PRODUCTION ENGINEERINGCOMBINED FIRST AND SECOND SEMESTER

Code	Subject	Hours/Week			Internal Marks	University Examination	
		L	T	P/D		Hrs	Marks
EN04 101	Engineering Mathematics 1	3	-	-	50	3	100
EN04 102	Engineering Mathematics II	3	-	-	50	3	100
EN04 103B	Engineering Physics(B)	2	-	-	50	3	100
EN04 103B(P)	Physics Lab(B)	-	-	1	25	-	-
EN04 104B	Engineering Chemistry(B)	2	-	-	50	3	100
EN04 104B(P)	Chemistry Lab(B)	-	-	1	25	-	-
EN04 105	Humanities	2	-	-	50	3	100
EN04 106B	Engineering Graphics(B)	1	-	3	50	3	100
EN04 107B	Engineering Mechanics(B)	2	1	-	50	3	100
PE04 108	Power Plant Engineering	2	-	-	50	3	100
PE04 109	Basic Civil & Electrical Engineering	2	-	-	50	3	100
PE04 110(P)	Production Lab I	-	-	3	50	-	-
PE04 111(P)	Production Lab II	-	-	2	50	-	-
TOTAL		19	1	10	600	-	900

EN04- 101 : MATHEMATICS I

(common for all B. Tech. programmes)

3 hours lecture per week

Module I: Differential Calculus (15 hours)

Indeterminate forms - L` hospital`s rule - radius of curvature - centre of curvature - evolute -functions of more than one variable - idea of partial differentiation - Euler`s theorem for homogeneous functions - chain rule of partial differentiation - applications in errors and approximations - change of variables - Jacobians - maxima and minima of functions of two -method of Lagrange multipliers.

Module II: Infinite Series (15 hours)

Notion of convergence and divergence of infinite series - ratio test - comparison test - Raabe`s test- root test - series of positive and negative terms - absolute convergence - test for alternating series- power series - interval of convergence - Taylors and Maclaurins series expansion of functions -Leibnitz formula for the n_{th} derivative of the product of two functions - use of Leibnitz formula in the Taylor and Maclaurin expansions

Module III: Matrices (21 hours)

Rank of a matrix - reduction of a matrix to echelon and normal forms - system of linear equations- consistency of linear equations - Gauss` elimination - homogeneous linear equations -fundamental system of solutions - solution of a system of equations using matrix inversion -Eigen values and eigen vectors - Cayley-Hamilton theorem - Eigen values of Hermitian, skew Hermitian and unitary matrices- Diagonalisation of a matrix using Eigen values and Eigen vectors- quadratic forms- matrix associated with a quadratic form- definite, semidefinite and indefinite forms.

Module IV: Fourier series and harmonic analysis (15 hours)

Periodic functions - trigonometric series - Fourier series - Euler formulae - even and odd functions - functions having arbitrary period - half range expansions - approximation by trigonometric polynomials - minimum square error - numerical method for determining Fourier coefficients - harmonic analysis

Reference books

1. Michael D. Greenberg, Advanced Engineeing Mathematics(second edition), Pearson Education Asia.
2. Wylie C.R. and L.C. Barrent, *Advanced Engineering Mathematics* , McGraw Hill
3. Kreyszig E., *Advanced Engineering Mathematics* , Wiley Eastern
4. Piskunov N., *Differential and Integral calculus* , MIR Publishers
5. Ayres F., *Matrices* , Schaum's Outline Series, McGraw Hill
6. Sastry, S.S., Engineering Mathematics-Vol.1 and2., Prentice Hall of India

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN04-102 : MATHEMATICS II

(common for all B. Tech. programmes)

3 hours lecture per week

Module I: Ordinary differential equations (21 hours)

Equations of first order - separable, homogeneous and linear types - exact equations – orthogonal trajectories - linear second order equations - homogeneous linear equation of the second order with constant coefficients - fundamental system of solutions –Solutions of the general linear equations of second order with constant coefficients- method of variation of parameters -Cauchy's equation - simple applications of differential equations in engineering problems,including problems in mechanical vibrations, electric circuits and bending of beams

Module II: Laplace transforms (15 hours)

Gamma and Beta functions - definitions and simple properties - Laplace transform – inverse transform - Laplace transform -shifting theorems-Transforms of derivatives and integrals -differentiation and integration of transforms - transforms of unit step function and impulse function - transform of periodic functions - solution of ordinary differential equations using Laplace transforms

Module III: Vector differential calculus (15 hours)

Vector function of single variable - differentiation of vector functions - scalar and vector fields -gradient of a scalar field - divergence and curl of vector fields - their physical meanings – relations between the vector differential operators

Module IV: Vector integral calculus (15 hours)

Double and triple integrals and their evaluation - line, surface and volume integrals - Green`s theorem - Gauss` divergence theorem - Stokes` theorem (proofs of these theorems not expected) -line integrals independent of the path

Reference books

1. Michael D. Greenberg, Advanced Engineeing Mathematics(second edition), Pearson Education Asia.
2. Wylie C.R. and L.C. Barrent, *Advanced Engineering Mathematics* , McGraw Hill
3. Kreyszig E., *Advanced Engineering Mathematics* , Wiley Eastern
4. Piskunov N., *Differential and Integral calculus* , MIR Publishers
5. Ayres F., *Matrices* , Schaum's Outline Series, McGraw Hill
6. Sastry, S.S., Engineering Mathematics-Vol.1 and2., Prentice Hall of India

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN04-103B : ENGINEERING PHYSICS(B)

(common for CH, CE, ME, PE)

2 hours lecture per week

Module-1(11 hours) *Interference of light* :

Interference from plane parallel thin films- Colours of thin films by reflected and transmitted light- Newton's rings – measurement of wavelength – thin wedge shaped air film Air-wedge – Testing of optical plane ness of surfaces –

Diffraction of light – Introduction of Fresnel and Fraunhofer class of diffraction – distinction between the two diffractions – Fresnel diffraction – rectilinear propagation of light – diffraction pattern due to a straight edge, expression for intensity maximum and minimum – Fraunhofer diffraction – simple theory of diffraction grating, its construction and working – determination of wavelength using diffraction grating – dispersive and resolving power of grating.

Polari zation of light : Double refraction – Huygen's theory of double refraction in uni axial crystal – positive and negative crystals – Nicol prism – construction and working – Quarter and Half wave plates- Theory of circularly and elliptically polarized light – their production and detection – Rotatory polarization – Laurent's half shade (brief explanation) - Laurent's half shade polarimeter – applications of polarized light

Module II (11 hours)*X-ray Physics* :

Introduction – properties of X-rays. X-ray diffraction – Bragg's law – derivation – Bragg's spectrometer – derivation of lattice constant of NaCl crystal - spacing between three dimensional lattice planes – structure of simple cubic body centered cubic and face centered cubic crystals – applications of X-rays.

Laser physics –

basic concepts of laser - spontaneous and stimulated emission expression for the ratio of their emission coefficients - absorption - population inversion - optical pumping - construction and components of laser - ruby laser, helium-neon laser and semiconductor laser –applications - basic principle of holography and its applications.

Module III (11 hours)*Vacuum science and technology* :

Introduction – gas flow in vacuum systems – pumping concepts – production of vacuum – vane pumps diffusion pumps – measurement of vacuum:McLeod gauge.

***Ultrasonic s*:** Piezo electric effect – Piezo electric crystal – production of ultrasonics by Piezo electric oscillator – detection of ultrasonics using Ultrasonic Diffractometer and velocity of ultrasonics in a liquid.

Non-destructive testing : Radiographic, Magnetic, Electrical and Ultrasonic methods.

Acoustics of buildings : Reverberation – Sabine's formula for reverberation time – unit of loudness: decibel and phon – factors influencing acoustic properties – measurement of absorption coefficient.

Module IV (11 hours)*Semiconductor physics*

Introduction – electron and hole concentration in intrinsic semiconductor in thermal equilibrium – concentration of holes in valence band – law of mass action – Fermi level in intrinsic semiconductor – electrical conductivity in intrinsic semiconductor– Fermi level in N-type and P-type extrinsic semiconductor – electrical conductivity of extrinsic semiconductor – diffusion current and total current.

Application of semiconductors : P-N junction diode and its characteristic – circuit symbol of P-NPand N-P-N transistors – characteristics of a transistor in common emitter configuration – input,output resistances and current amplification factor – LED, Photodiode, Solar cell, Photo resister (LDR), Liquid crystal display (LCD), and Zener diode – application of Zener diode as voltage regulator.

Fibre Optics :
Basic principle – fibre construction – step index (single and multimode) and graded index fibre – light propagation in fibre – signal distortion in optical fibres and transmission losses (brief idea only) – light wave communication using optical fibres with block diagram and its advantages – applications of fibre optics in medical field and industry.

Text books

1. Sreenivasan M.R., *Physics for Engineers* , New Age International
2. Murugeshan, M. *Modern Physics* S.Chand
3. Brijlal and Subrahmanyam N., *Text book of Optics* , S.Chand

Reference books

4. Kale, GokhaleFundamentals of Solid State Electronics Kitab Mahal
5. N.Subrahmanyam, and Brijlal *A text book of Sound,* Vikas.
6. Jenkins F.A. and White H.E., *Fundamentals of Optics* , McGraw Hill
7. Gupta.S.L and Kumar.V *Solid State Physics,* K.Nath
8. Rajam.J.B *Modern Physics* , S. Chand.

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN04-103B(P) : PHYSICS LAB (B)

(common for CH, CE, ME, PE)

2 hours lecture per week

LIST OF EXPERIMENTS

1. Wave length of mercury spectral lines using diffraction grating and spectrometer.
2. Ordinary and Extraordinary refractive index (μo and μe) of calcite or quartz in the form of equilateral prism, using spectrometer.
3. Wavelength of sodium light by Newton's rings method.
4. Diameter of a wire or thickness of paper by Air-Wedge method.
5. Specific rotation of cane sugar solution using polarimeter.
6. Frequency of an electrically maintained turning fork (Transverse and longitudinal mode).
7. Wavelength and velocity of ultrasonic waves using ultrasonic diffractometer.
8. Divergence of laser beam using He-Ne laser or semiconductor laser.
9. Wavelength of laser light with a transmission grating.
10. Band gap energy in a semi conductor, using a reverse biased P-N junction diode.
11. Static characteristics of transistor (PNP or NPN) in common emitter configuration.
12. Characteristics of a zener diode.
13. Characteristics of a light emitting diode and wavelength of emitted radiation.
14. Characteristic of photodiode.
15. Characteristic of photo resister (Light dependent resister).
16. Voltage regulation using zener diode.
17. Resolving power of a grating.
18. Wavelength of mono chromatic light by diffraction at a straight edge using laser beam.
19. Characteristics of a solar cell.
20. Planck's constant using photo electric cell or solar cell.
21. Measurement of numerical aperture and attenuation in an optical fibre.
22. Measurement of displacement using fibre optic sensor.

(ATLEAST 12 EXPERIMENTS SHOULD BE DONE).

Reference Books

1. Experiments in Engineering physics' – M.N. Avadhanulu, A.A. Dani, P.M. Pokley – S.Chand
2. Practical Physics with Viva Voce' – Dr. S.L. Gupla and Dr. V. Kumar – Pragati Prakashan

Internal work assessment

Laboratory Practical and records 2x10 = 20
2 tests 2x15 = 30
Total marks = 50

EN04-104B : ENGINEERING CHEMISTRY(B)

(common for CE, ME, PE)

2 hours lecture per week

SECTION-1
CHEMISTRY OF ENGINEERING MATERIALS:

Module –1 (13 Hours)

Cements- Non-hydraulic cements-Lime-Gypsum plaster (Manufacture and Properties)-hydraulic cements-Portland cement (Manufacture (dry and wet) and properties)-chemical constitution-Setting and hardening (Chemical equations)-Special cements-(High alumina cements, Sorel cements, White Portland Cement, Barium and Strontium Cements, Water-proof cements-Concrete- Reinforced concrete. (**3 hours**)

Glasses- Manufacture- Types of glasses (Soda lime glass, Potash lime glass, lead glass, Borosilicate glass, Optical glasses, Insulating glass, Bullet-resistant glass, Glass wool) and uses

(**2 hours**)

Wood-Properties-composition-anisotropy-structure modification-Plywood-Particle board-fibreboard-

(1 hour)

Metals- Metallurgy-(General extraction procedures-Purification methods)- Extraction and Purification and uses of Iron, Nickel, Chromium, Titanium, Vanadium, Tungsten, Zirconium,
Uranium, Thorium. (**4 hours**)

Water-Sources-Uses-Specification for various purposes (Industrial-Domestic-Drinking)-Analysis
of Water-Hardness-Alkalinity- -Boiler feed water-problems associated with hardness-Scale and
Sludge- Prevention of Scale formation (Internal treatment(Colloidal, Phosphate , Carbonate ,
Calgon Conditioning,) and Softening (External) methods (Lime Soda Process-Ion-exchange
Process)-Dissolved Oxygen removal for corrosion prevention. (**3 hours**)

Reference Books:

1. B.W.Gonser et.al (1964) " Modern Materials-advances in development and application" Vol 1-7, Academic Press, New York
2. J.C. Kuriakose and J.Rajaram " Chemistry in Engineering and Technology Vol.1and 2, Tata McGraw Hill, New Delhi
3. N.N.Greenwood and E.Earnshaw (1989) "Chemistry of the Elements" Pergamon Press

Module –2 (13Hours)

High Polymers and Lubricants- Classification of Polymers-(Natural and Synthetic, Organic and Inorganic, Thermoplasic and Thermosetting, Plastics, Elastomers, Fibres and liquid resins) Polymerization (Chain polymerization Polythene- PVC- Teflon – polystyrene -polymethylmethacrylate) Condensation polymerization(Polyamide and Polyesters) Co-polymerization (Buna-S, Buna-N, PVC- Co-polyvinylacetate, PAN-Co-polyvinyl Chloride),Coordination polymerization (Ziegler- Natta Polymerization)-Electrochemical Polymerization- Metathetical Polymerization-Group transfer Polymerization (**3 Hours**)

Mechanism of polymerization (Cationic, anionic, and free radical) Polymerization techniques(Bulk polymerization, Solution polymerization, Suspension polymerization, Emulsion polymerization, Melt polycondensation, Solution polycondensation, Interfacial condensation, Solid and Gas Phase Polymerization (**2 Hours**)

Structure relation to properties(Chemical resistance, Strength, Plastic deformation, Extensibility,Crystallinity) -Mol.Wt of Polymers-Number average Molecular wt, Weight average Mol.wt-Gel Permeation Chromatography (**1 Hour**)

Thermosetting resins (Bakelite, Urea-Formaldehyde, Silicones), Thermoplastic resins (Acrylonitrile, PVC, PVA ,PS, PMMA, PE). Fibres (Nylon6, Nylon66,Nylon6,10, Cellulose fibres, dacron, Kevlar) Application of polymers in electronic and electrical industry. Elastomers-Natural rubber-Structure-Vulcanization-Synthetic rubbers (Neoprene, Buna-S, Buna-N, thiokol,Silicone rubber) (**3 Hours**)

Compounding of Plastics (Fillers, Plasticizers, lubricants, pigments, antioxidants, Stabilizers) and Fabrication (Calendering, Die Casting, Film casting, Compression, injection, Extrusion and Blow moulding, Thermoforming,
Foaming, Reinforcing) (**1 Hour**)

Lubricants: Theory of friction – mechanisms of lubrication –Fluid film or hydrodynamic, thin film or boundary lubrication, extreme pressure lubrication-Classification of Lubricants-(Liquid(animal and vegetable oils, Petroleum oils),Semi-solid (Ca-soap grease, Li-soap grease,Al-soap grease, Axle grease) Solid lubricants (Graphite, Molybdenum di-sulphide- Structure relation to lubrication property) and synthetic lubricants (Di-basic acid esters, Poly glycol ethers,Organo phosphates, Organo silicones))

Properties of Lubricants (Viscosity index, Cloud point and pour point, flash point and fire point,Corrosion stability, Emulsification, Aniline point). Additives and their functions (Fatty acids,Sulphurised fats, Phenols, Calcium sulphonates, Organo-metallics, Hexanol, Amine phosphates,Tricresyl phosphates, Silicon polymers) (**3 Hours**)

Reference Books:

1. B.R.Gowariker et.al (2002) “Polymer Science” New Age International pp-505
2. B.W.Gonser et.al (1964) “ Modern Materials-advances in development and application” Vol
1-7, Academic Press, New York.
3. L.H.Van Vlack (1998) “Elements of Materials Science and Engineering” Sixth edition, Addison-Wesley , London pp-598

Module-3 (9 Hours)

Phase equilibria-definition of Phase, Component, Degree of Freedom-derivation of Phase rule-One component system (Water)-Two component Alloy system-Thermal analysis-Simple eutectic(Pb-Ag),
Continuous series of solid solutions (Cu-Ni)-Single phase alloys (**4 Hours**)

Commercial alloys –Properties and Uses. Alloy steels –effect of alloying elements-Al, B, Cr, Co,Si, Ni, Mn, Ti and W. Light Metal Alloys (Aluminum alloys-Magnesium Alloys-BerylliumAlloys-Titanium alloys)
Nickel-Copper alloys(Monel Metal), Nickel-Chromium alloys, Nickel –Molybdenum alloys.White Metals and their alloys (Zn, Cd, Pb, Tin).Refractory Metals and alloys
(**5 Hours**)

Reference Books:

1. S.Glasstone (1997) “Textbook of Physical Chemistry” Macmillan, New Delhi, pp-1320
2. P.W.Atkins (1987) “Physical Chemistry” Oxford University Press, Oxford, pp-857
3. C.P.Sharma (2004) “ Engineering Materials-Properties and applications of Metals and Alloys” Prentice-Hall of India, New Delhi , pp-258
4. N.N.Greenwood and E.Earnshaw (1989) “Chemistry of the Elements” Pergamon Press

SECTION-2

CHEMISTRY OF MATERIAL AND ENVIRONMENTAL DAMAGE

Module -4 (9 Hours)Material damages and prevention:

Corrosion – theoretical aspects -(electrochemical theory) –Galvanic series – Pourbiax diagram – assessment of corrosion potential of materials – Types ofcorrosion – Dry corrosion-direct chemical –Wet Corrosion-Electrochemical- differential aeration –Corrosion of Iron in acidic neutral, basic condition (Corrosion in boilers) – Galvanic corrosion-(corrosion at contact points in computers-Ag/Au)-Inter granular corrosion (18-8 Steel).Microbialcorrosion - Factors influencing corrosion.

Corrosion protection-Self protecting corrosion products-Pilling-Bedworth rule-Coatings-Organic-(paints and polymers)-Inorganic Coatings-Galvanizing (dip coating, Sherardizing, Wire-gun method)-Tinning- Electroplating-(Chromium, Nickel), Anodization of Aluminium- Passivation of metals by chemical treatment- Protection by Sacrificial Anode- Impressed current **(4 Hours)**

Environmental damage and prevention:

Pollution – Definitions – Classification of pollutants (Global, Regional, Local; Persistent and

Non-persistent; Pollutants – Eg: CO_2, CO, SO_x, NO_x, VOC, SPM, CFC, POP, Dissolved metals) –effects on environments – Air pollution – Fossil fuel burning – Automobile exhausts –Photochemical smog – PAN, PBN formation-chemical equations required) – Stratospheric Ozone depletion- CFCs -Nomenclature CFC’s –Chapman cycle of Ozone formation- CFC dissociation and its reaction with Ozone – Alternate refrigerants – Monitoring of pollution – gases (CO,SO_2,NO_X)and particulate (High volume sampler) - Pollution from thermal power plants – Coalcomposition- fly ash – Thermal pollution . Methods of control of Air pollution – Bag filters, cyclones, Scrubbing, ESP, Catalytic converters -composition and action with CO, NO_x.Water pollution-Pollutant Classification-(Organic, Inorganic, Suspended and Dissolved- Toxic metal waste- BOD-COD-) monitoring (analytical methods-brief discussion) and control – Waste water treatment-Aerobic, Anaerobic-USAB process-Industrial waste water treatment.Soil pollution-Solid waste-radio nuclides-Toxic metals- monitoring and control-Incineration-Dioxins- hazardous waste - deep-well injection **(5 Hours)**

Reference Books

1. L.L Shreir (Ed) “ Corrosion Control” Vol. I and II Newnes-Butterworths, London
2. C.A.Hampel (Ed) “Encyclopedia of Electrochemistry” Reinhold Publishing corporation,pp-
1206
3. V.Raghavan (2000) “Material Science and Engineering-A First Course” Prentice-Hall of
India Pvt.Ltd , New Delhi, pp-485
4. A.K.De (1996),”Environmental Chemistry” New age International Pvt.Ltd, New Delhi, pp-364
5. C.N.Sawyer and P.L.McCarty,(1989)“Chemistry for Environmental Engineering” McGrawHill Book Company, New-Delhi , pp-530

6. H.S.Peavy, D.R.Rowe and G.Tchobangoglous (1985) “Environmental Engineering” McGraw
Hill International , pp-720
7. S.P.Mahajan (1985)“ Pollution Control in Process Industries” Tata McGraw Hill, New Delhi,
pp-273
8. S.E.Manahan (1975)”Environmental Chemistry” Willard Grant Press, Boston,pp-532.

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN04-104B(P) : CHEMISTRY LAB(B)

(common for CE, ME, PE)

1 hour lab per week or 2 hours lab per alternate weeks

List of Experiments

1. Estimation of Copper in Brass(Iodometric method)
2. Estimation of Iron in a given sample of Iron ore
3. Estimation of Hardness of a sample of Water
4. Phenol formaldehyde- preparation andstudy of properties
5. Urea formaldehyde- preparation andstudy of properties
6. Flash and fire point-Pensky –Martens apparatus
7. Estimation of dissolved oxygen in a water sample (Winkler's method)
8. Corrosion potential measurement of certain metals and alloys in 3.5% salt solution (Steel(18-8), Al, Cu, Brass, Bronze, Monel metal or any alloys of industrial use)- Potentiodynamic and Potentiostatic methods.
9. Analysis of Cement
10. Estimation of Chloride in a sample of water
11. Electrodepostion-plating of Copper-detection of the thickness of the layer deposited.Anodizing of Aluminium –Characteristics of the coating
12. Estimation of SO_2, NO_2, H_2S.Calculation of concentration in ppm and microgram per M^3 and comparison of data with permitted levels.
13. Estimation of Pb, Cd in water - colourimetric method.
14 Estimation of Fluoride(alizarin dye method), Nitrate in water –colourimetric method
15. Identification tests for certain common plastics (PE, PVC, Nylon, PET, etc.)
16. Simple Eutectic system-Thermal analysis.

(Atleast 12 experiments should be done)

EN04-105 : HUMANITIES

(common for all B. Tech. programmes)

2 hours lec ture per week

Module I (10 hours) Introduction to English usage and grammar-

Review of grammar - affixes, prefixes, suffixes,participles and gerunds - transformation of sentences - commonly misspelt words - correction of mistakes - punctuation - idioms - style - vocabulary building

Reading comprehension

Exposure to a variety of reading materials, articles, essays, graphic representation, journalistic articles, etc.

Writing comprehension-

Skills to express ideas in sentences, paragraphs and essays

Module II (10 hours) Technical communication and report writing

Need, importance and characteristics of technical communication – correspondance on technical matters-aspects of technical description of machinery, equipment and processes – giving in an industrial situation –note taking and note making instruction correspondence on technical topics - different types of technical reports

Internal Work assessment for Lab

Lab performance and Record = 10+ 5
Tests = 10
Total Marks = 25
(Lab performance to be evaluated by the thoroughness of the procedure and practices, results of each experiment and punctuality in the submission of Rough and Fair Records)

Module III (14 hours)

History of science and technology

Science and technology in the primitive society – the development of human civilization from primitive to modern society- impact of sciences and technology on societies – Cultural and industrial revolutions - the rise and development of early Indian science – contribution of Indian scientist-JC Bose, CV Raman, Visweswaraya-Ramanujam and Bhabha- Gandhian concepts recent advances in Indian science

Module IV (10 hours)

Humanities in a technological age

Importance of humanities to technology, education and society - relation of career interests of
engineers to humanities - relevance of a scientific temper - science, society and culture

Reference books

1. Huddleston R., *English Grammer - An outline* , Cambridge University Press
2. Pennyor, *Grammar Practice Activities* , Cambridge University Press
3. Murphy, *Intermediate English Grammar* , Cambridge University Press
4. Hashemi, *Intermediate English Grammar -Supplementary Exercises with answers* ", Cambridge University Press
5. Vesilind; *Engineering, Ethics and the Environment* , Cambridge University Press
6. Larson E; *History of Inventions* , Thompson Press India Ltd.
7. Bernal J.D., *Science in History* , Penguin Books Ltd
8. Dampier W.C., *History of Science* ", Cambridge University Press
9. Encyclopedia Britannica, *History of Science, History of Technology*
10. Subrayappa; *History of Science in India* , National Academy of Science, India
11. Brownoski J, *Science and Human Values* , Harper and Row

12. Schrodinger, *Nature and Greeks and Science and Humanism* , Cambridge University Press
13. Bossel, H, *Earth at a Crossroads - paths to a sustainable Future* , Cambridge University Press
14. McCarthy, *English Vocabulary in Use* , Cambridge University Press
15. Anna University, English for Engineers and Technologists, Orient Longman
16. Meenakshi Raman et al., Technical communication –Principles and practice, Oxford University Press

Internal work assessment

One essay on relevant topic 10
One technical report 10
2 test 2X15= 30
Total marks = 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN04-106B : ENGINEERING GRAPHICS(B)

(common for CE CH, ME, PE)

1 hour lecture and 3 hours drawing

Module - 0 (8 Hours - 1 Drawing exercise)
Drawing instruments and their use - different types of lines - lettering and dimensioning - familiarization with current Indian Standard Code of practice for general engineering drawing. Construction of ellipse, parabola and hyperbola. Construction of cycloid, involute and helix. Introduction to Computer Aided Drafting. (For practice only, not for University Examination)

Module - 1 (12 Hours - 3 drawing exercises)
a) Introduction to orthographic projections - vertical, horizontal and profile planes - principles of first angle and third angle projections. Projections of points in different quadrants. Orthographic projections of straight lines parallel to one plane and inclined to the other plane - straight lines inclined to both the planes and occupied in one quadrant- traces of lines.
b) True length and inclination of a line with reference planes. Line occupied in more than one quadrant. Line inclined to the two reference planes but parallel to the profile plane. line dimensioned in surveyor's unit.

Module - II (16 Hours - 4 drawing exercises)
a) Projections of plane laminae of geometrical shapes parallel to one plane and inclined to the other plane - plane laminae inclined to both the planes. Auxiliary projections of plane laminae. Projections of laminae inclined to the two reference planes but perpendicular to the profile plane.
b) Projections of polyhedra and solids of revolution - frustums - projections of solids with axis parallel to one plane and inclined to the other plane. Projections of solids with the axis inclined to both the planes.(Solids to be drawn : Cube, prisms, pyramids, tetrahedron, cone, and cylinder.)Projections of solids on auxiliary planes. Projections of combinations of solids. (Solids to be drawn : Prisms, pyramids, tetrahedron, cube, cone, and sphere)

Module - III (12 Hours - 3 drawing exercises)
a) Sections of solids - sections by planes parallel to the horizontal or vertical planes and by planes inclined to the horizontal or vertical planes. True shape of section by projecting on auxiliary plane, (Solids to be drawn : Cube, prisms, pyramids, tetrahedron, cone, and cylinder.)

b) Intersection of surfaces - methods of determining lines of intersecting - intersection of prism in prism, cylinder in cylinder, and cylinder in cone.

Module - IV (12Hours - 3 drawing exercises)
a) Development of surfaces of solids - method of parallel line, radial line, triangulation and approximate developments. Development of polyhedra, cylinder, cone, and sectioned solids. Development of solids having hole or cut.
b) Development of surfaces of objects - transition pieces, pipe elbow, bent, funnel, trays and hoods. Development of spherical dishes and tanks using lune and zone methods.

Module - V (12 Hours - 3 drawing exercises)
a) Introduction to isometric projection - isometric scale - isometric views - isometric projections of prisms, pyramids, cylinder, cone, spheres, sectioned solids and combinations of them. Principle of oblique projection - cavalier, cabinet and general oblique projections of solids and simple objects.
b) Introduction to perspective projections - Classification of perspective views - parallel, angular and oblique perspectives - visual ray method and vanishing point method of drawing perspective projection- perspective views of prisms, pyramids and circles.

NOTE: *All drawing exer cises mentioned above are for class work. Additional exercises where ever necessary may be given as home assignments.*

Text books

1. John K.C., *Engineering Graphics* , Jet Publications
2. P.I. Varghese, Engineering Graphics, VIP Publications
3. Bhatt N.D., *Elementa ry Engineering Drawing* , Charotar Publishing House

Reference

1. Luzadder W.J., *Fundamentals of Engineering Drawing* , Prentice Hall of India
2. Narayana K.L and Kannaiah P, *Engineering Graphics* , Tata McGraw Hill
3. Gill P.S., *Geometrical Drawing* , Kataria and sons

Internal work assessment

Drawing exercises (Best 10)	10x3	= 30
2 tests	2x10	= 20
Total marks		= 50

University examination pattern

No question from module 0
Q I - 2 questions A and B of 20 marks from module I with choice to answer any one
Q II - 2 questions A and B of 20 marks from module II with choice to answer any one
Q III - 2 questions A and B of 20 marks from module III with choice to answer any one
Q IV - 2 questions A and B of 20 marks from module IV with choice to answer any one
Q V - 2 questions A and B of 20 marks from module V with choice to answer any one

EN04- 107B : ENGINEERING MECHANICS(B)

(common for CE, ME, PE)

2 hours lecture and 1 hour tutorial per week

Objectives

To build a strong foundation in Engineering Mechanics to serve as a basis for Mechanics of Solids, Mechanics of Machinery and Design of Machine Elements.

To acquaint the student with general methods of solving engineering problems.
To illustrate the application of the methods learned in Mechanics in practical engineering problems.
To familiarise the use of Vector Mechanics
Units: System International**.**

Vector approach should be followed at appropriate sections. Problems should be practiced using this approach.

Module 1(17 hours)

Introduction to engineering mechanics - units - dimensions - vector and scalar quantities - laws of mechanics - elements of vector algebra - important vector quantities - equivalent force systems - translation of a force to a parallel position - resultant of a force system - simplest resultant of

special force systems - distributed force systems - equations of equilibrium - free body diagrams - free bodies involving interior sections - control volume- general equations of equilibrium - problems of equilibrium - static indeterminacy.

Module 1I(17 hours)

Introduction to structural mechanics - trusses - analysis of simple trusses - chains and cables - friction forces - laws of coulomb friction - simple contact friction problems - properties of surfaces - first moment of area and centroid - theorems of pappus - guldinus - second moment and product moment of area - transfer theorems - computations - polar moment of area - moments and products of inertia - principal axes and principal moments of inertia (conceptual level treatment only)

Module III(16 hours)

Kinematics of a particle - simple relative motion - definition of particle - velocity and acceleration - translation and rotation - rectangular and cylindrical coordinates - path variables - simple kinematical relations - particle dynamics - central force motion - path variables - system of particles - applications

Module 1V(16 hours)

Energy methods for particles - analysis of a single particle - power considerations - conservative force fields - conservation of mechanical energy - alternative form of work-energy equation - systems of particles - work-energy equation - kinetic energy expression based on centre of mass - work-kinetic energy expressions based on center of mass - methods of moment of momentum for particles - linear momentum - impulse and momentum relations for a particle - momentum considerations for a system of particles - impulsive forces - impact - moment of momentum - moment of momentum equations for a single particle - moment of momentum equations for a system of particles

Text book

Shames I.H, *Engineering Mechanics - Statics and Dynamics* , Prentice-Hall of India
Hibbeler, Engineering Mechanics, Vol.I statics, Vol II Dynamics, Pearson

Reference books

1. Beer F.P and Johnston E.R., *Vector Mechanics for Eng ineers - Vols.1 and 2* , McGraw Hill
2. Merriam J.L and Kraige L.G., *Engineering Mechanics - Vols.1 and 2* , John Wiley
3. Rajasekharan and Sankarasubramanian, "Engineering Mechanics", Vikas Publishing House

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher. (At least one assignment should be computer based using spread sheet or suitable tools)
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module (in which, at least 5 questions to be numerical)
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one
(QII to V can have subdivisions and **at least 80% weightage** for numerical problems)

PE04-108: POWER PLANT ENGINEERING

2 hours lecture per week

Module I (12hours)

Steam plants - Schematic diagram of steam power plant - Steam generators - Fire tube and water tube boilers - Cochran, Babcock, Wilcox and Locomotive boilers - Important boiler mountings - Stop valve, safety valve, water level indicators, alarms, fusible plug - Componentsof powerplants-Economisers,
super heaters, air prehe~ters.condensors, evaporators, spray ponds and cooling towers - Dust collection ana ash handling Steam engines - Principles and opration - D-slide valve and piston valve -Condensing and non-condensing engines - Compounding of engines(introduction only) Steam turbines - Principles and operation - Impulse and reaction turbines -Compounding of turbines (introduction only)

Module II (12 hours) .

I.c. engine plants - Prim;iple of op..:rationof I.c. engines - Two stroke>and four-stroke engines - Petrol and diesel engines - Fuel systems - fuel pumps, injector, simple carbureror, governors, lubrication and cooling systems. Dieselengine plant- Schematicarrangementof a dieselengine plant- Auxiliaries
of a diesel engine plant Gas turbine plant- Principles of working of gas turbines - Classification - Open
and closed cycles - Schematic diagram of a simple gas turbine plant- Functions of components .

Module III (10 hours)

Nuclear power plants - Basic principles -nuclear reactor - main components -fuel, moderator, reflector. coolant, shielding, control and safety devices –layout of a simple plant
Hydro electric plants - general layout of high head and low head plants - brief description of components - reservoirs, dams, spilways, surge tank. penstock. turbines and draft tubes.

Module IV (10 hours)

Energy management - conservation of energy - energy audit - assessment and planning of energy management programme -sourcesof energy-fosile, non-fosile, conventionaland non-conventionalsources - solar,tidal. Windenergies etc.

Text and reference books

I. Ka.dambiV&Prasad 1\.1, *IlItrodllction(!lEnergy COII\:crsion.Vol.* 2, Willey Eastern
2. Morse FT, *Power Plam Engineering.* Van Nostrand
3. Kcswam H.B. *POII'erPlant Engineering,* Standard Book House
4. SkrotzklB.G.A&Vopatw.A.. *POIl'erStationEngineeringandEconomy,*McGrawHill
5. Ballaney PL, *Thermal Engineering,* Khanna Publishers
6. Lee J. F, *Theory of Steam and Gas Turbines,* McGraw Hill

Internal work assessment

60 % - Test papers Minimun 2)

30 %- ,AsslgmncntsHcrm project/any other mode decided by the teacher.

10%- Othermeasureslike Regulantyand ParticIpationInClass.

Total marks = 50

University examination pattern

Q I -8 short type questions of 5 marks. 2 trom each module

Q II - 2 questions A and B 01 15Jl1arks trom module I wIth chOIce to answer anyone

Q III - 2 questions A and B of 15marks from module II with choice to answer anyone

QIV -2questionsAandB01ISmarkslrommoduleIIIwithchOIceto answeranyone

Q V -2questionsAandBot ISmarkslrommoduleIVwithchOIcetoansweranyone

PE04-108 BASIC CIVIL AND ELECTRICAL ENGINEERING

PART A- Civil engineering

Module I (11 hours)

Introduction -classification of surveys - plane surveying -geodetic surveying -topographic surveying ~ reconnaissance -principle of working from whole to part -chain survey - instruments - principles of chain survey - field book - tie line and checkline-plotting of an existing building. Selling out of a simple plan.Plane table survey - instruments and accessories - radiation and intersection -orientation -plotting of an existing structure. (with demonstration for chain and plain table survey)

Module II (11 hours)

Levelling -definition of level surfaces - mean sea level - reduced level – bench marks - levelling instrument-temporary and permanent adjustments – fly leveling - booking (with demonstration)- reduction of levels - contour survey- definition - characteristics of contour - uses of conlour-Theodolite surveying - study of theodolitc - temporary adjustments - mcasurement of horizontal angles - method of repetition and reiteration -measurement of vertical angles - theodolite traverse

Text books

I. Kanetkar T.P.& Kulkarni S.v.. *SI/r\'cr;"g \t(}I! &/1.* Vidyarthigriha Prakashan
2. Punmla B.C., *SI/rver;"g Vol! &/1.* Laxmi Pub.
3. Arora K.R., *SIIII'eyi"g Vol! &/1.* Standard Book House

PART B -Electrical Engineering

Module III (12 hours)

Review of basic circuit laws - Ohm's law - Kirchoff'slaws- current sorces source conversion- reciprocative theorem - delta star and star deltatransfonnation -single phase series and parallel RLC circuits -poly phase a.c circuits - generation of three phase e.m.f - voltage and current

Module IV (10 hours)

Electrical Wiring - study of wires and cables -lighting accessories and 1001s- Jointing of wires- wiring simple lamp controlled by a switch. lamp and plug - tube light wiring - different systems of wiring - earthing - wiring estimates - building codes for electrical wiring (with demonstration)

Reference books

I. Hughes E., *Electrical Technology,*ELBS
2. Cotton H., *Electrical Technology,* PItman

Internal work assessment '-

60 % -Test papers (mmlmum 2 (rom each part)
30 % -AssIgnmentslTerm proJect/any other mode decIded by the teacher.
10 % - Other measures like Regularity and PartIcIpation In Class,
Total marks = 50

University examination pattern

Part A and Part 8 to be aqswered in separate answer books

Part -A

Q I - 4 short questions 01 5 marks each. 2 each from m~dule I and II
Q II -:2 questions A and B 01 15 marks trom module I wnh chOice to answer anyone
Q III - :2questions A and B 01 15 marks trom module 11wnh chOice to answer anyone

Part -B .

Q I - 4 short questions of 5 marks each. 2 each from module III and IV
Q II - 2 questionsA and B of 15marks lrom module III with chOiceto answer anyone
Q III - 2 questions A and B of 15marks from module IVwith choice to answer anyone

PE04-110fP) : PRODUCTION LAB I
3 hours practical per week

1. Carpentry

Wood- typesand selection- treatment – wood working tools- machineryf or wood working - carpentry joints - halved, 1110rtice& tenon, dovetail and simple beam joints - pattern making - types of pattern -allowances in pattern – colour coding - patterns for pulleys. valves etc. - layout of typical pattern shop visit to a pattern shop and preparation of study report

2. Fittine

Introduction to fitting shop equipments and tools - chipping and filing, hacksawing. marking. drilling, tapping, countersinking etc. - making simple fits of square. hexagonal, angular and rectangular shapes - layout of a fitting shop - visit to a fitting shop and preparation of study report

3. Sheet metal work

Characteristics of sheet metals - tools and machinery for sheet metal work - bending, blanking. piercing etc. - making of simple shapes from the drawing - preparation of drawings of development -cutting of plates, brazing etc. - pipe bending machine - general arrangements- bending of pipes - visit to a fabrication shop and preparation of study report

Reference books

I. HaJrachowdhury. *Elemellts oj Workshop1echllology Vol.J*
2. Chapman W A J, *Workshop 1eclmology Part J,*Edward Arnold
3. Lindberg, *Processes alld Materials oj mallujacture,* Prentice Hall
4. Nicholson, *Shop Theory,* Tala McGraw HIli
5. Bruce & Myer, *Sheet Metal Shop Practice,* Taraporewala Sons & Co.

Internal work assessment

Workshop practicals and record =30
2 tests 2*10=20
Total marks =50

PE04-l11 (P) : PRODUCTION LAB II
2 hours practicals per week

1. Smithy

Introduction (0 ".TIlth '~hop tools - forge, anvil, swage blocks - hand tools -hammers. tonges.swages. punches. drifts –hand forging operations- making of models like holts and ,nuts. chisels, I bolts. foundation bolts - use of forged parts - safety precautions - visit to a typical forging unit and preparation of study report

2. Foundrv

Principles of moulding - hand tools - moulding sands - pattern types – materials and allowances - moulding methods - uses of gates, risers and runners, cores,chaplets - fettling and finishing - preparation of green sand moulds for simple items like pulleys, valves etc. demonstration of carbon dioxide moulding -pouring practice - castng defects - safety aspects - visit to a foundry shop to observe the casting of C.I/steel castings and preparation of study report

3. Welding

Introduction to welding processes - gas welding and arc welding -trade and equipment - electrodes and filling materials - fluxes - types of welds and welded joints - welding positions - flame cutting -brazing and soldering -safety precautions - visit to a welding unit and preparation of study report

4. Plumbing

Plumbing tools and operations,- study and practice for making various plumbing works \

Reference books

I. HaJrachowdhury, *Elemel/fS of Workshop Techllology Vol.J*
2. Chapman W A J, *Workshop Technology Part J,* Edward Arnold
3. Lmdberg, *Processes alld Materwls of mall ufactu rer;*PrentIce Hall
4. NIcholson, *Mallufacturmg Processes,* McGraw HilI

Internal work assessment

Workshop practlcals and record	=30
2 tests	2*10=20
Total marks	= 50