

Bharati Vidyapeeth Deemed University
College of Engineering, Pune- 411043
The Structure of the Curriculum: 2007 Course

B. TECH. MECHANICAL: SEMESTER- I & II



Bharati Vidyapeeth University
College of Engineering, Pune
Department of Mechanical Engineering



Vision: To provide mechanical engineers capable of dealing with global challenges

Mission: Social transformation through dynamic education

Programme Educational Objectives (PEOs):

Graduates will be able,

- To fulfill need of industry with theoretical and practical knowledge
- To engage in lifelong learning and continued professional development
- To fulfill social responsibilities

Programme Outcomes (POs):

- a. To apply knowledge of mathematics, science and engineering fundamentals for solving engineering problems
- b. To identify the need, plan and conduct experiments, analyze data for improving the mechanical processes
- c. To design and develop mechanical systems considering social and environmental constraints.
- d. To design and develop a complex mechanical system using advanced mathematical and statistical tools and techniques
- e. Use of information technology (IT) tools for prediction and modeling of routine activities to enhance the work performance
- f. To know social responsibilities while doing professional engineering practice.
- g. To become familiar with eco-friendly, sustainable and safe work environment.
- h. To take into account professional ethics while designing engineering systems.
- i. Able to work efficiently as a group leader as well as an individual.
- j. To communicate in written and verbal form with subordinates and supervisors
- k. To apply project and finance management techniques in multidisciplinary environments.
- l. To create interest for higher education and updating the knowledge.

B. TECH. MECHANICAL: SEMESTER- I

Total Duration: 31 Hrs./ week									
Total Marks: 700									
Course Code	Course	Teaching Scheme (Hrs.)			Examination Scheme (Marks)				Total Marks
		L	P/D	T	TH	UT	TW & Pr	TW & Or	
K 70101	Engineering Mathematics- I	04	--	01	80	20	--	--	100
K 70102	Engineering Science- I	04	02	--	80	20	25	--	125
K 60103	Elements of Mechanical Engineering	04	02	--	80	20	25	--	125
K 20104	Elements of Civil Engineering	03	02	--	80	20	25	--	125
K 20105	Environmental Studies	03	--	--	80	20	25	--	125
K 60106	Engineering Graphics- I	02	02	--	--	--	50	--	50
K 60107	Workshop Practice-I	--	02	--	--	--	50	--	50
Total		20	10	01	400	100	200	--	700

B. TECH. MECHANICAL: SEMESTER- II

Total Duration: 32 Hrs./ week									
Total Marks: 700									
Course Code	Course	Teaching Scheme (Hrs.)			Examination Scheme (Marks)				Total Marks
		L	P/D	T	TH	UT	TW & Pr	TW & Or	
K 70108	Engineering Mathematics - II	04	--	01	80	20	--	--	100
K 70109	Engineering Science - II	04	02	--	80	20	25	--	125
K 20110	Engineering Mechanics	04	02	--	80	20	25	--	125
K 60111	Engineering Graphics – II*	03	02	--	80	20	50	--	150
K 40112	Elements of Electrical & Electronics Engineering	04	02	--	80	20	25	--	125
K 30113	Computer Fundamentals & Information Technology	--	02	--	--	--	25	--	25
K 60114	Workshop Practice.-II	--	02	--	--	--	50	--	50
Total		19	12	01	400	100	200	--	700

*Subject with Four hours Theory Paper

Rules for Conducting Tests

Mode of the test

- In each semester for each subject three tests shall be conducted. The schedule for the same will be declared at the commencement of academic year in the academic calendar.
- Each test shall carry 20 marks.
- University examination pattern has given weightage of 20 marks for the tests.
- To calculate these marks following procedure is followed:
 - i) Out of the three tests conducted during the semester, the marks of only two tests in which the candidate has shown his/her best performance shall be considered, to decide the provisional marks in each subject.
 - ii) Average marks obtained in two tests in which students have performed well, shall be considered as provisional marks obtained by the student in the tests.
 - iii) If the candidate appears only for two tests conducted during the semester, he/ she will not be given benefit of the best performance in the tests.
 - iv) If the candidate appears only for one test conducted during the semester, to calculate the marks obtained in the tests it will be considered that the candidate has got 0 (zero) marks in other tests.
 - v) The provisional marks obtained by the candidate in class tests should reflect as proportional to theory marks. In cases of disparity of more than 15% it will be scaled down accordingly; these marks will be final marks obtained by the student. No scaling up is permitted.
 - vi) If the candidate is absent for theory examination or fails in theory examination his final marks for tests of that subject will not be declared. After the candidate clears the theory, the provisional marks will be finalized as above.
- Paper pattern for tests
 - i) All questions will be compulsory with weightage as following

Question 1	-	7 marks
Question 2	-	7 marks
Question 3	-	6 Marks

ii) There will not be any sub-questions.

- For granting the term it is mandatory to appear for all three tests conducted in each semester.
- Roll nos. allotted to students shall be the examination nos. for the tests.

Department of Mechanical Engineering
ENGINEERING MATHEMATICS-I
(Course No.K70101)

Designation of Course		Engineering Mathematics-I	
Teaching Scheme:		Examination Scheme:	
Theory:-	04 Hours/ Week	Theory	80 Marks
Practical:-	-- Hours / Week	Duration	03 Hours
Tutorials:-	01 Hours / Week	Unit Test	20 Marks
		T. W. & Or.	-- Marks

Course Prerequisites:-	Basic Knowledge of Algebra
Course Outcomes:-	<ol style="list-style-type: none"> 1. To develop an ability to solve the consistency of any type of systems. 2. To develop an ability to find the roots of equations using DeMoiver's theorem and to locate imaginary points using argand diagram. 3. To develop an ability to find the derivative using Leibnitz's rule. 4. To develop an ability to test convergence and divergence of infinite series 5. To develop an ability to find total derivative 6. To develop an ability to find maxima and minima of any 7. function of two variables

Course Contents

Unit 1	Matrices:	(08 Hrs.)
Rank of a Matrix, Reduction to Normal Form, Consistency of Systems of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations, Eigen values and Eigen vectors, Cayley- Hamilton Theorem, Reduction of Quadratic Forms, Sylvester's Theorem (without proof) to find functions of a matrix, Application to problems in Engineering(Translation and Rotation of Matrix)		
Unit 2	Complex Numbers and Applications:	(08 Hrs.)
Definition, Cartesian, Polar and Exponential Forms, Argand's Diagram, Diagram's DeMoiver's Theorem and its applications, Hyperbolic Functions and Logarithms of Complex Numbers, Separation of Real and Imaginary Parts, Application to problems in Engineering.		
Unit 3	Differential Calculus:	(08 Hrs.)
Successive Differentiation, n (th) Derivatives of Standard Functions, Leibnitz's Theorem. Mean Values Theorems: Rolle's Theorem, Lagrange's and Cauchy's Mean Value Theorems.		
Unit 4	Infinite Series:	(08 Hrs.)
Infinite Sequences, Infinite Series, Alternating Series, Test for Convergence, Absolute and Conditional Convergence, Power Series, Range of Convergence. Expansion of Functions: Taylor's Maclaurin's Series.		
Unit 5	Differential Calculus:	(08 Hrs.)
Indeterminate Forms, L Hospital's Rule and Evaluation of limits. Partial Differentiation and Applications: Partial Derivatives, Euler's Theorem on Homogeneous Functions, Composite Function, Total Derivatives, Differentiation of Implicit Functions, Change of		

Independent Variables.		
Unit 6	Jacobian:	(08 Hrs.)
Jacobians and their applications, Chain Rule, Functional Dependence, Errors and Approximations.		
Maxima and Minima:		
Maxima and Minima of Functions of two variables, Lagrange's Method of Undetermined Multipliers.		

Text Books/ Reference Books

1. Advanced Engineering Mathematics, 5th Edition, Peter V O' Neil Thomson Learning.
2. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley Eastern Ltd.)
3. Advanced Engineering Mathematics, Wylie C. R. and Barrett L. C. (McGraw-Hill)
4. Advanced Engineering Mathematics, 2nd Edition, M. D. Greenberg (Pearson Education)
5. Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi.
6. Applied Mathematics (Volume I & II) P. N. Wartikar and J. N. Wartikar
7. A text Book of Engineering Mathematics- I, P. N. Wartikar and J. N. Wartikar

Unit Tests-

Unit Test-I	Unit-I, II
Unit Test-II	Unit-III, IV
Unit Test-III	Unit-V, VI

ENGINEERING SCIENCE-I
(Course No.K70102)

Designation of Course	Engineering Science-I		
Teaching Scheme:	Examination Scheme:		
Theory:- 04 Hours/ Week	Theory	80 Marks	
Practical:- 02 Hours/ Week	Duration	03 Hours	
Tutorials:- -- Hours/ Week	Unit Test	20 Marks	
	T. W. & Or.	25 Marks	

Course Prerequisites:-	Basics knowledge of Science and fundamentals Laws
Course Outcomes:-	<p>Students will be able to associate the wave nature of light and apply it to measure stress, pressure and dimension etc</p> <p>To discuss the concept of transverse waves</p> <p>To judge the problems associated with architectural acoustics and give their remedies and use ultrasonic as a tool in industry for Non-Destructive Testing.</p> <p>Students will be able to understand the methods involved in improving quality of water for domestic and industrial purposes</p> <p>Students will be able to associate the basic concepts of electrochemical techniques and its applications in society</p> <p>To recognize the properties and applications of fossil fuels and derived fuels.</p>

Course Contents

PHYSICS		
Unit 1	Optics-I	(08 Hrs.)
<p>Interference: Interference of waves. Visibility of fringes, interference due to thin film of uniform and non-uniform thickness, Newton's rings, Michelson's interferometer, Engineering applications of interference (optical flatness, interference filter, non-reflection coatings, multi-layer ARC, gravitational sensors using interference (for detection of mineral deposits.)</p> <p>Diffraction: Classes of diffraction, diffraction at a single slit (geometrical Method), condition for maximum and minimum, Diffraction at a circular aperture (Result only) Plane diffraction grating Conditions for principal maximum and minimum, Rayleigh's criterion for resolution, Resolving power of grating and telescope, Fresnel's zone plate, Gabor's zone plate.</p>		
Unit 2	Optics-II	(08 Hrs.)
<p><u>Polarisation</u>: Introduction, Polarisation by reflection, Law of Malus, Brewster's Double refraction and Huygen's theory, Positive and negative crystals Nicol prism, Dichroism, Polaroids, Elliptical and circular polarization, Quarter and half wave plates, Production of polarized light, Analysis of polarized light, Photoelasticity.</p> <p><u>Lasers</u>: Spontaneous and stimulated emission, Population inversion, Ruby laser, Helium-Neon laser. Semiconductor laser, Properties of Lasers, Applications of lasers (engineering / industry, medicine, communication, computers.)</p> <p>Holography, Compton effect, Compton shift.</p>		
Unit 3	Acoustics and Ultrasonic's:	(08 Hrs.)
<p>Elementary acoustics: Reverberation and reverberation time, Sabine's formula, Intensity level, Sound intensity level, Threshold of hearing, Audibility curve, Limits of audibility, Ultrasonic waves, Production</p>		

of ultrasonic waves by piezo-electric oscillator and magnetostrictive oscillator, Application of ultrasonic waves.

Superconductivity and Spectroscopy: Introduction, Properties of a super conductor, Meissner's effect, Critical, Field, Type of superconductors, BCS theory, High temperature superconductors. .Application of superconductors. Effect of magnetic field on spectral lines-Zeeman effect (normal and anomalous), Raman effect

Text Books/ Reference Books

1. Fundamentals of Optics -Jenkins and White, McGraw Hill International Book Company Ltd.
2. Optics -Subramanyam and Brij Lal, S. Chand & Company Ltd. Modern
3. Physics -J. B. Rajam, S. Chand & Company Ltd.
4. Modern Physics - B. L. Thereja, S. Chand & Company Ltd. Introduction to
5. Solid State Physics - C. Kittel, Wiley Eastern Ltd. Engineering Physics -
6. Sen, Gaur and Gupta, Dhanpat Rai & Sons

CHEMISTRY

Unit 4	Water:	(08 Hrs.)
Structure of water, Effects of hard water on boilers and heat exchangers (a) corrosion (b) caustic embrittlement (c) scales and sludges (d) priming and foaming. Water softening methods for industrial purpose: (a) Permutated or zeolite process (b) Phosphate conditioning. Water softening for drinking purpose: Drinking water or Municipal water and purification of water for domestic use (a) Removal of suspended impurities: screening, sedimentation, filtration (b) Removal of microorganism-by boiling, by adding bleaching powder, by chlorination, by using chloramines tablets, by using Ozone gas Toxic elements in water and their adverse effects: Toxic effects of the elements like Arsenic, cadmium, lead and Mercury etc. Numerical based on the Zeolites.		
Unit 5	Electrochemistry:	(08 Hrs.)
Introduction, Arrhenius Ionic theory, Kohlrausch's law of conductivity of electrolytes, Law of independent migration of ions, Laws of electrolysis, Ostwald's dilution law, Acids and Base, concept of pH and pOH, Buffer solutions, Solubility Product, Redox Reactions. Electrode Potential, electrochemical cell, concentration cell, reference Electrodes, Polarization, Decomposition Potential, Overvoltage, and Conduct metric Titrations. Batteries, Fuel cells, Aluminum-Air Battery, Lead Acid Storage Cell, numerical based on the above articles.		
Unit 6	Fuels:	(08 Hrs.)
Classification of fuels, calorific value of fuels, NCV and GCV, Determination of calorific values using Bomb calorimeter and Boys' gas calorimeter, Theoretical calculation of calorific value of a fuel, Analysis of coal: a) proximate b) ultimate analysis of coal, Pulverized coal metallurgical coke, Petroleum cracking synthetic Petrol, Refining of gasoline, Reforming knocking Non Petroleum fuels like natural gas and oil gas, Analysis of fuel gas, Petrochemicals, Numerical based NCV, GCV		

Text Books/ Reference Books

1. Engineering Chemistry by Jain and Jain, Dhanpat Rai Company (P) Ltd, New Delhi.
2. Chemistry of Engineering Materials, Agarwal C.V, Rata Publication Varanasi, 6th edition(1979).
3. Chemistry in Engineering and Technology, Volume W, Tata McGraw Hill Publishing Company Ltd, New Delhi (1988).
4. Applied Chemistry, O. P. Vidyankar, J. Publications, Madurai, (1955) Engineering.
5. Chemistry, S. N. Chand and Co., Jalandhar, 31st Edition (1990) Engineering.

6. Chemistry by Dara S. S. Chand Publications.

Unit Tests-

Unit Test-I	Unit-I, II
Unit Test-II	Unit-III, IV
Unit Test-III	Unit-V, VI

ELEMENTS OF MECHANICAL ENGINEERING
(Course No: K60103)

Designation of Course	Elements Of Mechanical Engineering	
Teaching Scheme:	Examination Scheme:	
Theory:- 04 Hours/ Week	Theory	80 Marks
Practical:- 02 Hours/ Week	Duration	03 Hours
Tutorials:- -- Hours/ Week	Unit Test	20 Marks
	T. W.	25 Marks

Course Prerequisites:-	Basics of Science and Mathematics
Course Outcomes:-	<ol style="list-style-type: none"> 1. Able to understand fundamental concepts and definition. 2. Able to understand power conversion mechanical devices. 3. Able to differentiate between conventional and non-conventional energy sources. 4. Able to understand basic modes of Heat transfer. 5. Able to understand the different laws of ideal gasses. 6. Able to understand different manufacturing processes.

Course Contents

Unit 1	Thermodynamic Concepts and Laws:	(08 Hrs.)
<p>Fundamental Concepts and Definitions: Thermodynamic system, Surroundings and boundary, Thermodynamic properties, Thermodynamic processes and cycles, Energy, Power, Work and heat. Zeroth law of Thermodynamics, Temperature and Temperature scale, Pressure and its measurement, Macro and microscopic approach</p> <p>Laws of Thermodynamics: Principles of conservation of mass and energy, continuity equation, First law of Thermodynamics, Joule's experiment. Application of first law to non-flow processes and cycles. Concept of internal energy, flow energy and enthalpy. Application of steady flow energy equation to nozzles, turbines, heat exchangers and pumps.</p>		
Unit 2	Power Conversion Devices:	(08 Hrs.)
<p>Power Producing Devices: Boilers and Steam turbines, reciprocating I. C. Engines, Gas turbines, Hydraulic turbines, Compressed air motor. (Theoretical study using schematic diagrams). Power Absorbing Devices: Reciprocating pumps and compressors, Centrifugal pumps and rotary compressors. Study of Household, refrigerators and window air conditioners using schematic diagrams. (Elementary treatment only. No Numerical)</p>		
Unit 3	Energy Sources and Heat Transfer:	(08 Hrs.)
<p>Sources of Energy: Thermal, Hydraulic, Nuclear, Wind, Solar, Tidal, Biogas, ocean thermal energy (Schematic of plant layout) Heat Transfer: Basic modes of heat transfer, conduction, convection and radiation. Statement and explanation of Fourier's law of heat conduction, Newton's law of cooling, Stefan-Boltzmann's law of radiation. Conducting and insulating materials and their properties. Description and types of heat exchangers.</p>		
Unit 4	Processes of Ideal Gases and Steam:	(08 Hrs.)
<p>Ideal gas and Processes: Ideal gas definition, Gas Laws, The characteristic equation of ideal gas, Universal gas constant, Relationship between C_p and C_v. Non flow processes using ideal gases. Properties and Processes of Steam: Formation of steam, phase changes, properties of steam. Use of steam tables, Work done and heat transfer</p>		

during constant pressure, constant volume, isothermal, hyperbolic, adiabatic, polytropic and throttling processes on steam		
Unit 5	Manufacturing Process:	(08 Hrs.)
Metal Cutting Machine Tools: Lathe Machine - Centre lathe (Basic elements, working principle and types of operations). Drilling Machine - Pillar drilling machine (operation only) Introduction to NC, CNC machines, classification, principles and explanation with block diagram, Sheet metal working, piercing and blanking operations on punching press. Non-traditional machining processes like electro-discharge machining and electro-chemical machining. Metal Joining Processes: Welding, soldering, brazing methods and applications.		
Unit 6	Mechanical Devices and Machine Elements:	(08 Hrs.)
Individual and group drives, belt drive, rope drive, chain drive, gear drive and friction clutches (types and applications only). Power transmission shafts, axles, Keys, couplings, bush and ball bearings (Types and applications only). Description and application of ON-OFF valves, Non return valves, pressure regulating valves, throttle valves and butterfly valves.		

Term- work

The term work shall consist of the study and demonstration on any five from the first six and any three from remaining list

1. Water tube boiler or smoke tube boiler
2. Reciprocating air compressor
3. Internal combustion engine
4. Household refrigerator / window air conditioner
5. Heat exchangers
6. Water turbines
7. Power transmission devices
8. Lathe and drilling machine
9. Valves
10. NC/CNC Machine

Text Books/ Reference Books

1. Thermodynamics and Heat Engines by Domkundwar and Kothandarman, Publisher Dhanpat rai & Co. Ltd,
2. Educational and Technical Publisher
3. Elements of Workshop Technology Vol- I and II by Choudhary, Hajara S. K., Media Promoters & Publishers
4. Basic Engineering Thermodynamics by Reyner, Joel, Publisher - Addison Wesley Longman Limited
5. Thermodynamics and Engineering Approach by Y. A. Cengal and M. A. Boles, Tata McGraw Hill Publishing Ltd., New Delhi
6. Design of Machine Elements, V. B. Bhandari, Tata McGraw Hill Publishing Company Ltd.
7. Theory of Machines- S. S. Rattan, Tata Mc Graw Hill Publishing Company Ltd.

Unit Tests-

Unit Test-I	Unit-I, II
Unit Test-II	Unit-III, IV
Unit Test-III	Unit-V, VI

ELEMENTS OF CIVIL ENGINEERING
(Course No.K20104)

Designation of Course	Elements Of Civil Engineering		
Teaching Scheme:	Examination Scheme:		
Theory:- 03 Hours/ Week	Theory	80 Marks	
Practical:- 02 Hours/ Week	Duration	03 Hours	
Tutorials:- -- Hours/ Week	Unit Test	20 Marks	
	T. W. & Or.	25 Marks	

Course Prerequisites:-	Basics of Science, measurements and Mathematics
Course Outcomes:-	<p>Students should be able to describe various branches of Civil engineering and principles of Surveying.</p> <p>Students should know use of Prismatic compass for measurement of bearings and computations of included angles.</p> <p>Students should know use of level and computation of RLs and principles of modern surveying equipments</p> <p>Students should know principles of building planning and bye laws.</p> <p>Students should know function and types of foundations</p> <p>Students should be able to describe components of infrastructure elements such as roads, railways and bridges.</p>

Course Contents

Unit 1	Introduction and Linear Measurements:	(07 Hrs.)
Branches of Civil Engineering, applications of Civil Engineering to other disciplines in Engineering, role of Civil Engineer in various construction activities. Principles of surveying, classification of surveys, scale and Representative fraction, linear measurement - instruments used, direct ranging.		
Unit 2	Angular Measurement:	(06 Hrs.)
Study of prismatic compass, types of bearings and reference meridians, measurement of bearing and angles, local attraction and its adjustment, adjustment of closing error, dip and declination, open and closed traverse.		
Unit 3	Vertical Measurements and Modern Equipment:	(07 Hrs.)
Study and use of auto and dumpy level and leveling staff, temporary adjustment of dumpy level, types of bench marks, reduction of levels by collimation plane and rise and fall method. Contours - uses and characteristics. Modern equipments - Electronics Distance Meter - principle and basic functions, Total Station and its field applications, study of Global Positioning System, measurement of area by mechanical and digital planimeter.		
Unit 4	Building Planning, Construction and Materials:	(07 Hrs.)
Building Planning: Site selection, building plans, elevation, and principles of planning. Building byelaws-necessity, Floor Space Index, heights, open space requirement, set back distances, ventilation and lighting, concept of carpet and built up area. Constructions: types of structures-load bearing, framed and composite structures, building components. Construction materials: concrete and its ingredients, cement, reinforcement steel, bricks.		
Unit 5	Foundations:	(08 Hrs.)
Building foundation- necessity and functions, concept of bearing capacity of soil and rock, foundation		

settlement, differential settlement, types of foundation - shallow and deep, and causes of foundation failure. Earthquake, causes of earthquake, Definition of terms- focus, epicenter, isoseismal lines, seismograph, seismogram, intensity, magnitude of earthquake, earthquake zones as per IS codes, effect of earthquake on civil structures.

Unit 6	Infrastructure:	(08 Hrs.)
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Roads- types of roads and their suitability, cross section of roads; meaning of terms: width of road, super elevation, camber, gradients, sight distance; materials used in construction of roads. Railways- advantages types of gauges, section of railway track, components of railway track. Bridges-necessity, components of bridges - sub structures and super structure.

Text Books/ Reference Books

1. Introduction to Surveying - M. Anderson, McGraw Hill Publication Surveying for Engineers - W. Uren, J. Price, Macmillan Publication.
2. Surveying and Leveling - T. P. Kanetkar and S. V. Kulkarni, PVG Publication, Pune Building Construction - S. P Bindra and S. P. Arrora, Dhanpatrai Publication, New Delhi.
3. Building Design and Drawing - Shah, Kale, Patki. Tata McGraw Hill Publication Foundation Engineering- Dr. B. J Kasmalkar, PVG Publication, Pune.
4. Principals of Geotechnical Engineering - B. M. Das, Thomson Brooks.
5. Text Book of Engineering Geology - Dr. R. B. Gupte, PVG Publication, Pune Transportation Engineering - R. Paquette, John Wiley and Sons.
6. Highway Engineering - Khanna Justo, Khanna Publishers, New Delhi.

Unit Tests-

Unit Test-I	Unit-I, II
Unit Test-II	Unit-III, IV
Unit Test-III	Unit-V, VI

ENVIRONMENTAL STUDIES
(Course No. K20105)

Designation of Course	Environmental Studies	
Teaching Scheme:	Examination Scheme:	
Theory:- 03 Hours/ Week	Theory	80 Marks
Practical:- -- Hours/ Week	Duration	03 Hours
Tutorials:- --Hours/ Week	Unit Test	20 Marks
	T. W. & Or.	25 Marks

Course Prerequisites:-	Basic knowledge of environment, natural resources, soils types.
Course Outcomes:-	<ol style="list-style-type: none"> 1. The student should be able to explain multidisciplinary nature of Environmental Studies. 2. The student should be able to explain natural resources available in the environment and its associated problems 3. The student should be able to discuss concept of ecosystem and its components 4. The student should be able to describe concept of Biodiversity 5. The student should be able to explain sources of and control measures of environmental pollution 6. The student should be able to describe social and environmental issues.

Course Contents

Unit 1	The Multi-disciplinary nature of Environmental Studies:	(02 Hrs.)
	<ul style="list-style-type: none"> • Definition, Scope and Importance • Need for public awareness 	
Unit 2	Natural Resources:	(08 Hrs.)
	<ul style="list-style-type: none"> • Renewable and non-renewable resources • Natural resources and associated problems <ol style="list-style-type: none"> a. Forest resources: Use and over-exploitation, deforestation case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflict's over water, dams-benefits and problems. c. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer- pesticide problems, water logging, salinity, case studies. e. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies. f. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of individual in conservation of natural resources. • Equitable use of resources for sustainable lifestyles. 	
Unit 3	Ecosystems:	(06 Hrs.)
	<ul style="list-style-type: none"> • 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, characteristics, features, structure and function of the following ecosystems : -
 1. Forest ecosystem.
 2. Grassland ecosystem.
 3. Desert ecosystem.
 4. Aquatic ecosystems (ponds, streams, rivers, oceans, estuaries)

Unit 4	Biodiversity and its Conservation:	(08 Hrs.)
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- Introduction : Definition: genetics, species and ecosystem diversity
- Biographical classification of India
- Value of bio-diversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, national and local level.
- India as a mega - diversity nation.
- Hot spots of biodiversity.
- Threats to bio-diversity: habitat loss, poaching of wildlife conflict, man wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Unit 5	Definition, causes, effects and control measures of :	(07 Hrs.)
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- Definition, causes, effects and control measures of :
 - a) Air Pollution
 - b) Water Pollution
 - c) Soil Pollution
 - d) Marine Pollution
 - e) Noise Pollution
 - f) Thermal Pollution
 - g) 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, cyclone and landslides.

Unit 6	Social Issues and the Environment	(07 Hrs.)
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- 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.
- Waste land reclamation.
- Consumerism and waste products.
- Environment Protection Act
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.

	<ul style="list-style-type: none"> • Forest Conservation Act. • Issues involved in enforcement of environmental legislation. • Public awareness. 	
Unit 7	Human population and the Environment:	(07 Hrs.)
	<ul style="list-style-type: none"> • Population growth, variation among nations. • Population explosion-Family Welfare Programme. • Environment and Human Health. • Human Rights. • Value Education. • HIV/AIDS Women and Child Welfare. • Role of Information Technology in Environment and Human Health. • Case studies. 	
Unit 8	Field Work / Term Work:	(07 Hrs.)
	<ul style="list-style-type: none"> • 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 simple ecosystems- pond, river, hill slope, etc. The core module syllabus for Environmental studies includes class room teaching and field work. The syllabus is divided into 8 units, covering 48 lectures. The first 7 units, which cover 44 lectures, are class room teaching based and intended to enhance knowledge skills and attitude to environment. Unit 8 is based on field activities, to be covered over 4 lecture hours, and would provide students with firsthand knowledge on various local environmental aspects 	

Text Books / References

1. Agrawal. K. C., 2001 Environmental Biology, Nidi Publ. Ltd., Bikaner.
2. Dr. Bharucha Erach, the Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmadabad- 380013, India. E.mail:mapin@icnet.net(R).
3. Brunner R. C. - 1989 Hazardous Waste Incineration. McGraw Hill Inc-480p Clark R. S., Marine Pollution, Clanderson Press Oxford (TB).
4. Cunningham W. P. Cooper, T. H. Gorhani, E & Hepworth M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai 1196 p.
5. De A. K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Center for Science and Environment (R)
6. Gleick, H. P., 1993 Water in Crisis, Pacific Institute for Studies in Dev, Environmental & Security, Stockholm Env. Institute Oxford University Press 473p.
7. Hawkins R. E., Encyclopedia of India Natural History, Bombay Natural History Society, Bombay(R).
8. Heywood, V .H & Watson. R.T. 1995, Global Biodiversity Assessment Cambridge, University. Press 1140 p.
9. Judah H. & Bhopal V. M., 1995, Environmental Protection and Laws, Himalayas.

Unit Test

Unit Test 1	Unit I, II & III
Unit Test 2	Unit IV & V
Unit Test 3	Unit VI & VII

ENGINEERING GRAPHICS - I
(Course No: - K60106)

Designation of Course	Engineering Graphics - I	
Teaching Scheme:	Examination Scheme:	
Theory:- 02 Hours/ Week	Theory	-- Marks
Practical:- 02 Hours / Week	Duration	-- Hours
Tutorials:- -- Hours / Week	Unit Test	-- Marks
	T. W.	50 Marks

Course Prerequisites:-	Basic Knowledge of Mathematics
Course Outcomes:-	<ol style="list-style-type: none"> 1. Differentiate Ist angle and IIIrd angle projection Method. 2. Interpret views of the object and to draw by using Isometric projection method and to draw different Engineering Curves

Course Contents

Unit 1	Orthographic Projections and Missing Views:	(08 Hrs.)
Quadrants 1 st and 3 rd angle method of orthographic projections. Concept of horizontal, vertical and end vertical planes. Sectional views. Interpretation of an object from the given orthographic projections. Drawing of the third view from the two views. Dimensioning of the views.		
Unit 2	Isometric Projection, Geometrical Curves, Link Mechanisms, CAD	(06 Hrs.)
To draw isometric projection or isometric view from given orthographic projections of an object. Isometric scale. To draw Ellipse, Cycloid, Spiral, Involute and Helix. To find the locus of points in simple mechanisms. To write commands in order to get / draw the figures of simple objects using Auto-CAD.		

Term work

Term work shall consist of five half-imperial size or A2 size (594 mm x 420 mm) sheets and one assignment on Auto-CAD.

Sheets

1. Types of lines, Dimensioning practice, Free hand lettering, 1st and 3rd angle method symbol.
2. Orthographic Projections Missing views
3. Isometric views
4. Curves and loci of points

Assignment

Drawing of simple figures using AutoCAD and writing the required commands in order.

Text Books/ Reference Books

1. M. B. Shah and B. C. Rana, "Engineering Drawing", 1st Ed, Pearson Education, 2005.
2. P. S. Gill, "Engineering Drawing (Geometrical Drawing)", 10 Edition, S. K. Kataria and Sons, 2005.
3. N. D. Bhatt and V M. Panchal, "Engineering Drawing (Plane and Solid Geometry)", 42th Edition, Charotar Publishing House, 2000.
4. P. J. Shah, "Engineering Drawing", C. Jamnadas and Co., 1 Edition, 1988.
5. P. Nageswara Rao, "AutoCAD 14 for Engineering Drawing Made Easy", Tata McGraw Hill Co.

Ltd., 1A Edition, 2000.

6. C. R. Shrock, "Exercise Workbook for Beginning AutoCAD", New Age International Publishers.

WORKSHOP PRACTICE-I
(Course No.60107)

Designation of Course	Workshop Practice-I		
Teaching Scheme:	Examination Scheme:		
Theory:- -- Hours/ Week	Theory	-- Marks	
Practical:- 02 Hours / Week	Duration	-- Hours	
Tutorials:- -- Hours / Week	Unit Test	-- Marks	
	T. W.	50 Marks	

Course Prerequisites:-	Basic knowledge of mathematics, basic components of machine.
Course Outcomes:-	<ol style="list-style-type: none"> 1. The student should know the different sections of metal and wood working process. 2. The student should able to handle the marking, measuring and cutting tools used for wood working 3. The student should able to get the practical knowledge of gas welding and arc welding processes. 4. The student should able to know the different types of welding joints. 5. The student should able to get the practical knowledge of soldering process. 6. The student should able to get the introduction about centre lathe and CNC lathe machines.

Course Contents

Term work of Workshop Practice I and Workshop Practice II shall consist of two sets viz.SET A and SET B. Students are required to complete any one set in first semester for term work of Workshop Practice I and the remaining set shall be completed as term work of Workshop Practice II in second semester.

Set A shall consist of

Jobs:

- 1) Wood Working- one job involving joint, wood turning, use of filler materials and adhesives
- 2) Welding- one job with edge preparation and simple joint using gas or arc welding.
- 3) Soldering- Fabrication of at least 5 electronic components on a PCB.
- 4) Demonstration on a centre lathe and CNC lathe.

OR

A suitable combination of above operations to make a composite job either individually or in a group.

Journal:

Journal shall consist of write-up about materials, equipments used in above processes, specific procedures followed, and safety precautions.

Set B shall consist of

Jobs:

- 1) Fitting- One job with one joint along with drilling, tapping, hacksaw cutting
- 2) Tin smithy- One job including riveting/soldering
- 3) Black Smithy- One job with at least two different operations
- 4) Plastic molding- One plastic component on injection molding machine.

OR

A suitable combination of above operations to make a composite job either individually or in a group.

Journal:

Journal shall consist of write-up about materials, equipments used in above processes, specific procedures followed, and safety precautions.

At the end of each semester students are required to submit the completed jobs and Journal for assessment of work done in workshop.

Department of Mechanical Engineering
ENGINEERING MATHEMATICS – II
(Course No. K70108)

Designation of Course	ENGINEERING MATHEMATICS – II		
Teaching Scheme:	Examination Scheme:		
Theory:- 04 Hours/ Week	Theory	80 Marks	
Practical:- -- Hours/ Week	Duration	03 Hours	
Tutorials:- 01 Hours/ Week	Unit Test	20 Marks	
	T. W.	-- Marks	

Course Prerequisites:-	Student should have knowledge of Mathematics-I
Course Outcomes:-	<ol style="list-style-type: none"> 1. To develop an ability to solve differential equations of first order and first degree. 2. To develop an ability to form mathematical model of rectilinear motion, electric circuit, Fourier heat conduction, Newton's law of cooling. 3. To develop an ability to transform the Cartesian co-ordinates into spherical polar and cylindrical coordinate systems. 4. To develop an ability to represent periodic function as Fourier series. 5. To develop an ability to evaluate definite integral by DUIS rules and to trace Cartesian and polar curves. 6. To develop an ability to apply methods to find area and volume by double and triple integration.

Course Contents

Unit 1	Differential Equations:	(09 Hrs.)
Differential Equations of First Order and First Degree, Exact Differential Equations and Reducible to Exact form, Linear Differential Equations, Reducible to Linear types, Method of Substitution and Miscellaneous Types, Differential Equations of First and Higher degree		
Unit 2	Applications of Differential Equations (of First Order and First Degree):	(08 Hrs.)
Orthogonal Trajectories, Atmospheric Pressure, Newton's Law of Cooling, Motion Under Gravity and Rectilinear Motion, L-R, R-C and L-C Circuits, Applications to Mass-Spring System, One Dimensional Conduction of Heat Applications to Chemical Engineering.		
Unit 3	Solid Geometry:	(09 Hrs.)
Cartesian, Spherical Polar and Cylindrical Coordinate systems, Relation between coordinate systems. Sphere, Tangent Plane of the Sphere, Sphere through a Circle, Orthogonal Spheres, Cone and Cylinder, Quadratic surfaces.		
Unit 4	Fourier Series:	(09 Hrs.)
Definition and Dirichlet's Conditions, Full range Fourier series on $c \leq x \leq c + 2\pi$ and $c \leq x \leq c + 2L$, Expansions of even and odd Periodic functions and on $-\pi \leq x \leq \pi$ and $-L \leq x \leq L$, Half Range Fourier Expansions Harmonic Analysis and Application to problems in Engineering. Reduction formulae for Trigonometric functions, Beta and Gamma functions.		
Unit 5	Foundations:	(08 Hrs.)
Integral Calculus (Single Integral):		

Differentiation Under the Sign of Integration, Error functions.

Curve Tracing:

Tracing of Cartesian, Polar and Parametric curves, Rectification of curves.

Unit 6 Multiple Integrals and their Application:

(09 Hrs.)

Double and Triple Integrations, Application of Multiple Integral to Areas and Volumes, Mean and RMS Values, Mass, Centre of Gravity and Moment of Inertia.

Text Books / References

1. Advanced Engineering Mathematics, 5th Edition, by Peter V. O'Neil (Thomson Learning).
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).
3. Advanced Engineering Mathematics by Wylie C.R. and Barrett L. C. (McGraw-Hill).
4. Advanced Engineering Mathematics, 2nd Edition, by M. D. Greenberg (Pearson Education).
5. Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
6. Applied Mathematics (Volume I & II) by P. N. Wartikar and J. N. Wartikar (Pune Vidyarthi Griha Prakashan).
7. A Text Book of Engineering Mathematics - II by P. N. Wartikar and J. N. Wartikar.

Unit Tests-

Unit Test 1	Unit I & IV
Unit Test 2	Unit II & V
Unit Test 3	Unit III & VI

ENGINEERING SCIENCE – II
(Course No. K70109)

Designation of Course	Engineering Science – II		
Teaching Scheme:	Examination Scheme:		
Theory:- 04 Hours/ Week	Theory	80 Marks	
Practical:- 02 Hours/ Week	Duration	03 Hours	
Tutorials:- -- Hours/ Week	Unit Test	20 Marks	
	T. W.	25 Marks	

Course Prerequisites:-	Students should have knowledge of Engineering Science-I
Course Outcomes:-	<ol style="list-style-type: none"> 1. To use the properties of charged particles to develop modern instruments and explain the mechanism of fusion and fission. 2. To understand the behavior of quantum particles in different types of potentials. 3. To understand the basics of semiconductors and its uses to develop devices such as diode, transistor, solar cell etc. 4. Students will be able to understand the fundamental principles of corrosion and methods used for minimizing corrosion. 5. To recognize the preparation, properties and applications of polymeric materials.

Course Contents

PHYSICS		
Unit 1	Modern Physics:	(09 Hrs.)
Motion of a charged particle in electric and magnetic fields, Electrostatic and Magneto static focusing, Wavelength and resolution. Specimen limitation, Depth of field and focus. Electron microscope. Positive rays, Separation of isotopes by Bainbridge mass spectrograph. Nuclear fission, Liquid drop model of nucleus, Nuclear fission in natural uranium. Fission energy, Critical mass and size. Reproduction factor, Chain reaction and four factor formula. Nuclear fuel and power reactor, Nuclear fusion and thermonuclear reactions. Merits and demerits of nuclear energy, Particle accelerators, Cyclotron, Betatron, Microtron.		
Unit 2	Quantum Mechanics:	(08 Hrs.)
Wave nature of matter, De-Broglie waves. Wavelength of matter waves. Electron diffraction, Davisson and Germer's experiment, Heisenberg's uncertainty principle with illustrations, Schrodinger's time dependant and time independent wave equation, Physical significance of wave function. Application of Schrodinger's time independent wave equation to the problems of (1) Electron gas, (2) Step potential (3) Potential barrier, (4) Particle in a rigid box (5) Particle in a non-rigid box (Boundary condition and result).		
Unit 3	Electrical Properties:	(07 Hrs.)
Band theory of solids. Band structures of Lithium, Sodium, Beryllium, Silicon and Diamond, Classification of solids on the basis of band theory. Fermi-Dirac probability function and position of		

Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semiconductors. Band structure of p-n junction diode under forward and reverse biasing, Conductivity in semi-conductor, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics.		
<i>CHEMISTRY</i>		
Unit 4	Corrosion And Its Control:	(08 Hrs.)
Definition, dry or Chemical corrosion, wet or Electrochemical corrosion, mechanism of wet or electrochemical corrosion, Galvanic Corrosion, concentration cell corrosion passivity, underground or soil corrosion, pitting corrosion, inter granular corrosion, stress corrosion, microbiological corrosion. Electrochemical and galvanic series, Factors influencing corrosion and corrosion control.		
Unit 5	Polymers:	(08 Hrs.)
Definition and Classification based on origin and thermal behavior, Polymerization reactions, Functionality, Degree of Polymerization, tacticity. Types of Polymerization - Addition and condensation, Thermo-softening and Thermosetting Plastics, Polymerisation reactions, properties and uses of some polymers such as Polyethylene, Polypropylene, Polyvinyl Acetate, Polystyrene, Teflon, Melamine Formaldehyde, PMMA, SBR. Polymers in Medicine and surgery, Polymer blends and Alloys, Engineering Plastics.		
Unit 6	Instrumental Methods of Chemical Analysis:	(08 Hrs.)
Infrared Spectroscopy, Visible Spectroscopy, Ultraviolet Spectroscopy. Introduction, Principle, Instrumentation (Schematic Diagram) and Engineering Applications of the above Techniques.		

PHYSICS: Term Work Experiments:

Any five experiments from the following:

1. Determination of band gap of semi-conductor
2. Solar cell characteristics.
3. E/m by Thomson's method.
4. Uses of CRO for measurement of phase difference by Lissajous figures
5. Hall effect and Hall coefficient
6. Conductivity by four probe method.
7. Diode characteristics (Zener diode. Photo diode. LED, Ge/Si diode)
8. Plank's constant by photodiode.

Assignments:

Any **two** of following:

1. Harmonic oscillator
2. Nuclear radiation detectors.
3. Scanning electron microscope and scanning tunneling microscope
4. Advanced opto-electronic devices

Text Books /References

1. Physics for Engineers - Srinivasan M. R., New Age International (P) Ltd.
2. Atomic Physics - Weher and Richards, Narosa Publishing House
3. Modern Physics - B. L. Thereja, S. Chand & Company Ltd.

4. Atomic Physics - J. B. Rajam, S. Chand & Company Ltd.
5. Principle of Electronics - V. K. Mehta, S. Chand & Company Ltd.
6. Electronics Principles - A. P. Molvino, McGraw Hill International Book Company Ltd.

CHEMISTRY: Experiments:

Any **five** of the following:

1. To Determine the Molecular Weight of a polymer
2. Estimation of Copper from brass sample solution Iodometrically
3. Estimation of percentage of Iron in Plain Carbon Steel by Volumetric Method
4. To find the Radius of Macro Molecule by Viscometer
5. To Determine Surface Tension of a liquid by Stalagmometer
6. Determination of the strength of unknown liquid by using the colorimeter

Text Books / References

1. Fundamentals of Engineering Chemistry - Theory and Practice by S. K. Singh, New International Publishers.
2. A Textbook of Engineering Chemistry by S. S. Dara, S. Chand and Company Ltd., New Delhi.
3. Instrumental Methods of Chemical Analysis by Chatwal and Anand, Himalaya Publishing House.
4. Engineering Chemistry by Jain and Jain.
5. Nace Corrosion Engineers R. B. by R. Baboian, C. G. Munger.
6. Corrosion Engineering by Mars G. Montana & Norbert D. Green.
7. Polymer Handbook Edited by Brandrup, J. Immergut, Edmund H., etc.

Unit Tests-

Unit Test-I	Unit-I, II
Unit Test-II	Unit-III, IV
Unit Test-III	Unit-V, VI

ENGINEERING MECHANICS
(Course No.K20110)

Designation of Course	Engineering Mechanics		
Teaching Scheme:	Examination Scheme:		
Theory:- 4 Hours/ Week	Theory	80 Marks	
Practical:- 2 Hours/ Week	Duration	03 Hours	
Tutorials:- - Hours/ Week	Unit Test	20 Marks	
	T. W.	25 Marks	

Course Prerequisites:-	Basic knowledge of physics and mathematics.
Course Outcomes:-	<ol style="list-style-type: none"> 1. The student should able to calculate Resultant of the Force system and also apply conditions of equilibrium for different problems. 2. The student should able to calculate Centroid and moment of Inertia of areas. 3. The student should be able to calculate effect friction force. 4. The student should be able to calculate velocity, acceleration, displacement, time for bodies in motion. 5. The student should be able to use D'Alemberts principle, Work-energy principle and Impulse momentum principle. 6. The student should be able to use concept of ICR for rigid body motion.

Course Contents

Unit 1	Force system in a plane	(8 Hrs.)
Types of forces classification of a force system Resolution of forces Resultant of a force system in a Plane- Analytical and Graphical approach Moment of a force, Couple, Force and Couple system About a point. Equilibrant, Free Body Diagram, Types of Supports, Conditions of Equilibrium Equilibrium of a force system in a plane.		
Unit 2	Force system in a Space and Moment of Inertia	(8 Hrs.)
Resultant and Equilibrium of a force system in a space, moment of a force about a point and About in line. Centroid of a line element, plane areas and volume, center of gravity, Moment Of inertia.		
Unit 3	Application of Static Equilibrium	(8 Hrs.)
Analysis of perfect Trusses – Method of Joint, Method of Section and graphical Method, Analysis of Pin Jointed Frames ,Analysis of cables subjected to Concentrated Load Coefficient of Static Friction Impending motion of Blocks , Ladder and wedges, Belt friction & Band-brake system.		
Unit 4	Kinematics of a Particle	(8 Hrs.)
Kinematics of Rectilinear motion of Particles – Equations of motion , Motion Curves ,Relative motion Dependent motion. Kinematics of Curvilinear motion of practical -Equation of motion in Cartesian, Polar and Path variable co-ordinate system, motion of projectile.		
Unit 5	Kinetics of a Particle	(8 Hrs.)
Kinetics of Rectilinear Motion of Particles , Newton's Second Law of motion , D'Alembert's principal , Work- Energy Principal ,Impulse-Momentum Principal, Direct Central Impact, Coefficient of Restitution,		

Spring Force. Kinetics of Curvilinear motion of Particles: D'Alembert's principle, Work-Energy Principle, Impulse-Momentum Principle, Oblique Central Impact		
Unit 6	Rigid Body Motion	(8 Hrs.)
Kinematics of Rigid bodies: Translation and Rotation about a fixed axis, General Plane Motion, Concept of Instantaneous center of Rotation. Kinetics of Rigid bodies: General Plane motion, D'Alembert's Principle, Work-Energy Principle.		

Term Work Experiments:

A) The term-work shall consist of total SIX experiments. (Minimum THREE from each section)

Section - I

1. Determination of reactions of Simple and Compound beam. Study of equilibrium of concurrent force system in a space.
2. Determination of coefficient of friction for Flat Belt and Rope. Verification of Law of Polygon of forces.
3. Study of Simple Lifting Machine.

Section - II

1. Study of Curvilinear motion. Determination of Coefficient of Restitution.
2. Determination of gravitational acceleration using Compound Pendulum. Determination of Moment of Inertia of Fly wheel.
3. Determination of Moment of Inertia of Irregular shape body using Torsional Pendulum.

B) The term-work shall also consist of minimum SIX graphical solutions of the problems on different topics. (Minimum THREE from each section)

Text Books/ Reference Books

1. Beer F.P. and Johnston E.R., "Vector Mechanics for Engineers - Vol. -I and Vol. -II
2. Timoshenko S.P. and Young D.H. "Engineering Mechanics" McGraw Hill Publication.
3. Singer E. L. "Engineering Mechanics" Harper and Row Publications.
4. Meriam J.I. and Craig "Engineering Mechanics" John Wiley and Sons Publications.
5. Shames I. H. "Engineering Mechanics" Prentice Hall of India Ltd.
6. Bhavikatti S. S. and Rajashekarappa K. G. "Engineering Mechanics" New Age International Ltd
7. Mokashi V. S. "Engineering Mechanics I and II" Tata McGraw Hill Publications
8. Tayal A. K. "Engineering Mechanics" Umesh 8. Tayal A. Publications

Unit Tests-

Unit Test-I	Unit-I & IV
Unit Test-II	Unit-II & V
Unit Test-III	Unit-III & VI

ENGINEERING GRAPHICS-II
(Course No. K60111)

Designation of Course	Engineering Graphics-II		
Teaching Scheme:	Examination Scheme:		
Theory:- 03 Hours/ Week	Theory	80 Marks	
Practical:- 02 Hours/ Week	Duration	04 Hours	
Tutorials:- -- Hours/ Week	Unit Test	20 Marks	
	T. W.	50 Marks	

Course Prerequisites:-	Knowledge of basic drawing, mathematics and geometry.
Course Outcomes:-	<ol style="list-style-type: none"> 1. Able to understand projection of Lines and Planes 2. Able to understand projection of solids and its sections. 3. Able to understand development of different solids. 4. Able to understand intersection of surfaces of solids

Course Contents

Unit 1	Projections of Lines and Projections of Planes.	(12 Hrs.)
Projections of points. Projections of lines situated in 1st quadrant only Horizontal trace (HT) Vertical trace (VT) Applications of lines. Auxiliary inclined plane (AIP), Auxiliary vertical plane (AVP), distance between skew lines, distance of a point from a line. Projections of planes, True shape of plane, Angle between two planes, distance of a point from a plane.		
Unit 2	Projections of Solids and Sections of Solids:	(12 Hrs.)
Projections of solids such as prisms, pyramids, cylinder, cone and sphere. Projections of solids in combination. Sections of above solids by AIP and AVP True shape of section.		
Unit 3	Development of Surfaces of Solids	(09 Hrs.)
To draw the development of the lateral surfaces of cut prism, pyramid, cylinder and cone. To draw orthographic projections from the given developed surface of solid.		
Unit 4	Intersection of Surfaces of Solids:	(09 Hrs.)
To draw the lines or the curves of intersection of the surfaces of solids excluding following combination. Pyramid-pyramid, Pyramid-cone, Cone-cone, Sphere-cone, Sphere pyramid.		

Term Work

Term work shall consists of six half-imperial size or A2 size (594mm x 420mm) Sheets

1. Projections of lines
2. Projections of planes
3. Projections of solids
4. Sections of solids
5. Development of surfaces
6. Intersections of surfaces

Text Books/ Reference Books

1. M. B. Shah and B. C. Rana, "Engineering Drawing", 1st Edition, Persian Education, 2005.
2. P. S. Gill, "Engineering Drawing (Geometrical Drawing)", 10th Edition, S. K. Kataria and Sons, 2005.
3. N. D. Bhatt and V. M. Panchal, "Engineering Drawing (Plane and Solid Geometry)" 42nd Edition, Charotar Publishing House, 2000.

4. Warren J. Luzadder and Jon M. Duff, "Fundamentals of Engineering Drawing", Prentice Hall of India Pvt. Ltd., 11 Edition, 1995.
5. P. J. Shah, "Engineering Drawing", C. Jamnadas and Co., 1- Edition, 1988.\
6. P. Nageswara Rao, "Auto CAD 14 for Engineering Drawing Made Easy", Tata McGraw Hill Co. Ltd

Note:

Paper shall be based on the topics covered in the syllabus of Engineering Graphics-I and Engineering Graphics-II

Unit Test:

Unit Test-I	Unit-I, II
Unit Test-II	Unit-III, IV
Unit Test-III	Unit-V, VI

ELEMENTS OF ELECTRICAL & ELECTRONIC ENGINEERING
(Course No. K40112)

Designation of Course	Elements Of Electrical & Electronic Engineering		
Teaching Scheme:	Examination Scheme:		
Theory:- 04 Hours/ Week	Theory	80 Marks	
Practical:- 02 Hours/ Week	Duration	03 Hours	
Tutorials:- -- Hours/ Week	Unit Test	20 Marks	
	T. W.	25 Marks	

Course Prerequisites:-	Basic knowledge of physics, electronics, electrical.
Course Outcomes:-	<ol style="list-style-type: none"> 1. Able to understand and apply knowledge of basic laws and theorems to solve simple electrical dc circuits. 2. Able to define basic terms of single phase and three phase ac circuits and supply systems. Draw vector diagram and solve simple numerical on ac circuits. 3. Able to describe fundamental concepts of magnetic and electromagnetic circuits. Explain principle of transformer and calculate efficiency and regulation of transformer 4. Able to draw power supply system layout, block diagram of SMPS, UPS. Know and use electrical safety rules. 5. Able to specify and select electronic components as per required application. 6. Able to specify and select suitable measuring instruments for required application.

Course Contents

Unit 1	Basic Concepts in Electrical Circuits:	(08 Hrs.)
Fundamental electrical quantities: Potential difference(voltage),current, power, energy, circuit elements-resistance, inductance, capacitance, laws for dc circuits analysis-Kirchhoff's voltage and current law, superposition theorem, the venin's theorem, maximum power transfer theorem.		
Unit 2	AC Circuits:	(08 Hrs.)
Graphical, mathematical and phase representation of ac voltage and currents, instantaneous, average and RMS value, peak factor form factor, periodic time, frequency, phase difference, power factor and complex power, analysis of series and parallel single phase ac circuits consisting of R,L,C combinations and Resonance phenomenon. Concept of 3-phase ac supply, supply specifications, phase sequence, star and delta connection and their line and phase values, current, voltage and power relationship for balanced 3-phase star and delta connected loads(with phase representation)		
Unit 3	Magnetic circuits and Transformer	(08 Hrs.)
Magnetic effects of an electric current ,magnetic circuit concepts terms MMF, flux density, field intensity, permeability, reluctance, composite series and parallel magnetic circuits, magnetization and hysteresis curve hysteresis and eddy current loss. Introduction to 1-phase transformer, function, principle of operation, types ,specifications, EMF equations ideal and practical transformer ,operation on no load and load conditions, losses, efficiency, regulation, determination of efficiency and regulation by direct loading introduction to auto transformation and instrument transformers.		
Unit 4	Electrical power Systems:	(08 Hrs.)

Generation, transmission and distribution systems layout ,types of supply system 3 phase-3wire,3phase-4 wire ac system rectifiers half wave, full wave, bridge wave with relevant wave forms, UPS, SMPS, stabilizers. Electrical safety, Necessity of earthing-safety and first aid measures against electrical shock.		
Unit 5	Electrical and Electronic component, device and Integrated Circuits:	(08 Hrs.)
Basic principle and applications of D.C. machines, connection diagram, load characteristics and applications, three phase induction and working principle. Types of resistance (fixed, variable, precision-carbon film, metal film, wire wound) their standard values specifications and applications .classification of capacitors based on dielectrics ,their standard values, specification and applications, study of different core materials depending on range of frequencies for inductors and transformers. Flat package, SMD's, pin configuration and cooling of LC's mounting of LC's basic block diagram and its explanation along with specifications of Mobile phones fax machines, Microwaves , personal computers.		
Unit 6	Electrical and Electronic Instruments:	(08 Hrs.)
Salient constructional features, operating principle, specification of PMMC and MI voltmeter and ammeter, Dynamometer- wattmeter, Induction type single phase energy meter. Basic block diagram, its explanation, specification and application of Digital millimeter, Function generator, CRO.		

List of Practical's to be performed in the laboratory

1. Verification of Kirchhoff's current and voltage laws for D. C. network Verification of superposition theorem for a given D. C. network.
2. Experimental verification of current flowing through a branch of D. C. circuit using the venin's theorem.
3. Verification of maximum power transfer theorem for D. C. circuit Performance of 1-phase a. c. R-L-C circuit and developing phase or diagram Verification of relationship between star and delta connection (balanced).
4. Efficiency and regulation of a given 1-phase transformer by direct loading Testing and operation of domestic appliances.
5. Use of CRO for obtaining wave forms of electrical quantities Load characteristics of different rectifiers.

Text Books/ Reference Books

1. Electrical Technology- Edward Huges
2. Basic Electrical Engineering D. P. Kothari, Nagrath
3. Electrical power system technology-S.W. Fordo, D. R. Patrick
4. Principles of Electronics-Dr. H. M. Rai
5. Electronic Devices and circuit Theory- R. L. Boylestad and L. Nashelsky
6. Electrical, Electronics Measurements and Instrument
7. Principles of Communication Engineering- Anokh Singh, A. K. Chhabra

Unit Tests-

Unit Test-I	Unit-I, II
Unit Test-II	Unit-III, IV
Unit Test-III	Unit-V, VI

COMPUTER FUNDAMENTALS AND INFORMATION TECHNOLOGY
(Course No. K70113)

Designation of Course	Computer Fundamentals And Information Technology		
Teaching Scheme:	Examination Scheme:		
Theory:- ---Hours/ Week		Theory	-- Marks
Practical:- 02 Hours/ Week		Duration	--Hours
Tutorials:- -- Hours/ Week		Unit Test	-- Marks
		T.W.	25 Marks

Course Prerequisites:-	Basic Computer software knowledge and computer accessories.
Course Outcomes:-	<ol style="list-style-type: none"> 1. Able to study different types of Number Systems and Conversion Techniques. 2. Able to understand the working of different types of Input/ Output Devices 3. Able to learn Software installations on Various Platforms 4. Able to develop familiarity with MS Office Suite. 5. Able to understand the Characteristics of Object Oriented Programming. 6. Able to write simple programs in C++.

Course Contents

Unit 1	Computer Fundamentals	
Computer basics, data representation, number system. Computer architecture, Microcomputer PC hardware: CPU, Memory, Disks, Cards, Slots, Floppy And Modem.		
Unit 2	Input / Output / Storage Devices	
<p>Input devices: function, typical examples of input devices with their installation such As keyboard, mouse, scanners, bar code readers, MICR readers, Audio and Video input Devices.</p> <p>Output devices: Typical examples of output devices with their installation such as VDU, printers, TFT, Audio and Video output devices. Storage devices: Primary storage such as RAM, ROM, secondary storage such as floppy disk, hard disk, CD ROM, ZIP drives tape drives, DAT etc.</p>		
Unit 3	Software	
Software characteristics, Types of software's files, Introduction to OS with DOS Commands. Operating environment such as windows. Programming language with High level and low-level programming. Utility packages such as MS office with MS- Word, Power Point, Excel, CAD and their typical applications in engineering.		
Unit 4	MS-Windows	
Introduction, Installation, Utilization, Features, and Accessories-notepad, paint, and word pad. Communication, Entertainment, System tools: disk cleaning, scan disk, Formatting disk, disk defragmentation etc. System setting. Control panel, desktop. Internet: Modem Types, Connectivity, TCP/IP, ISP, ISDN, Getting connected, and WWW. Browsers such as IE-5, Email, Newsgroups, Chatting, and Internet security. Search engines such as yahoo, Google, info seek, Alta Vista, hot boat etc. Computer Network, Basic concept. Layers, Topologies, Introduction to Networking. Types of LAN, WAN, MAN, Internet working. Wireless networks, Satellite links		

Unit 5	Database Management Systems (DBMS)	
File concepts. Database, logical and physical databases. Data modeling: hierarchical, Network, relational, and object oriented. Concept of normalization: database creation And modification using SQL. Sample queries. Multi Media System: Introduction to Multimedia System, Multimedia components, Text, audio, video, etc.		
Unit 6	Latest trends in Information Technology	
Study of MIS, BIS, GIS, OOP Concepts: Comparison of structured and object oriented Programming language, object structures. Object classes. Inheritance, Object identity. Encapsulation, Polymorphism.		

Term Work:

Term work will consist of ten assignments based on above syllabus out of which four assignments will be based on C programming language.

Assignment List:

1. Study of various Input and Output devices like Keyboard, Mouse, Scanner, Monitor, Printer etc.
2. Software Installation: Install any Office suite for study purpose
3. Study of any Office suite: Features make new documents, save documents, edit documents.
4. Study of various data representation & conversion techniques (Decimal to Octal, Decimal to binary, Decimal to hexadecimal)
5. Study of an operating system and list its features like I/O processing, memory management, process management.
6. Study basic of basic UNIX OS Commands (directory, file maintenance commands)
7. Compare the basic features of Windows OS with Linux or UNIX OS? Design a Spreadsheet for a given application
8. Study of Search Engines (like Google, Yahoo, AltaVista, Info Seek) and its features & WWW technologies.
9. Design a 3-D structure using any design tool
10. List and study database driven software.
11. Create a Database in any suitable application and perform add, delete and modify operations on it
12. Write a C++ program to compare 3 integer and display the greatest number
13. Write a C++ program to perform arithmetic operations on two complex numbers using operator overloading
14. Write a C++ program to study the concept of Inheritance

Required Software for above assignments:

1. UNIX / Linux
2. MS Windows
3. Open Office / MS Office / Star Office
4. 3D Studio MAX /Maya
5. Turbo C++

Text Book/References

1. Dr. V Rajaraman: Computer Fundamentals
2. Peter Norton: Inside IBM PC, (TMH)
3. Tannanbaum: Computer Networks, (TMH)

4. Korth: Database Management Systems, (TMH)
5. Yashwant Kanitkar: C-Programming
6. C Programming Language : Reference and Users Manuals, Microsoft Press
7. Steven Alter: Information Systems, Addison Wesley
8. Stroutstrup: Programming in C, (TMH)

WORKSHOP PRACTICE-II
(Course No: K60114)

Designation of Course	Workshop Practice-II		
Teaching Scheme:	Examination Scheme:		
Theory:- -- Hours/ Week	Theory	-- Marks	
Practical:- 02 Hours/ Week	Duration	-- Hours	
Tutorials:- -- Hours/ Week	Unit Test	-- Marks	
	T. W.	50 Marks	

Course Prerequisites:-	Basic knowledge of fabrication techniques, machine components.
Course Outcomes:-	<ol style="list-style-type: none"> 1. The student should know the different sections of metal and wood working processes. 2. The student should be able to handle the marking, measuring and cutting tools used in fitting section. 3. The student should be able to get the practical Knowledge of sheet metal work. 4. The student should be able to handle the different tools used in black smithy. 5. The student should be able to get the Practical Knowledge of plastic molding process. 6. The student should be able to get the Practical Knowledge of Plumbing process.

Course Contents

Students are required to complete the remaining set as the Term Work of Workshop Practice - II

Set A shall consist of

Jobs:

- 1) Woodworking-one job involving joint, woodturning, use of filler materials and adhesives
- 2) Welding- one job with edge preparation and simple joint using gas or arc welding.
- 3) Soldering- Fabrication of at least 5 electronic components on a PCB.
- 4) Demonstration on a centre lathe and CNC lathe.

OR

A suitable combination of above operations to make a composite job either individually or in a group.

Journal:

Journal shall consist of write-up about materials, equipments used in above processes, specific procedures followed, and safety precautions.

Set B shall consist of

Jobs:

- 1) Fitting- one job with one joint along with drilling, tapping, hacksaw cutting
- 2) Tin smithy- One job including riveting/ soldering
- 3) Black Smithy- One job with at least two different operations
- 4) Plastic moulding- one plastic component on injection moulding machine.

OR

A suitable combination of above operations to make a composite job either individually or in a group.

Journal:

Journal shall consist of write-up about materials, equipments used in above processes, specific procedures followed, and safety precautions

At the end of each semester students are required to submit the completed jobs and journal for assessment of work done in workshop

Rules regarding ATKT, Continuous Assessment and award of Class

A. T. K. T.

- A candidate who is granted term for B. Tech. Semester-I will be allowed to keep term for his/her B. Tech. Semester-II examination even if he/she appears and fails or does not appear at B. Tech. Semester-I examination.
- A candidate who is granted term for B. Tech. Semester - III will be allowed to keep term for his/her B. Tech. Semester-IV examination even if he/she appears and fails or does not appear at B. Tech. Semester-III examination.
- A candidate who is granted term for B. Tech. Semester-V will be allowed to keep term for his/her B. Tech. Semester-VI examination if he/she appear and fails or does not appear at B. Tech. Semester-V examination.
- A candidate who is granted term for B. Tech. Semester-VII will be allowed to keep term for his/her B. Tech. Semester-VIII examination if he/she appears and fails or does not appear at B. Tech. Semester-VII examination.
- A candidate shall be allowed to keep term for the B. Tech. Semester-III course if he/she has a backlog of not more than 3 Heads of passing out of total number of Heads of passing in theory examination at B. Tech. Semester-I & II taken together.
- A candidate shall be allowed to keep term for the B. Tech. Semester-V of respective course if he/she has no backlog of B. Tech Semester-I & II and he/she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 heads of passing in termwork and practical examination or termwork and oral examination.
- A candidate shall be allowed to keep term for the B. Tech. Semester-VII course if he/she has no backlog of B. Tech. Semester-III & IV and he/she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 Heads of passing in termwork and practical examination or termwork and oral examination.

CONTINUOUS ASSESSMENT

- In respect of Term work at B. Tech. Semester-I & II, B. Tech. Semester-III & IV and B. Tech. Semester-V & VI, target date shall be fixed for the completion of each job, project experiment

or assignment as prescribed in the syllabus and the same shall be collected on the target date and assessed immediately at an affiliated college by at least one pair of the concerned teachers for the subject and the marks shall be submitted at the end of each term to the Principal of the college.

- Termwork and performance of Practical/Oral examination shall be assessed on the basis of the depth of understanding of the principles involved, correctness of results and not on ornamental or colorful presentation.
- For B. Tech. Semester-VII & VIII, termwork assessment will be done by external and internal examiners jointly during the examination schedule declared by the university. The record of continuous assessment shall be made available to the examiners during Term work and practical and Term work and oral examinations. Examiner shall use this record for overall assessment of the performance of the student. Every practical/termwork assignment shall be assessed on the scale of 20 marks and weightage of 20 marks shall be distributed as follows:

Sr. No.	Activity	Marks
1	Timely Submission	04
2	Presentation	06
3	Understanding	10

- Marks obtained out of 20 for all assignments together will be converted on scale of marks assigned to term work of respective subject in the structure of the course.

CLASS

The class should be awarded to the student on the basis of aggregate marks obtained together in both the semesters of the respective year by him. The award of class shall be as follows.

A	Aggregate 66% or more marks	First Class with Distinction
B	Aggregate 60% or more marks but less	First Class
C	Aggregate 55% or more marks but less	Higher Second Class
D	Aggregate 50% or more marks but less	Second Class
E	Aggregate 40% or more marks but less	Pass Class