B.Tech. SYLLABUS
(1st Semester / 2008 -2009)

NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI – 620 015
TAMILNADU, INDIA.

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B.TECH. CURRICULUM FOR I & II SEMESTER 2008-09

SEMESTER-I

CODE	COURSE OF STUDY	L	T	P	C
HM101	Basic Course in Communicative English	3	0	0	3
MA101	Mathematics-1	3	0	0	3
PH101	Physics-1	2	0	3	3
CH101	Chemistry-1	2	0	3	3
ME101	Engineering Mechanics	3	0	0	3
CS101	Basics of programming	2	0	2	3
CC101	Energy and Environmental Engineering	2	0	0	2
MP101/ PR101	Engineering graphics / Workshop Practice	1 0	0 0	4 4	3 2
CF101	NSS/NCC/NSO	0	0	0	0
	Total	18/17	0	12	23/22

SEMESTER –II

CODE	COURSE OF STUDY	L	T	P	C
HM102	Professional Communication	3	0	0	3
MA102	Mathematics-II	3	0	0	3
PH102	Physics-II	3	0	3	4
CH102	Chemistry-II	3	0	3	4
BEI102	Basic Engineering-I	2	0	0	2
BEII102	Basic Engineering-II	2	0	0	2
BS102	Branch specific Course	2	0	0	2
PR101/ MP101	Workshop Practice / Engineering Graphics	0 1	0 0	4 4	2 3
CF102	NSS/NCC/NSO	0	0	0	0
	Total	18/19	0	10	22/23

HM101 BASIC COURSE IN COMMUNICATIVE ENGLISH

Objectives

The primary objective is to develop in the under-graduate students of engineering a level of competence in English required for independent and effective communication for academic and social needs.

Course Material

Instruction will be provided through relevant material – articles from popular magazines, Newspapers, technical journals, samples from industries and also text books. Practice in the four language skills will be provided in an integrated manner.

Course Content

Communication: An introduction - Its role and importance in the corporate world – Tools of communication – Barriers – Levels of communication.

Listening: Importance to listening in the corporate world - Listening process & practice – Exposure to recorded & structured talks, class room lectures – Problems in comprehension & retention – Note-taking practice – Listening tests.

Reading: Introduction of different kinds of materials: technical & non-technical – Different reading strategies: skimming, scanning, inferring, predicting and responding to content – Guessing from context – Note making – Vocabulary extension.

Speaking: Barriers to speaking – Building confidence & fluency – dialogue practice- Extempore speech practice – Speech assessment.

Writing: Effective writing practice – Effective sentences: role of acceptability, appropriateness, brevity & clarity in writing – Cohesive writing practice – Paragraph writing – Discourse writing.

Text Book

1. Meenakshi Raman and Sangeetha Sharma (2008) Technical *Communication*, Oxford University Press, New Delhi.

Reference Books

1. M. Ashraf Rizvi (2005*), Effective Technical Communication*, Tata McGraw-Hill, New Delhi.
2. Golding S.R. (1978), Common *Errors in English Language*, Macmillan.
3. Christopher Turk (1985), *Effective Speaking*, E & FN Spon, London

MA101 MATHEMATICS-I

Characteristic equation of a matrix –Eigen values and Eigen vectors – Properties of Eigen values – Diagonalization of matrix – Cayley-Hamilton Theorem (without proof) verification

– Finding Inverse and Power of a matrix using it – Quadratic form – Definite and indefinite forms – Orthogonal reduction of quadratic form to canonical form.

Sequences of real numbers – Limit of a sequence – Convergent and divergent sequences– sub sequence- Cauchy's sequence – monotone convergence theorem (without proof)- Sequence with recurrence relations

Infinite series-Convergence Tests for positive term series – Comparison, Root, Ratio and Raabe's tests - Alternating series – Leibnitz's rule – Absolute and Conditional Convergence. Riemann rearrangement theorem (with out proof)-

Curvature – Radius, Centre and Circle of Curvature in Cartesian form –Evolute – Envelope of family of curves with one and two parameters – Functions of several variables - Partial derivatives and Transformation of variables – Jacobian and its Properties- Maxima and Minima of function of two variables.

Double integral – Changing the order of Integration – Change of variables from Cartesian to Polar Coordinates – Area using double integral in Cartesian and Polar Coordinates – Triple integral – Change of Variables from Cartesian to Spherical and Cylindrical Coordinates – Volume using double and triple integrals.

Text Books

1. Kreyszig, E., Advanced Engineering Mathematics, 8th edition, John Wiley Sons, 2001.
2. Grewal, B.S., Higher Engineering Mathematics, 40th edition, Khanna Publications, Delhi, 2007.

Reference Books

1. Apostol, T.M. Calculus Volume I & II Second Edition, John Wiley & Sons (Asia) 2005
2. Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Education Inc. (First Indian reprint), 2002
3. Strauss. M.J, Bradley, G.L. and Smith, K.J. Calculus, 3rd Edition, Prentice Hall, 2002

PH101 PHYSICS - I

Waves and Oscillations

Traveling wave in one dimension – wave equation – examples – simple harmonic motion – examples: simple pendulum, LC circuit – damped oscillation – forced oscillation and resonance – origin of refractive index – dispersion.

Acoustics

Characteristics of musical sound – loudness – Weber-Fechner law – decibel – absorption coefficient – reverberation – reverberation time – Sabine's formula – acoustics of buildings – Ultrasonic production: Magnetostriction and piezoelectric methods – determination of velocity of ultrasonic waves (acoustic grating) – applications.

Thermodynamics

Mole – ideal gas – heat capacity – exact differential – first law – Meyer's relation – isothermal and adiabatic processes – work done – second law – Carnot engine – Carnot's theorem – Kelvin's scale of temperature – Clausius' theorem and entropy – first law revisited – statistical interpretations of temperature and entropy.

Crystallography

Crystalline and amorphous solids – system of crystals – symmetry operation – Miller indices – atomic radius – coordination number – atomic packing factor calculation – X-ray diffraction – powder photograph method.

Quantum Mechanics

Inadequacy of classical mechanics – wave and particle duality of radiation – de Broglie concept of matter waves – Heisenberg's uncertainty principle – Schrodinger's wave equation – interpretation of wave function – eigenvalues and eigenfunctions – superposition principle – particle confined in one dimensional infinite square well potential.

Text Books

1. Material Science,V. Rajendran and A. Marikani, Tata McGraw-Hill (2004).
2. Engineering Physics, M.N. Avadhanulu, S. Chand & Co. (2007).

References

1. Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons (2001).
2. Waves – Berkeley Physics Course Vol. 3, F.S. Crawford Jr., Tata McCraw-Hill (2008).
3. Optics, 3rd edition, A. Ghatak, Tata McGraw-Hill (2005).

Lab Experiments

1. Torsional pendulum
2. Sonometer – Frequency of turning fork.
3. Measurement of temperature using thermocouple
4. Thermal conductivity – Lee's disc method
5. Half shade polarimeter – determination of specific rotatory power
6. Determination of dispersive power of prism
7. Conversion of Galvanometer into ammeter and voltmeter

Reference

1. Physics Laboratory Manual, Department of Physics, NITT.

CH101 CHEMISTRY-I

Electrochemistry: Electrolytic and galvanic cells, EMF series, Nernst equation for electrode potential, cell EMF, its measurement and applications, Weston standard cell, hydrogen electrode, calomel electrode, glass electrode, reversible and irreversible cells, concentration

cell, electrode (hydrogen gas electrode) and electrolyte concentration cell, concentration cell with and without transference, fuel cells, hydrox fuel cell.

Corrosion: Dry corrosion and wet corrosion, mechanisms, types of corrosion, DMC, DAC, stress, inter granular, atmospheric and soil corrosion, Factors affecting corrosion, protection from corrosion by metallic coatings, electroplating, electrolessplating and cathodic protection.

Organic Chemistry: Carbon-carbon bond properties, hybridization-sp^3, sp^2 and sp, homolytic and heterolytic cleavage of carbon-carbon bonds, S_N1 and S_N2, E_1 and E_2 reactions, Birch reduction, MPV reduction, Baeyer-Villiger oxidation, Oppenauer oxidation, aromatic nucleophilic substitution, benzyne mechanism, aromatic electrophilic substitution.

Thermodynamics: Entropy as a thermodynamic quantity, entropy changes in isothermal expansion of an ideal gas, reversible and irreversible processes and physical transformations, work and free energy functions, Helmholtz and Gibbs free energy functions, Gibbs-Helmholtz equation, Gibbs-Duhem equation, Clapeyron-Clausius equation and its applications, Van't Hoff isotherm and applications.

Fuels and Lubricants: Fuels - classification, examples and relative merits, types of coal, determination of calorific value of solid fuels, Bomb calorimeter, theoretical oxygen requirement for combustion, proximate and ultimate analysis of coal, manufacture of metallurgical coke, flue gas analysis, problems, Lubricants – definition, theories of lubrication, characteristics of lubricants – viscosity, viscosity index, oiliness, pour point, cloud point, flash point, fire point and carbon residue, additives to lubricants, manufacture of lube oil.

Text Books

1. P.C. Jain and M. Jain, Engineering Chemistry, Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2007.
2. J. March, Advanced Organic Chemistry, Wiley Eastern, New Delhi, 1990.

Reference Books

1. R. Gopalan, D. Venkappayya and N. Sulochana, Engineering Chemistry, Vikas Publishing House, New Delhi, 2005.
2. J.C. Kuriacose, J. Rajaram, Chemistry in Engineering and Technology, Vol I & II, Tata McGraw Hill publishing Company Ltd, New Delhi, 1984.
3. P.W. Atkins, Physical Chemistry, Oxford University Press, 1998.

CHEMISTRY-I LAB

1. Percentage purity of bleaching powder
2. Percentage purity of washing soda
3. pH metric titration
4. Conductometric titration
5. Potentiometric titration
6. Determination of corrosion rate of mild steel in acid medium by weight loss method

Reference Book

1. Laboratory Manual, Department of Chemistry, NITT

ME101 ENGINEERING MECHANICS

Statics

Concurrent forces in a plane: Principles of Statics-Composition of forces-Equilibrium of concurrent forces in a plane-Method of projections-Equilibrium of three forces in a plane-Method of Moments – Friction
Parallel forces in a plane: Two parallel forces- General case of parallel forces in a plane-Center of parallel forces and center of gravity-Centroids of composite plane figures and curves – Distributed forces in a plane
General case of forces in a plane: Composition of forces in a plane-Equilibrium of forces in a plane
Force systems in space: Concurrent forces in space- method of projections, methods of moments-couples in space-parallel forces in space-center of parallel forces and center of gravity- general case of forces in space.

Dynamics

Rectilinear Translation: Kinematics of rectilinear motion-Principles of dynamics-Differential equation of rectilinear motion-Motion of particle acted upon by a constant force-D'Alembert's principle-Momentum and impulse-Work and energy- Ideal systems: conservation of energy- Impact
Curvilinear translation: kinematics of curvilinear motion- Differential equations of curvilinear motion-Motion of a projectile-D'Alembert's principle in curvilinear motion.
Rigid Body motion: Rotation of a rigid body about a fixed axis and Plane motion of a rigid body.

Text Books

1. Rajasekaran.S. & Sankara Subramanian.G., "*Engineering mechanics–statics and Dynamics"—Vikas Publishing Comp.-2005*
2. S. Timoshenko & D.H. Young '*Engineering Mechanics*" McGraw Hill 1995

Reference Books

1. Irving H.Shames, *"Engineering Mechanics – Statics and Dynamics ",* Pearson educations Forth edition 2003.
2. Beer & Johnston, "*Vector Mechanics for Engineers", Vol.1 "statics" and Vol.2 "Dynamics"*, McGraw Hill International Edition, 1995.
3. Suhas Nitsure " Engineering Mechanics", Technical Publications, Pune 2007

CS101 BASICS OF PROGRAMMING (THEORY & LAB)

Introduction to computer systems-CPU-Memory –I/O Devices-Types of Computers – Generation of Computers –Recent trends in Software Technology

Overview of Operating System-Compilers-System software-MATLAB-SciLab

Introduction to C- Basic concepts: Keywords-Identifiers-Variables, Constants-Operator-statements-Decision making and looping-Branching.
Functions-User defined functions- parameters-Call by value- Call by reference –Recursion-Arrays-Storage classes.

String manipulation – Pointers –array of pointers – Storage classes- Structures and Union – Array of Structures.

Introduction to Object Oriented Programming Concepts- Features –class- object- Inheritance- Overloading –Programming using basic concepts

Programming Exercises in C and C ++ using the above concepts.

Text Books

1. Byron And Gottfried, Programming in ANSI C, Schaum series, 2003
2. Robert Lafore, Object Oriented Programming, Tata McGraw Hill, 2001

CC101 ENERGY AND ENVIRONMENTAL ENGINEERING

Conventional Vs Non convectional power generation, Renewable and alternative energy trends in power generation in future.

Solar, Wind, Bioenergy, Ocean Thermal energy conversion (OTEC), Tidal, Fuel cell, Magneto Hydro Dynamics (MHD).

Thermo electric and thermionic generators – Principle and Application - Energy conservation and management- Industry, domestic, case studies.

Air pollution- sources- effects- control- air quality standards, air pollution act- measurement, Water pollution- effects- selection of process- Disposal of solid wastes.

Green house effect- Acid rain- Noise pollution – Thermal pollution- Pollution aspects of various power plants.

Text Books

1. Rai. G.D., Non conventional energy sources, Khanna Publishers, Delhi, 2006.
2. Gilbert M. Masters, Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall.

Reference Books

1. Rao S., Parulekar B.B., Energy Technology-Non conventional, Renewable & Conventional, Khanna Publishers, Delhi, 2005.
2. Glynn Henry J., Gary W. Heinke, Environmental science and Engineering, Pearson Education, Inc., 2004.

MP101 ENGINEERING GRAPHICS

Drawing standard SP46: Dimensioning, Lettering, type of lines, scaling conventions.

Geometrical constructions: Dividing a given straight line into any number of equal parts, bisecting a given angle, drawing a regular polygon given one side, special methods of constructing a pentagon and a hexagon

Introduction to orthographic projection, drawing orthographic views of objects from their isometric views

Orthographic projections of Points lying in four quarters, Orthographic projection of lines parallel and inclined to one or both planes. Orthographic projection of planes inclined to one or both planes

Types of solids, Projections of solids with axis perpendicular to HP, solids with axis perpendicular to VP, solids with axis inclined to one plane. Projection of spheres touching each other

Sectioning of solids: section planes perpendicular to one plane and parallel or inclined to other plane.

Intersection of surfaces: intersection of cylinder and cylinder, intersection of cylinder and cone, intersection of prisms.

Development of surfaces: Development of cylindrical and conical surfaces

Development of prisms.

Isometric Projection and view of planes and simple solids.

Introduction to computer aided drafting: introduction to computer aided drafting package to make drawings

TEXT BOOKS

1. N.D. Bhatt, "Engineering Drawing" Charotar publishing House, 46th Edition, (2003).
2. K.V. Nataraajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).

REFERENCE BOOK

1. K.Venugopal & V.Prabhu Raja, "Engineering Graphics", New Age International (P) Limited (2008).

PR 101 WORKSHOP PRACTICE

Introduction to the use of tools and machinery in Carpentry, Welding, Foundry, Fitting and Sheet metal.

Carpentry

Wood sizing exercise in planning, marking, sawing, chiseling and grooving to make

1. Half lap joint
2. Cross lap joint

Welding

Exercise in arc welding for making

1. Lap joint
2. Butt joint

Foundry

Preparation of sand mould for the following

1. Flange
2. Anvil

Fitting

Preparation of joints, markings, cutting and filing for making

1. V- joint
2. T- joint

Sheet metal

Making of small parts using sheet metal

1. Tray
2. Funnel

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