TECH. SEMESTER – III
SUBJECT: KINEMATICS OF MACHINES

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	1	2	7	5	60	40	25	25	150

Reference Code ME304A

DETAILED SYLLABUS:

1 MECHANISM AND MACHINES

Terminology and definitions, mechanism & machines. rigid and resistance body, link, kinematic pair types of motion, degrees of freedom, classification of Kinematic pairs, kinematic chain, linkage, kinematic inversions of single and double slider crank chain, four bar chain mechanism with lower pairs, straight line mechanism and approximate straight-line mechanism, quick return mechanisms, Steering gear mechanisms

2 VELOCITY ANALYSIS

Vectors, displacement of a rigid body, relative displacement, definition of velocity, angular velocity, rotation of a rigid body, translation and rotation of a rigid body, relative velocity method, instantaneous axes of motion, properties of instantaneous centers, the Aronhold Kennedy theorem of three centers, velocity analysis by instantaneous centers.

3 ACCELERATION ANALYSIS

Definition of acceleration, angular acceleration, a general case of acceleration, radial and transverse components of acceleration, the Coriolis component of acceleration, examples of Acceleration analysis, acceleration diagrams

4 BELTS, ROPES & CHAIN DRIVES

Introduction, belt and rope drives, open and crossed belt drives, velocity ratio, slip, materials for belt and ropes, law of belting, length of belt, ratio of friction tensions, power transmitted, centrifugal effect on belts, maximum power transmitted by a belt, initial tension, creep, chain drive-chain length, angular speed ratio, classification of chains

5 GEARS & GEAR TRAINS

Introduction, classification of gears, gear terminology, law of gearing, velocity of sliding, forms of teeth, cycloidal profile teeth, involute profile teeth, comparison of cycloidal and involute tooth forms, birth of contact, arc of contact, number of pairs of teeth in contact, interference in involute gears, minimum number of teeth, interference between rack and pinion, undercutting, introduction to helical, spiral, worm and bevel gears

6 CAMS

Introduction, types of cams, types of followers, cam terminology, displacement diagrams, motions of the follower, graphical construction of cam profile

TEXT / REFERENCE BOOKS

1. Theory of Machines, S. S. Rattan, Tata McGraw-Hill Publishing Co. Ltd New Delhi
2. Theory of Machines, P. L. Ballaney, Khanna Publishers, New Delhi
3. Theory of Machines and Mechanisms, Joseph Shigley and John Uicker, Jr., McGraw Hill
4. Theory of Mechanisms & Machines, Amitabha Ghosh & Ashok Mallik, Affiliated East-West Press Pvt. Ltd
5. Theory of Machines, Thomas Bevan, CBS publishers and distributors
6. Theory of Machines, Sadhu Singh, Pearson Education
7. Mechanism and Machine Theory, J.S. Rao and R.V. Dukkipati, New Age International Publisher
8. Kinematics & Dynamics of Machinery, Charles Wilson & J. Peter Sadler, Pearson Education

B. TECH. SEMESTER – III
SUBJECT: ENGLISH

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
2	0	2	4	3	40	0	50*	0	90

Reference Code HSMC-01
*TW marks include Viva based on TW

DETAILED SYLLABUS:

1   VOCABULARY BUILDING

The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms, and standard abbreviations.

2   BASIC WRITING SKILLS

Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely

3   IDENTIFYING COMMON ERRORS IN WRITING

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

4   NATURE AND STYLE OF SENSIBLE WRITING

Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion

5   WRITING PRACTICES

Comprehension, Précis Writing, Essay Writing

6   ORAL COMMUNICATION

(This unit involves interactive practice sessions in Language Lab) Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common, Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations

TEXT / REFERENCE BOOKS

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

B. TECH. SEMESTER – IV
SUBJECT: APPLIED THERMODYNAMICS

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	25	25	150

Reference Code ME202

DETAILED SYLLABUS:

1 EXERGY: WORK POTENTIAL OF ENERGY

Overview of laws of thermodynamics, exergy associated with kinetic and potential energy, reversible work and irreversibility, second law efficiency

THERMODYNAMIC RELATIONS

Maxwell relations, Clapeyron equation, Clausius-Clapeyron equation

2 GAS POWER CYCLE

Basic considerations in the analysis of power cycles, air-standard cycles: assumptions, Otto cycle, diesel cycle, dual cycle and their comparison, simple Brayton cycle and its modification-intercooling, reheating and regeneration

3 VAPOUR POWER CYCLES

The Carnot vapour power cycle, simple Rankine cycle and its energy analysis, modified Rankine cycle: superheating, reheating and regeneration

4 FUELS AND COMBUSTIONS

Calorific values of fuel, requirements of good fuel, proximate and ultimate analysis of fuel, theoretical determination of calorific value using Dulong's formula, air requirement for combustion, boiler performance

5 REFRIGERATION CYCLE

Reversed Carnot cycle, Joule-Thompson effect, analysis of ideal vapour compression refrigeration cycle, actual vapour Compression refrigeration cycle, refrigerants and its properties, selection, air refrigeration (Bell-Coleman) cycle

6 PSYCHROMETRY AND AIR-CONDITIONING

Psychrometric properties and processes, adiabatic saturation temperature, psychrometric chart, human comfort and industrial air-conditioning

TEXT / REFERENCE BOOKS

1. Thermodynamics- An engineering approach, Yunus A. Cengel, Michael A. Boles., Tata McGraw Hill publishing co. ltd.

2. Engineering Thermodynamics, P.K. Nag, Tata McGraw Hill publishing co. ltd.

3. Fundamental of thermodynamics, Sonntag. R.E., Borgnakke C. and Van Wylen G.J, John Wiley and Sons.

4. Fundamentals of engineering thermodynamics, Moran M.J. and Shapiro H.N., John Wiley and Sons.

B. TECH. SEMESTER – IV
SUBJECT: ADVANCE SOLID MECHANICS

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	25	25	150

Reference Code ME302

DETAILED SYLLABUS:

1 STRESSES AND STRAINS IN THREE DIMENSIONS

Solid mechanics approaches, concept of continuum, homogeneity and isotropy, types of forces on a body, state of stress at a point, rectangular stress components, stress sign convention, equality of cross shear, traction on an arbitrary surface, principal stresses and planes, stress invariants, hydrostatic and deviatoric stress tensor, Mohr's circle for general state of stress, plane of maximum shear, stress transformations, octahedral planes and stresses, differential equation of equilibrium

Difference between displacement and deformation, strain at a point, strain displacement relationship, engineers and mathematician's strain tensors, change in length of a linear element – Total strain concept, rigid body rotation, cubical dilatation, principle axes of strain and principal strain, strain deviator, strain invariants, strain transformation, compatibility conditions, stress-strain relationship and elastic constants required for different types of materials, stress strain relationship for isotropic material, plane stress and plane strain

2 THEORIES OF ELASTIC FAILURE UNDER STATIC LOADING

Concept of factor of safety, factors affecting factor of safety, maximum principal stress theory, maximum shear stress theory, maximum principal strain theory, maximum strain energy theory, maximum shear strain energy theory, region of safety for all theories

3 THICK CYLINDERS

Cylinder Classification, design of thick cylinders, Lame's theory, Design based on various failure theories, cylinders subjected to external pressure, Methods of prestressing of cylinders, Analysis of compound cylinders

4 COLUMNS AND STRUTS AND STRESSES DUE TO ROTATION

Classification of columns, strength of columns, end conditions and equivalent length, Euler's formula, Rankine's hypothesis, columns subjected to eccentric loading, beam columns

Stresses in rotating ring, stresses in rotating thin solid and hollow disc, stresses in thin disc with a pin hole, disc of uniform strength

5 SLOPE AND DEFLECTION OF BEAMS

Introduction, Beam deflection, relation between slope, deflection and radius of curvature, slope and deflection at a section by various methods

6 BENDING OF CURVED BARS

Introduction, Stresses in curved bars (Winkler-Bach theory) (Rectangular section, Circular section, Triangular section, Trapezoidal section, T-Section)

TEXT / REFERENCE BOOKS

1. Advanced Mechanics of Solids, L. S. Srinath, Tata McGraw Hill
2. Strength of Materials, R. K. Rajput, S. Chand & Co. Ltd.
3. Solid Mechanics, S. M. A. Kazimi, Tata McGraw Hill
4. Strength of Materials, D. S. Bedi, Khanna book publishing co. Pvt ltd.
5. Elements of Strength of Materials, Timoshenko S. P. and Young D.H., East-West Press Pvt. Ltd.
6. Mechanics of Materials, Timoshenko and Gere, CBS Publishers
7. Mechanics of Structures, S. B. Junarkar, Charotar Publishers

SUBJECT: MANUFACTURING TECHNOLOGY-I

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	4	7	5	60	40	25	25	150

Reference Code ME302

DETAILED SYLLABUS:

1 SAND CASTING PROCESS

Principal of casting process, different types of patterns, pattern materials, pattern allowances, pattern colours, types of sand, moulding materials and core, moulding processes, melting practice and metal pouring, gating system design, fettling process and casting defects

2 SPECIAL CASTING PROCESSES

Gravity die casting, pressure die casting, centrifugal casting, investment casting, continuous casting, vacuum casting, squeeze casting, comparison with conventional sand casting process

3 LATHE MACHINE

Function, working principle, classification, specifications, main parts, feed mechanism, lathe accessories, lathe operations, cutting tool materials, tool geometry of single point cutting tool, cutting Parameters: speed, feed and depth of cut, machining time, material removal rate, specification of lathe machine, capstan and turret lathe, working principle, parts

4 MILLING, SHAPER AND PLANNER MACHINE

Working principle, main parts, classification of milling machines, specification, milling machine mechanism, work holding devices, cutter holding devices, different milling cutters, tool geometry of plain milling cutter, milling operations, cutting parameters, machining time, milling attachments, principle of indexing, types of indexing

Function of shaper, working principle, classification, main parts, driving mechanism of shaper, feed mechanism of shaper, different operations on shaper machine, cutting parameters: speed, feed and depth of cut, machining time, specification of shaper machine

Working principle of planer, classification, difference between shaper and planer, planner operations, specification of planner machine

5 DRILLING, BORING AND GRINDING MACHINE

Working principle of drilling, classification, main parts, specification, different operations on drilling, machining time

Working principle & types of boring machines, boring tools

Working principle, main parts, classification of grinding machines, specification, Grinding operations, types of grinding wheels, wheel marking, truing, glazing, loading

6   INTRODUCTION TO ADDITIVE MANUFACTURING

Additive manufacturing – basics, processes and applications

TEXT / REFERENCE BOOKS

1. Element of Workshop Technology, S. K. Hajra Choudhury,Vol. 1, Media Promoters and publishers Pvt.
2. Element of Workshop Technology, S. K. Hajra Choudhury,Vol. 2, Media Promoters and publishers Pvt.
3. Foundary Technology, O. P. Khanna, Dhanpat Rai Publication
4. A course in Workshop Technology, B.S.Raghuwanshi, Dhanpat Rai & Sons, Delhi
5. Elements of Lathe work, B.Brushtein and V.Dementyev, Peace Publishers, Moscow
6. Manufacturing Engg. And Technology, S. Kalpakajain, PHI/Pearson
7. H.M.T, "Production Technology", Tata McGraw Hill
8. Manufacturing Processes for Engineering Materials, Kalpakjain S. and Schmid Steven R., Pearson Publication
9. Workshop Technology Vol. I, II & III, Chapman
10. Manufacturing Technology – 1 Foundary, Forming and Welding, P. N. Rao

SUBJECT: DYNAMICS OF MACHINE

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	1	2	5	5	60	40	25	25	150

Reference Code ME304B

DETAILED SYLLABUS:

[1] STATIC FORCE ANALYSIS

Introduction, conditions of static equilibrium, equilibrium of different members, free body diagrams, principle of super position, static force analysis of various mechanism, principle of virtual work, static force analysis with friction

[2] DYNAMIC FORCE ANALYSIS

Introduction, D–Alembert's principle, equivalent offset inertia force, dynamic analysis of simple mechanisms, combined static and inertia force analysis of different mechanisms, dynamic force analysis of reciprocating engine: inertia of reciprocating mass and connecting rod, dynamically equivalent system

[3] FLYWHEEL

Introduction, function, turning-moment diagrams, fluctuation of energy, dimensions of flywheel rims

[4] BALANCING

Introduction, static balancing, dynamic balancing of several masses in different planes, balancing of reciprocating and rotary masses

[5] GOVERNORS

Introduction, different types of governors, various terminologies, effort and power of a governor, controlling force

[6] GYROSCOPE

Concept of gyroscope, angular velocity, angular acceleration, gyroscopic couple, gyroscopic effect on aviation, marine and automobiles

TEXT / REFERENCE BOOK

1. Theory of Machines, S S Rattan, Tata McGraw Hill.

2. Theory of Machines, R. S. Khurmi and J. K. Gupta, S. Chand and Company Ltd.

3. Theory of Machines and Mechanisms, Joseph Shigley and John Uicker, Jr., McGraw Hill.

4. Theory of Mechanisms & Machines, Amitabha Ghosh & Ashok Mallik, Affiliated East-West Press Pvt. Ltd.

5. Kinematics & Dynamics of Machinery, Charles Wilson & J. Peter Sadler, Pearson Education.

6. Dynamics of Machinery, Farazdak Haideri, Nirali Publication.
7. Mechanism and Machine Theory, J.S. Rao and R.V. Dukkipati, New Age International Publisher

<h2 style="text-align: center; color: purple;">B. TECH. SEMESTER – IV</h2>
<h2 style="text-align: center; color: purple;">SUBJECT: MACHINE DRAWING AND INDUSTRIAL DRAFTING</h2>

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
0	0	4	4	2	0	0	25	25	50

<div style="text-align: right;">Reference Code ME308</div>

DETAILED SYLLABUS:

<h3 style="text-align: center;">PART A: MACHINE DRAWING</h3>

1 FUNDAMENTALS OF MACHINE DRAWING

Introduction to Machine drawing, conventional representations of various machine elements such as threaded parts, bearing, gears, spring, etc. conventional representation of part materials, standard abbreviations.

2 DETACHABLE FASTNERS

Introduction, screw thread nomenclature, forms of thread, thread designation, drawing representations of threads: normal, schematic and conventional. part drawing exercises of threaded fasteners such as bolts, nuts, screws, studs, nut locking arrangements

3 PERMANENT FASTNERS

Rivets and riveted joints, BIS symbols for riveted joints. types of welded joints, BIS symbols for welded joints. drawing exercises for representation of riveted joints and welded joints

4 ASSEMBLY DRAWING

Detail drawing of machine components. assembly drawings of various machines, mechanisms and equipment such as cotter joint, knuckle joint, flange coupling, universal coupling, screw jack etc. from detail drawings, sketches and actual machine components

5 PRODUCTION DRAWING

Introduction to limits, fits, dimensional tolerance, surface roughness and their drawing representation. Geometric dimensioning and tolerancing: basic terminology, indication of geometric tolerance in drawing

<h3 style="text-align: center;">PART B: COMPUTER AIDED DRAFTING</h3>

1 DRAWING OBJECTS

Starting with AutoCAD, AutoCAD dialog boxes, co-ordinate Systems, drawing line, circle, arc, rectangle, ellipse, polygons

2 EDITING SKETCHED OBJECTS

Editing sketches, moving, copying, pasting, offsetting, scaling, chamfering, trimming, mirroring. filleting, sketched objects

3 DIMENSIONING

Giving dimensions and annotations to drawings, creating linear, rotated, angular, aligned, base line dimensions, modifying dimensions, showing surface roughness symbols, weld symbols, dimensional tolerances, geometric tolerances

4   **PLOTTING**

Plotting the drawings in AutoCAD, plotting drawing using the plot dialog box, adding plotters and using plot styles, plotting sheets

5   **DRAWING EXERCISES WITH AUTOCAD**

Orthographic drawing and Isometric drawing of objects, drawing of machine parts, detail and assembly drawing of machines

6   **3D MODELING**

Creating a 3D model of any object using AutoCAD, generating drawings from the 3D model.

TEXT / REFERENCE BOOK

1. Machine Drawing, K. L. Narayana, P. Kannaiah, K. Venkata Reddy, 3rd edition, New age international (P) Ltd.

2. Machine Drawing, Basudeb Bhattacharyya, Oxford University Press

3. Machine Drawing, N. D. Junnarkar, Pearson Education Pvt. Ltd

4. Machine Drawing - P.S. Gill, S.K. Kataria & Sons New Delhi.

5. Machine Drawing - N. Sidheshwar, P. Kannaiah. McGraw-Hill India.

6. Engineering Drawing Practice for Schools and Colleges SP 46: 2003- BIS (Bureau of Indian Standards).

7. AutoCAD 2017 for Engineers & Designers- Prof. Sham Tickoo. Dreamtech Press.

8. Design of Machine Elements - V. B. Bhandari, Tata McGraw-Hill Publishing Co. Ltd.

9. A text book of Machine Design - P. C. Sharma, D. K. Aggarwal, S. K. Kataria & Sons.

10. PSG Design data book.

SUBJECT: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
1	0	2	3	2	0	0	100*	0	100

No Reference Code
*TW marks include Viva based on TW

DETAILED SYLLABUS:

1 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Meaning and definition of artificial intelligence, Physical Symbol System Hypothesis, production systems, Characteristics of production systems; Breadth first search and depth first search techniques. Heuristic search Techniques: Hill Climbing, Iterative deepening DFS, bidirectional search.

2 KNOWLEDGE REPRESENTATION

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, logical consequences, syntax and semantics of an expression. Forward and backward reasoning. Proof methods, substitution and unification, conversion to clausal form, normal forms, resolution, refutation, deduction.

3 NATURAL LANGUAGE PROCESSING & VISUAL PERCEPTION

Language & its comprehension, reading, understanding conversation and essays. Language context, language in a social context, Introduction to problem solving, decision making and reasoning, Visual perception from sensation to representation, approaches to perception, perception of object sand forms, role of environment in seeing, deficits in perception, and perception in practice. Automatic and controlled processes in attention.

4 INTRODUCTION TO MACHINE LEARNING

Preliminaries, what is machine learning; varieties of machine learning, learning input/output functions, sample application. Boolean functions and their classes, CNF, DNF, decision lists. Version spaces for learning, version graphs, learning search of a version space, candidate elimination methods

TEXT / REFERENCE BOOK

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill
2. Introduction to AI & Expert System: Dan W.Patterson, PHI
3. Introduction to Machine learning, Nils J.Nilsson
4. Introduction to Machine Learning with Python A guide for data scientists, Andreas, C. Muller & Sarah Guido, O'Reilly
5. Artificial Intelligence by Luger (Pearson Education)
6. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch
7. Russel & Norvig, Artificial Intelligence: A Modern Approach, Pearson Education.

B. TECH. SEMESTER – IV
SUBJECT: UNIVERSAL HUMAN VALUES

Teaching Scheme (Hours/week)					Examination Scheme				
Lect	Tut	Prac	Total	Credits	Ext	Sess.	TW	Prac	Total
3	0	0	3	3	60	0	0	0	60

Reference Code HSMC-02

DETAILED SYLLABUS:

1 COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION

Purpose and motivation for the course, recapitulation from Universal Human Values-I, self-Exploration–what is it?-Its content and process; 'Natural Acceptance' and experiential validation-as the process for self-exploration, continuous happiness and prosperity-A look at basic human aspirations, right understanding, relationship and physical facility-the basic requirements for fulfillment of aspirations of every human being with their correct priority, understanding happiness and prosperity correctly-a critical appraisal of the current scenario, method to fulfill the above human aspirations: understanding and living in harmony at various levels

2 UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', understanding the needs of Self ('I') and 'Body'- happiness and physical facility, understanding the body as an instrument of 'I' (I being the doer, seer and enjoyer), understanding the characteristics and activities of 'I' and harmony in 'I' , understanding the harmony of I with the body: sanyam and health; correct appraisal of physical needs, meaning of prosperity in detail, programs to ensure sanyam and health

3 UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN- HUMAN RELATIONSHIP

Understanding values in human-human relationship; meaning of justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; trust and respect as the foundational values of relationship, understanding the meaning of trust; difference between intention and competence, understanding the meaning of respect, difference between respect and differentiation; the other salient values in relationship, understanding the harmony in the society (society being an extension of family): resolution, prosperity, fearlessness (trust) and co-existence as comprehensive human goals, visualizing a universal harmonious order in society- undivided society, universal order- from family to world family

4 UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE

Understanding the harmony in the nature, interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in

nature, understanding existence as co-existence of mutually interacting units in all pervasive space, holistic perception of harmony at all levels of existence, include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

5 IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS

Natural acceptance of human values, definitiveness of ethical human conduct, basis for humanistic education, humanistic constitution and humanistic universal order, competence in professional ethics: a. ability to utilize the professional competence for augmenting universal human order b. ability to identify the scope and characteristics of people friendly and eco-friendly production systems c. ability to identify and develop appropriate technologies and management patterns for above production systems, case studies of typical holistic technologies, management models and production systems, strategy for transition from the present state to universal human order: a. at the level of individual: as socially and ecologically responsible engineers, technologists and managers b. at the level of society: as mutually enriching institutions and organizations

TEXT / REFERENCE BOOK

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books

2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan

3. Human Values, A.N. Tripathi, New Age Intl. Publishers