Course Structure for First Year Engineering

First Semester						
Theory						
Category	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Evaluation**
BS	NRMA1A001	Mathematics –I	3-0-0	3	100	50
BS	NRPH1A001/ NRCH1A002	Physics/Chemistry	3-0-0	3	100	50
ES	NRBE1B001/ NRBL1B002	Basic Electrical Engineering /Basic Electronics Engineering	2-0-0	2	100	50
ES	NRBM1B001/ NRBC1B002	Basic Mechanical Engineering / Basic Civil Engineering	2-0-0	2	100	50
HS	NRCE1E001	Communicative English	2-0-0	2	100	50
MC	NRIT1F301	Induction Training (21 Days)		0		
Total Credit (Theory)				**12**		
Total Marks					**500**	**250**
Practical						
BS	NRPH1A201/ NRCH1A202	Physics Lab/Chemistry Lab	0-0-3	2	-	100
ES	NRBE1B201/ NRBL1B202	Basic Electrical Engineering / Basic Electronics Engineering Lab	0-0-3	1	-	100
ES	NRBM1B201/ NRBC1B202	Basic Mechanical Engineering / Basic Civil Engineering Lab	0-0-3	1	-	100
ES	NREG1B201/ NRWO1B202	Engineering Graphics & Design Lab/Workshop	0-0-3	2	-	100
HS	NRCE1E201	English Language Lab	0-0-3	1		100
Total Credit (Practical)				**6**		
Total Semester Credit				**18**		
Total Marks						**500**
Grand Total (Theory & Practical)= 1250						

Second Semester						
Theory						
Category	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Evaluation**
BS	NRMA2A001	Mathematics-II	3-0-0	3	100	50
ES	NREM2B001	Engineering Mechanics	3-0-0	3	100	50
BS	NRPH2A001/ NRCH2A002	Physics / Chemistry	3-0-0	3	100	50
ES	NRBE2B001/ NRBL2B002	Basic Electrical Engineering /Basic Electronics Engineering	2-0-0	2	100	50
ES	NRBM2B001 / NRBC2B002	Basic Mechanical Engineering / Basic Civil Engineering	2-0-0	2	100	50
ES	NRPL2B001	Programming Language	3-0-0	3	100	50
MC	NRNC2F301	NCC/NSS/Yoga		0		
Total Credit (Theory)				**16**		
Total Marks					**600**	**300**
Practical						
BS	NRPH2A201/ NRCH2A202	Physics Lab/Chemistry Lab	0-0-3	2		100
BS	NRBE2B201/ NRBL2B202	Basic Electrical Engineering / Basic Electronics Engineering Lab	0-0-3	1		100
BS	NRBM2B201/ NRBC2B202	Basic Mechanical Engineering / Basic Civil Engineering Lab		1		100
ES	NREG2B201/ NRWO2B202	Engineering Graphics & Design Lab/Workshop	0-0-3	2		100
HS	NRPL2B201	Programming Lab	0-0-3	2		100
Total Credit (Practical)				**7**		
Total Marks (Practical)						**500**
Grand Total (Theory & Practical) = 1400						
Total Semester Credit				**23**		
Total First Year Credit				**41**		

NRMA1A001 Mathematics-I 3-0-0

OBJECTIVE:

The objective of the course Mathematics-I is to familiarize the prospective engineers with techniques in calculus, Gamma & Bita function, differential equation of first and second order, series solution of differential equations, Laplace transform. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Module-1 (8 hrs.)

Asymptote, Curvature (Cartesian and polar), Gamma & Beta function , Partial differentiation, Maxima and Minima for function of two variables.

Module-2 (8 hrs.)

Differential Equation: First order differential equations, Separable Equation, Exact differential equation, Linear differential equation, Bernoulli's equation application to Electrical circuits.

Module-3 (9hrs.)

Linear differential equation of second, Homogeneous equation with constant co-efficient, Euler-Cauchy equations, Solution by undetermined co-efficient, Solutions by variation of parameters, Modelling of electric circuits

Module-4 (10 hrs.)

Series solution of differential equations, Power series method, Legendreequation and Legendre polynomial. Bessels function and its properties.

Module – 5 (10 hrs.)

Laplace transformation and its use in getting solution to differential equations, Convolution, Integral Equations.

OUTCOMES

On completion of this course, student are able to:

- Apply the knowledge of calculus, Gamma & Beta functions for analyzing engineering problems.
- Solve first order differential equation analytically using standard method.
- Demonstrate various physical models through higher order differential equation and solve such linear ordinary differential equation.
- Obtain series solution of differential equation and explain application of Bessel's function.
- Apply Laplace problem to determine complete solution to ordinary differential equation.

Text Books:

1. Differential Calculus by Santi Narayan and Mittal,

2. Advanced Engineering Mathematics by E. Kreyszig, Tenth Edition , Willey

3. Higher Engineering Mathematics by B.V. Raman, , Mc-Graw Hills Education

4. Engineering Mathematics by Srimanta Pal and S.C. Bhunia, Oxford Publication

References:

1. Ordinary and Partial Differential equations by J. Sihna Ray and S Padhy, Kalyani Publishers

2. Advance Engineering Mathematics by P.V.O'NEIL, CENGAGE

3. Ordinary Differential Equation by P C Biswal , PHI second edition.

4. Engineering Mathematics by P. S. Das & C. Vijayakumari, Pearson.

N.B:Thecourseisof3creditwith4contacthours.

PHYSICS 3-0-0

For 1st Semester Code (NRPH1A001) For 2nd Semester Code (NRPH2A001)

Module I

Oscillation & Amp; Waves (8 Hours)

Simple Harmonic Oscillation: velocity of motion, acceleration, time period, frequency, phase; damped harmonic oscillation: Wave equation of damped vibration, logarithmic decrement, quality factor, relaxation time; Forced oscillation, resonance, velocity resonance and amplitude resonance, coupled oscillation, Normal coordinates and normal frequencies, In- phase and out-of-Phase Oscillation, Concept of wave and wave equation,, reflection and transmission of longitudinal waves at boundaries.

Module II

OPTICS (10 Hours)

Concept of interference, two sources interference pattern, Bi-prism, Fringe width, uses of biprism, Newton's ring & measurement of wavelength and refractive index. Diffraction: Huygen's principle, Fresnel's Diffraction and Fraunhoffer's diffraction, Half period zone, Zone plate, construction, principle, multiple foci, comparison ofzone plate with convex lens, Fraunhoper's diffraction of Single slit, intensity distribution

Module III

LASER and Fibre Optics :(6 Hours)

Atomic excitation and energy states, Interaction of external energy with atomic energy states, Absorption, spontaneous emission and stimulated emission, Population inversion, Pumping mechanism, optical pumping, Electrical Pumping, Components of laser system, active medium, population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser (basic concepts, and Engineering application only),Structure of optical fibre, Principle of propagation and numerical aperture, Acceptance angle, classification of optical fibre (Single mode and Multimode, SINand GRIN), FOCL (Fiber Optic Communication Link)

Solid State Physics (4 Hours)

Crystalline and Amorphous solid, unit cell, lattice parameter, Miller Indices, Reciprocal Lattice(Only Concept), Bragg's law, Concept of fermions and Bosons and their distribution Functions, Band theory of Solids(Qualitative),Classification of materials: metals, semiconductor and insulator in terms of band theory.

Module IV

Electromagnetism (8 Hours)

(Student will be familiarized with some basic used in vector calculus prior to Development of Maxwell's electromagnetic wave equations. No proof of theorems and laws included in this unit expected- statement and interpretation should sufficient.)

Introduction; Scalar & vector fields, Gradient Of Scalar Field, divergence and curl of Vector Field, Gauss divergence theorem, Stokes theorem (Only Statements, noproof), Gauss's law of electrostatics in free space and in a medium (Onlystatements), Faraday's law of electromagnetic induction (Only statements)Displacement current, Ampere's circuital law, Maxwell's equation in Differential andIntegral form, Electromagnetic wave equation in E and, Electromagnetic Energy,Poynting theorem and Poynting vector(no derivation)

Module V

Quantum Physics: (10 Hours)

Elementary concepts of quantum physics formulation to deal with physical systems. Need for Quantum physics- historical overviews (For concept), Einstein equation, de

Broglie Hypothesis of matter waves, Compton Scattering, Pair production (no derivation), Uncertainty Principle, Application of Uncertainty Principle, Non-existence of electrons in the Nucleus, Ground state energy of a harmonic oscillator.Basic Features of Quantum Mechanics: Transition from deterministic to Probabilistic,Wave function, probability density, Normalization of wave function (Simple problem),observables and operators, expectation values (Simple problem), Schrodingerequation-Time dependent and time independent equation Application: Free Particle and Particle in a box

Books:

1. Engineering Physics by D.R. Joshi, Mc Graw Hill
2. Principle of Physics Vol. I & Vol. II by Md. M. Khan & S. Panigrahi (Cambridge Univ. Press).
3. Lectures on Engineering Physics by L. Maharana, Prafulla ku. Panda, Sarat Ku. Dash, Babita Ojha (Pearson)
4. Engineering Physics by D.K. Bhattacharrya and Poom Tondon , Oxford University Press

Reference Books:

1. Optics - A. K. Ghatak
2. Introduction to Electrodynamics - David J. Griffiths, PHI Publication
3. Concepts of Modern Physics – Arthur Beiser.
4. Physics-I for engineering degree students - B.B. Swain and P.K.Jena.

CHEMISTRY 3-0-0

For 1st Semester Code (NRCH1A002) For 2nd Semester Code (NRCH2A002) Course Objectives:

(1) To understand the basics of quantum mechanical concepts and spectroscopy.

(2) To predict the bulk properties and processes using thermodynamic considerations. (3) To learn an introductory idea about new materials.

(4) To understand the fundamental concepts on fuels and corrosion chemistry.

Module I: [10Classes]

Quantum Chemistry and Spectroscopy: Basic concepts and postulates of quantum mechanics. Introduction to Schrodinger Wave Equation (without derivation), Particle in a box: Energy levels, quantum numbers and selection rule.

Spectroscopy: Lambert Beer's Law, Principles and applications of UV-Visible Molecular Absorption Spectroscopy; Chromophores, applications on quantitative analysis. Effect of conjugation on chromophores, Absorption by aromatic systems, introductory idea on rotational and vibrational SpectroscopyPrinciples and application to diatomic molecules.

Module II: [8 Classes]

The phase rule: Statement of Gibb's phase rule and explanation of the terms involved, Phase diagram of one component system – water and sulfur system, Condensed phase rule, Phase diagram of two component system – Eutectic Bi-Cd, Pb-Tin system &Isomorphous System.

Module III: [10 Classes]

Fuels: Classification of fuels, calorific value. (Determination by Dulong's formula), G.C.V. and N.C.V., Solid fuels, Analysis of coal. Liquid fuels: Classification of petroleum, Refining of petroleum, Cracking, Knocking and anti knocking, cetane and octane numbers. Unleaded petrol, synthetic petrol, power alcohol. Gaseous Fuel: Producer gas, Water gas, LPG, CNG, Kerosene gas, Combustion calculation.

Module IV: [08 Classes]

Corrosion: Electrochemical theory of corrosion, galvanic series, Types of corrosion; Differential metal corrosion, Differntial aeration corrosion (Pitting and water line corrosion), Stress corrosion (caustic embrittlement in boilers), Factors affecting, metal coatings – Galvanizing and Timing, Corrosion inhibitors, cathodic protection.

Module-V: [10 Classes]

New Materials: Introduction to nanomaterials, classification (0D, 1D, 2D) with examples, size dependent properties, Top-down and Bottom-up approaches of nanomaterial synthesis. Introductory idea on synthesis of nanomaterials via green synthetic route. Application of nanomaterials in environmental fields and electronic devices.

Text Books:

1. Engineering Chemistry (NPTEL web-book) by B. L. Tembe, Kamaludddin and M. S. Krishan.
2. Text Book in Applied Chemistry by A. N. Acharya and B. Samantaray, Pearson India.
3. Fundamentals of Molecular Spectroscopy by Banwell, Tata McGraw Hill Education.
4. Textbook of nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt. Ltd., 2012.
5. Advanced Engineering Chemistry by M. R. Senapati, University Science Press, India..
6. Engineering Chemistry, Jain and Jain, DhanpatRai Publication.

Reference Books:

1. Inorganic Chemistry by Donald A. Tarr, Gary Miessler, Pearson India, Third Edition.
2. Quantum Chemistry by Ira N. Levine, Pearson 7th Edition.
3. Molecular Spectroscopy, Ira N. Levine, John Wiley and Sons
4. Modern Spectroscopy – A Molecular Approach, by Donald McQuarrie and John Simon, published by University Science Books.
7. Inorganic Chemistry by W. Overton, Rounk and Armstrong, Oxford Univesity Press, 6th edition.
8. Introductory to Quantum Chemistry by A. K. Chandra. , 4th Edition, Mcgraw Hill Education.

Course Outcomes:

1. Understand the basics of quantum mechanical concepts and spectroscopy.
2. Rationalise bulk properties and processes using thermodynamic considerations.
3. Preliminary understanding on introductory idea about nano materials.
4. Analyse the quantitative aspects of fuel combustion and the mechanism of corrosion.

Basic Electrical Engineering 2-0-0

For 1st Semester Code (NRBE1B001) For 2nd Semester Code (NRBE2B001) Module 1:

DC & AC Circuits (6 hours)

Circuit laws: Fundamentals of electrical circuit, Ohm's law, Kirchoff's laws, series and parallel connections, analysis of circuits using Node voltage, mesh current, superposition, Thevenin and Norton Theorems to solve simple circuits with dc excitation. Single phase circuit: Single phase emf generation, Representation of sinusoidal waveforms, average, effective, peak and rms values, j operator, Rectangular and polar representation of phasors, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

Module 2:

Three Phase Circuits (5 hours)

Three phase circuit: Three phase emf generation, Delta-star and star-delta conversions, voltage and current relations in star and delta connections. solution of the three phase circuits with balanced voltage and balanced load conditions, phasor diagram, measurement of power in three phase circuits.

Module 3:

Magnetic Circuits (5 hours)

Magnetic Circuits: MMF, flux, reluctance, inductance. Review of Ampere Law, Biot Savart Law. Magnetic field, BH characteristics and Hysteresis loss, Series and parallel magnetic circuits.

Module 4:

Electrical Machines (6 hours)

Transformers (Single Phase): Construction, operation, Phasor diagram and performance testing. Induction Motors (Three Phase): Basic Principles, Rotating Magnetic Field, Equivalent circuit, Phasor diagram, Torque-Speed Characteristics Basics of DC machines: EMF Equation, Torque Equation, Methods of Excitation

Text / References:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford UniversityPress, 2011.
3. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
4.D.C.Kulshreshtha,"BasicElectricalEngineering",McGrawHill,2009.

Basic Electronics Engineering 2-0-0

For 1st Semester Code (NRBL1B002) For 2nd Semester Code (NRBL2B002) Module 01 : (6Hours)

Introduction to Semiconductors, Junction Diode: Principle of Diodes, V-I characteristics of junction diode, AC and DC Resistance of Diode, Diode Current Equation, Equivalent circuit of Diode, Breakdown Mechanism, Zener Diode, Rectifier circuit, Clipper and Clamper, Avalanche Diode Bipolar Junction Transistor: Transistor Operation, Current Equation in n-p- n &amplifier; p-n-p transistors, CB,CE,CC Configurations and their Characteristics, Load line Analysis, DC Biasing (Fixed bias and Voltage Divider), Introduction to Amplifiers.

Module 02 : (6 Hours)

Field Effect Transistor: JFET-types, Operations and their Characteristics, MOSFETs-types, Operations and their Characteristics
CMOS: Brief Introduction to CMOS, Principle of operation of Digital Inverters, VTC Characteristics,

Module 03: (5 Hours)

Operational Amplifiers: The Ideal Op Amp, Inverting and Non – Inverting configurations, Equivalent Circuit model, Op amp application in Integration,

Differentiation and Summing Circuits.

Module 04 : (5 Hours)

Digital Electronic Principles: Introduction, Binary digits, Logic levels and Digital waveforms, Introduction to basic Logic operation, Number system, Decimal numbers, Binary numbers, Decimal-to-Binary conversion, Simple binary arithmetic, Logic Gates, Boolean algebra and Combinational Logic Circuits: The inverter, The AND, OR, NAND NOR, Exclusive-OR and Exclusive-NOR gate, Boolean operations and expressions, Laws and Rules of Boolean algebra, De Morgan's theorem, Boolean analysis of logic circuits, Standard forms of Boolean expressions, Boolean expression and truth table. Basic combinational logic circuits, Implementation of combinational logic, the universal properties of NAND and NOR gates, Basic adders.

Text book:

1. Electronic Devices Circuit Theory - by Rober L. Boylestad 11th Edition, Pearson Publication, 2014

2. Microelectronic Circuits by A. S. Sedra and Kenneth C. Smith 7th Edition, Oxford University Press. 2017

3. Digital Design by M. Morris Mano, 5th Edition, Pearson Publication, 2016.

BASIC MECHANICAL ENGINEERING 2-0-0

For 1st Semester Code (NRBM1B001) For 2nd Semester Code (NRBM2B001)

MODULE-I (8 classes)

Thermodynamics:

Systems, Properties, Process, State, Cycle, Internal energy, Enthalpy, Zeroth Law, First law and Second Law of Thermodynamics, Basic Concept of Entropy, Properties of ideal gas., Properties of pure substances, Steam formation, Types of Steam, Enthalpy, Specific volume,
Internal energy and dryness fraction of steam, use of Steam tables. Related numericals.

MODULE-II (6 classes) Application of

Thermodynamics:

Air compressors, Steam Power Plant, Refrigerators and Heat pump, I.C. Engines (Brief Description of different components of above mentioned systems and working principles with Schematic diagram only)

MODULE-III (5 Classes)

Basic Power transmission devices:

Belt, Rope, Gear drives.Coupling, clutch, brakes. (Working principle only)

Introduction to Robotics:

Robot anatomy, joints and links and common robot configurations

MODULE-IV (5 Classes)

Mechanical Measurements:

Temperature, pressure, velocity, flow, strain, force, torque measurements. (Working principle only).

Text books

i. Basic Mechanical Engineering by Pravin Kumar, Pearson
ii. Basic Mechanical Engineering by A R Israni, P K Shah, BS Publications
iii. Text book of Elements of Mechanical Engineering, S T Murthy, Universities press iv. Basic and applied Thermodynamics by P. K. Nag, Tata McGraw Hill

Reference books

i. Basic Mechanical Engineering by .D. Mishra, P.K Parida, S.S.Sahoo, India Tech Publishing company
ii. Elements of Mechanical Engineering by J K Kittur and G D Gokak, Willey iii. Basic Mechanical Engineering by BasantAgrawal, C M Agrawal, Willey
iv. Engineering Thermodynamics by P. Chattopadhaya, Oxford University Press

BASIC CIVIL ENGINEERING 2-0-0

For 1st Semester Code (NRBC1B002) For 2nd Semester Code (NRBC2B002)

MODULE-I (6 classes)

Introduction and Scope of Civil Engineering. Broad disciplines of Civil Engineering; Importance of Civil Engineering, Early constructions and developments over time, Development of various materials of construction and methods of construction.

Building Material and Building Construction:

Bricks: Brick as a construction material and its importance, qualities of a good brick, Stone: classification, composition and characteristics, Cement: Classification, tests for cement, uses of cement, types of cement, Concrete: Quality of mixing water, Workability, Compaction of concrete, concrete mix design, Grade and strength of Concrete. Fundamentals of R.C.C. and Prestressed concrete. Types of steels used in civil engineering works.
Building Components and their basic requirements, Mortar, Stone masonry, brick masonry, roof, floors.

MODULE-II (6 classes)

Surveying: Linear measurement and chain survey: Use of chains and tapes for measurement of correct length of lines, direct and indirect ranging,Compass surveying: Use of prismatic compass, bearing of a line. Local attraction, Introduction to modern surveying instruments EDM and Total Station.

MODULE-III (6 classes)

Fundamental of soil and its classification, Foundations: Types of shallow and deep foundations with neat sketches. Fundamentals of Irrigation Engineering. Introduction of Hydraulics structure like canals, siphons, weirs, dams etc.

MODULE-IV (6 classes)

Transport, Traffic and Urban Engineering: Introduction to planning and design aspects of transportation engineering, different modes of transport, highway engineering, rail engineering, airport engineering, traffic engineering, urban engineering

TEXT BOOKS

i. Basic Civil Engineering, S. Gopi, Pearson
ii. Building Construction, Sushil Kumar, Standard Publishers Distributors iii. Surveying and Levelling by R. Subramanian, Oxford University Press

REFERENCE BOOKS

i. Engineering Materials, S.C. Rangwala, Charotar Publishing House
ii. Building Material and Construction, G C Sahu, Joygopal Jena, McGrow Hill iii. Surveying Vol-1 by R Agor, Khanna Publishers
iv. Basic Civil Engineering, M.S. Palanichamy, McGraw Hill

NRCE1E001 Communicative English 2-0-0

Course Objectives:

- To enhance the Listening, Speaking, Reading and Writing skills of the students.
- To make the students Industry-ready.

Module 1

Introduction to communication (6 hours)

1.1 The importance of communication through English at the present time; the process of communication and factors that influence communication : sender, receiver, channel, code, topic, message, context, feedback, 'noise', filters and barriers; the importance of audience and purpose

1.2 Verbal and non-verbal communication

1.3 Listening Skills: Importance and types of Listening

1.4 Identifying and rectifying common errors: Subject-verb agreement, Noun/ Pronoun/ Articles/ Prepositions Usage, Word choice

1.5 Vocabulary Building

Module 2

The sounds of English (6 hours)

2.1 The International Phonetic Alphabet (IPA); Vowels, diphthongs,consonants, consonant clusters; phonemic transcription;

2.2 Syllable division and word stress; sentence rhythm and weak forms, contrastive stress

2.3 Intonation: falling, rising and falling-rising tunes

2.4 Problem sounds in cultural contexts (Indian context)

Module 3

Workplace Communication (6 hours)

3.1 Communication challenges in culturally diverse workforce; Ethics in Communication

3.2 Bias-free communication

3.2 Effective Business Presentations: Importance in workplace communication; Planning, Preparing, Organizing, Rehearsing, and Delivering Oral presentations, Handling Questions; Power Point Presentation

Module 4

Writing at Work (6 hours)

4.1. Business letters

4.2. Writing notices, circulars, emails.

4.3 Writing reports and Proposals

4.4 Writing CVs (for Technical Positions and Internships)

Module 5

5. Soft Skills/Life Skills (8 hours)

5.1. Body Language

5.2. Connected Speech (Intonation in Everyday Speaking and Conversation)

5.2. Types of interviews, Planning and Preparing for a Job Interview; Stages of an Interview; Mastering the art of giving interviews.

5.3. Team Management and Leadership Skills; Group Discussion; Public Speaking (Reference: Martin Luther King: I have a Dream, Vivekananda: Chicago Address, Toni Morrison: Noble Prize Acceptance Speech)

Recommended Books:

1. Business Communication by Carol M Lehman, Debbie D Dufrene and Mala Sinha. Cengage Learning. 2nd Edition.

2. English Grammar in Use. Raymond Murphy. Cambridge UP. 4th Edition.

3. A Textbook of English Phonetics for Indian Students by T. Balasubramanian [MACMILLAN]

4. Soft Skills: Key to Success in Workplace and Life by Meenakshi Raman and Shalini Upadhyay. Cengage Learning. 2018 Edition.

Reference Books:

1. Technical Communication, Principle and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford University Press

2. Business Communication Today by Courtland L Bovee and Thill, Pearson.

3. Communication skill by Sanjay Kumar & Puspa Lata, Oxford University Press. 2nd Edition.

4. Body Language. Allan Pease. Free on Googlebooks.

5. Business and Managerial Communication, Sengupta, PHI

6. Business Communication for Managers, P. Mehra, Pearson

Physics Laboratory 0-0-3

For 1st Semester Code (NRPH1A201) For 2nd Semester Code (NRPH2A201)

Minimum hours: 30 Hours Credit: 02

A student is expected to perform ten experiments form the list given below.

1. Determination of Young's modulus by Searle's method.

2. Determination of Young's modulus by bending of beams.

3. Determination of Rigidity modulus by static method.

4. Determination of surface tension by capillary rise method.

5. Determination of acceleration due to gravity by Bar pendulum.

6. Verification of laws of vibration of string using sonometer.

7. Determination of wave length of light by Newton's ring apparatus.

8. Determination of wavelength of laser source by diffraction rating method.

9. Determination of grating element of a diffraction grating.

10. Plotting of characteristic curve of a PN junction diode.

11. Plotting of characteristic curves of BJT.

12. Study of Hall Effect.

13. Study of RC circuit.

14. Determination of unknown resistance using Meter Bridge.

15. Energy gap determination by Four-Probe method.

Books:

1. Engineering Practical Physics, by S.Panigrahi and B. Mallick, (CENGAGE learning)

CHEMISTRY LAB 0-0-3

For 1st Semester Code (NRCH1A202) For 2nd Semester Code (NRCH2A202)

B. Tech. (for all branches):

1. Preparation of Polymer/drug.
2. Determination of cell constant and conductance of solutions.
3. Determination of partition coefficients of iodine between benzene and water.
4. Determination of rate constant of acid catalysed hydrolysis reaction.
5. Determination of dissolved oxygen in a sample of water.
6. Determination of Viscosity of a lubricating oil by Red Wood Viscometer.
7. Determination of Flash point of a given oil by Pensky-Marten's flash point approach.
8. Colligative properties using freezing point depression.
9. Proximate analysis of coal.
10. Determination of percentage of available chlorine in a sample of bleaching powder.
11. Estimation of calcium in limestone.
12. Acid-Base Titration by Potentiometry.
13. Determination of total hardness of water by EDTA method.
14. Determination of amount of sodium hydroxide and sodium carbonate in a mixture.
15. Standardization of $KMnO_4$ using sodium oxalate. Determination of ferrous iron in Mohr's salt by potassium permanganate.
16. Preparation of colloidal/nano particle solutions.

Basic Electrical Engineering Lab 0-0-3

For 1st Semester Code (NRBE1B201) For 2nd Semester Code (NRBE2B201)

List of Experiment under Basic Electrical Engineering Lab:

1. Power and phase measurements in three phase system by two wattmeter method
2. Verification of super position, Thevenin and Norton's theorem
3. Plotting of B-H curve of magnetic material and calculation of hysteresis loss
4. Series RLC circuit (Power measurement, Phasor diagram)
5. OC and SC test of 1-phase transformer.
6. Study of House wiring**.**

Basic Electronics Engineering Lab 0-0-3

For 1st Semester Code (NRBL1B202) For 2nd Semester Code (NRBL2B202)

List of Experiment under Basic Electronics Engineering Lab.

1. Familiarization with electronic components (Active & Passive) & electronic equipments (Multi-meters, CROs and function generators)
2. Study of the V-I characteristics of P-N junction diode & Calculate DC & AC resistance.
3. Construction of half-wave rectifier and full wave rectifier circuits (with &without Filter) & study of their output waveforms by CRO and calculation of efficiency and ripple factor
4. a) Construction of positive, negative and biased clipper circuits & study of their output waveforms by CRO b) Construction of positive and negative clamper circuits & study of their output waveforms by CRO
5. Design of inverting and non-inverting amplifiers using Op-Amp for a given gain with the help of breadboard and distinct components.
6. Study and realization pf logic gates. (Truth table verification)

BASIC MECHANICAL ENGINEERING 0-0-3

For 1st Semester Code (NRBM1B201) For 2nd Semester Code (NRBM2B201)

(Minimum 5 experiments/studies)

1. Model study of Steam Power Plant
2. Model study of Two stroke and Four stroke I.C. Engine
3. Model study of Refrigerator & Air conditioners
4. Model study of Automobile Parts
5. Determination of velocity ratio of belt drive
6. Study of Gears and Gear trains
7. Verification of Bernoulli's Theorem and its application to Venturimeter.
8. Calibration of Bourdon Tube Pressure gauge and measurement of pressure using manometers

BASIC CIVIL ENGINEERING LAB 0-0-3

For 1st Semester Code (NRBC1B202) For 2nd Semester Code (NRBC2B202)

(Minimum 5 experiments/studies)

1. Shape and size test of brick
2. Compressive strength of brick
3. Testing of chain and measurement of correct length of the line
4. Bearing of a line
5. Study of Total Station
6. Setting time of cement
7. Tensile strength of reinforcing steel
8. Compressive strength of concrete

ENGINEERING GRAPHICS & DESIGN LAB 0-0-3

For 1st Semester Code (NREG1B201) For 2nd Semester Code (NREG2B201)

Introduction: Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning line Conventions

AUTO CAD: layout of the software, standard tool bar/menus and description of most commonly used toolbars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP &LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints.

2 – Sheets **Orthographic Projections:**

Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only),True and apparent lengths, True and apparent inclinations to reference planes.

2 – Sheets **Orthographic Projections of Plane Surfaces (First Angle Projection Only):**

Introduction, Definitions–projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only

1-Sheet

Projections of Solids (First Angle Projection Only):

Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions. 2-Sheets Sections and Development of Lateral Surfaces of Solids

Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP.

2 – Sheet **Isometric Projection (Using Isometric Scale Only):**

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres. 2-Sheets

Text Books:

i. Engineering Drawing - N.D. Bhatt & V.M. Panchal, Charotar Publishing House, Gujarat.
ii. Computer Aided Engineering Drawing - S. Trymbaka Murthy, 4th Ed, University Press
iii. Engineering Drawing by N.S. Parthasarathy and Vela Murali Oxford University Press

Reference Books

i. Engineering Graphics - K.R. Gopalakrishna, Subash Publishers Bangalore.
ii. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-Luzadder Warren J., Duff John M., Eastern Economy Edition, Prentice-Hall of India Pvt. Ltd., New Delhi.
iii. Computer Aided Engineering drawing, Prof. M. H. Annaiah, New Age International Publisher, New Delhi

WORKSHOP PRACTICE 0-0-3

For 1st Semester Code (NRWO1B202) For 2nd Semester Code (NRWO2B202)

Fitting Practice:

Use of hand tools in fitting, preparing a male and female joint of M.S. or making a paper weight of M.S.

Welding Practice (Basic Theory to be explained prior to practice):

Gas Welding & Electric Arc welding Practice.

A joint such as a Lap joint, a T-joint or a Butt joint is to be prepared or to make furniture.

Machining (Basic Theory to be explained prior to practice):

(i) Stepped cylindrical Turning of a job and Thread-cutting in lathe. (ii) Shaping
(iii) Milling

NRCE1E201 English Language Lab 0-0-3

Objective: To assist students master the listening, speaking, reading and writing skills through practice.

Module1:

Listening and Speaking(8 Hrs) Accent in speech (1 Hr)

Longer Discourse (dialogues, songs, contextual speech etc.) (1 Hr)

Role-play (2 Hrs)

Practicing sounds of English (1 Hr)
Extempore (1 Hr)
Presentations (2 Hr)

Module 2: Reading 4 Hrs
Reading comprehension practice: Technical text (2 Hrs), General text (2 Hrs)

Module 3 : Writing 4 Hrs Guided composition (2 Hrs) Free-writing (2 Hrs)

Recommended Books:
1. English for Technical Communication by N P Sudharshana & C Savitha Cambridge University Press, 1st edition, 2018.
2. Communication Skills A Workbook by Sanjay Kumar & Pushp Lata, Oxford Publication.
3. English Language Communication Skills : Lab Manual cum Workbook by Rajesh Kumar, Cengage Learning, Ist edition, 2014.

NRMA2A001 Mathematics-II 3-0-0

OBJECTIVE:

The objective of the course Mathematics-II is to familiarize the prospective engineers with techniques in Matrix algebra, Vector differential calculus, Vector integral calculus, Fourier series, Fourier transform, Fourier integral. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Module-1 (8 hrs.)

Matrix Algebra, Solution of system of linear equations (Gauss Elimination), Rank and Inverse of matrices (Gauss-Jordan), Examples of Vector Spaces.

Module-2 (8 hrs.)

Eigen values and eigen vectors, Symmetric and skew-symmetric matrices, Orthogonal matrices, Complex matrices, Hermitian and skew matrices, Unitary matrices and similarity of matrices, Diagonalisation of Matrices

Module-3 (9hrs.)

Vector differential calculus: vector and scalar functions and fields, Derivatives, Curves, tangents and arc Length, gradient, divergence, curl

Module-4 (10 hrs.)

Vector integral calculus: Line Integrals, Green Theorem, Surfaceintegrals, Gauss theorem and Stokes Theorem (Without Proof)

Module – 5 (10 hrs.)

Fourier series, Fourier expansion of functions of any period, Even and odd functions, Half range Expansion, Fourier transform and Fourier Integral.

OUTCOMES

On completion of this course, student are able to :

- Apply the knowledge of matrix algebra for solving system of linear equations and compute the inverse of matrices.
- To develop the essential tool of matrices to compute eigen values and eigen vectors required for matrix diagonalization process.
- Illustrate the concept of vector differential calculus to understand the solenoidal and irrotational vectors
- Illustrate the concept of vector integral calculus and exhibit the inter dependence of line, surface and volume integrals.
- Know the use of periodic functions and Fourier series, Fourier intergral, Fourier transform to analyze circuit and system communication.

Text Book:

1. Advanced Engineering Mathematics by E. Kreyszig, Tenth Edition, Willey

References:

2. Higher Engineering Mathematics by B.V. Raman, , McGraw Hills Education

3. Engineering Mathematics by P. S. Das & C. Vijayakumari, Pearson.

4. Advance Engineering Mathematics by P.V.O'NEIL, CENGAGE.

N.B: The course is of 3 credits with 4 contact hours.

NREM2B001 ENGINEERING MECHANICS 3-0-0

Module I (10 Hours)

Concurrent forces on a plane – Composition and resolution of forces and equilibrium of concurrent coplanar forces, Method of projections, Methods of moment, Friction, Parallel forces in a plane- Two parallel forces, General case of parallel forces.

Module II (8 Hours)

Center of parallel forces in a plane and center of gravity- centroids of composite plane figure and curves, Distributed parallel forces in a plane.

General case of forces in a plane- composition of forces in a plane and equilibrium of forces in a plane.

Moments of Inertia- Plane figure with respect to an axis in its plane and perpendicular to the plane- parallel axis theorem, Moment of Inertia of material bodies.

Plane trusses- method of joints and method of sections, Principle of virtual work –equilibrium of ideal systems.

Module III (8 Hours)

Rectilinear Translation- Kinematics- Principles of Dynamics- Concept of Inertial and Non-inertial frame of reference, D'Alemberts Principles.

Module IV (10 Hours)

Momentum and impulse, Work and Energy- impact

Curvilinear translation- Kinematics- equation of motion- projectile- D'Alemberts Principle in curvilinear motion, Moment of momentum, Work- Energy in curvilinear motion. Kinetics of Rotation of rigid body

Text Book:

1. Engineering Mechanics by S Timoshenko, D.H Young and J.V.Rao, McGraw Hill.

Reference Books:

i. Vector Mechanics for Engineers Statics /Dynamics by Beer, Johnston, McGraw Hill
ii. Fundamental of Engineering Mechanics by S. Rajesekharan & G. Sankara Subramanium, Vikash Publishing House Pvt. Ltd.
iii. Engineering Mechanics by Shames and Rao, Pearson Education.
iv. Engineering Mechanics, Statics and Dynamics by Boresi and Schmidt, Thomson. v. Engineering Mechanics by K.L. Kumar, Tata McGraw Hill.

Distribution of Credit Semester wise:

Semester	**Credit**
First	18
Second	23
Third	22
Fourth	21
Fifth	22
Sixth	22
Seventh	17
Eighth	15
---------- **Total**	
160	

Internal Evaluation Scheme

Classification	Marks
Attendance and Classroom interaction	05
Assignment	05
Surprise Test	05
Quiz	05
Class Test-I & Class Test-II	30
Total	50

Pass Mark in Internal is 50% of total marks i.e. 25

External Evaluation Scheme

University Semester Examination of 3 Hours duration.
Pass mark will be 35% which means students have to score 35 out of 100.

Practical/Sessional Evaluation Scheme

Pass mark will be 50% which means students have to score 50 out of 100.

Evaluation Scheme

Attendance & Daily Performance -20
Lab Record - 20
Lab Quiz - 10
Final Experiments & Viva – 50
---------- Total=100

- All Lab examinations are to be completed one week before the end semester examination and marks are to be displayed on the college notice board.
- Students are to be shown their copies and marks within 15 days of any Internal Examination. For each internal examination secured marks are to be displayed in the college notice board.
- Highest mark secured must be displayed with name.
- Every month the attendance must be displayed with name.
- At least three student feedbacks are to be collected. (After one month of teaching, after Class Test-II and after completion of course and before end semester examination.)
- Remedial classes if conducted must be shown as the part of the Time table and attendance record to be maintained.