B. N. Mandal University

Laloo Nagar, Madhepura (Bihar)-852113

Revised Courses of Study

B. Tech.

Mechanical Engg.

First Year to Final Year

- Scheme
- Details of Subjects
- Syllabus

B. N. Mandal University, Laloonagar, Madhepura

Details of theory & Sessional Papers code of 1st Year B. Tech. Course

Common to all Branches (CE/CSE/ECE/EE/ME/IT)

Subject	Subject Code	Branch Code	L	T	P	Th. Ext.	Th. Int.	Sessional
Technical English	TE	101	3	1	0	70	30	---------
Mathematics-I	MA-I	102	3	1	0	70	30	---------
Mathematics-II	MA-II	103	3	1	0	70	30	---------
Engineering Chemistry	CHE	104	2	1	3	70	30	Engineering Chemistry-50
Engineering Physics	PHY	105	2	1	3	70	30	Engineering Physics-50
Engineering Mechanics	EM	106	2	1	3	70	30	Engineering Mechanics-50
Basic Electrical Engineering	BEE	107	2	1	3	70	30	Basic Electrical Engineering-50
Engineering Drawing	ED	108	2	1	3	70	30	Engineering Drawing-50
Workshop Practice-I	WP-I	109	0	0	3	---	---	Workshop Practice-I - 100
Fundamentals of Information Technology	IT	110	0	0	3	---	---	Fundamentals of Information Technology-50

Expert-I (External)
Name:
Designation:
Address:

Expert-II (Internal)
Name: ARVIND ANAND
Designation: Asst. Prof
Address: Physics Deptt., MIT, Purnea

Dean
Faculty of Science & Engineering
BNMU, Madhepura

Principal
MIT, Purnea

Member Secretary
Syllabus Committee
BNMU, Madhepura

Subject: Technical English **Branch Code: 101** (ECE/CSE/EE/ME/CE/IT)

L-T-P: 3-1-0

First Term

1. **Structural Patterns,** single word substitution, Time and Tense, Verb, Preposition. **Lecture: 5**
2. **Common Errors,** Homonyms, Synonyms, Antonyms, Comprehension based on topics of Science & Technology. **Lecture: 5**
3. **Precis,** Paragraph writing, Technical description. **Lecture: 3**
4. **Applying for Job,** Resume. **Lecture: 3**
5. **Official correspondence,** Memorandum, Notice, Agenda, Minute, Circular letters, Demi-official letters. **Lecture: 4**
6. **Business Correspondence:** Types, sales letter, social correspondence, invitations, congratulation, the rules of business letter writing. **Lecture: 4**

Second Term

7. **Report writing.** **Lecture: 3**
8. **Value of ethics** and communication, computer ethics. **Lecture: 2**
9. **Phonetics,** Phonetic transcription and pronunciation, phones and morphemes. **Lecture: 6**
10. **Interviews,** introduction, fundamental principles of interviews, general principles of interviews, success in interview. **Lecture: 5**
11. **Group discussion.** **Lecture: 4**
12. **Seminar,** Relevant literary, Grammatical and current situation. **Lecture: 4**

Text books:

1. English Grammar and effective business communication by M A Pink and S Thomas, S Chand.
2. English Grammar by Dr D Thakur.
3. Comprehensive English Grammar by C J Joseph & E G Myall, Inter univ press.
4. Technical English by Sharon J Garson & Steve M Garson.
5. A course in Linguistics by Tarni Prasad, PHI.

Reference books:

1. Communication in English for technical student by Orient Lognman.
2. Business correspondence and report writing by R C Sharma and Krishna Mohan, TMH.

ject: Mathematics-I Branch Code: 102 (ECE/CSE/EE/ME/CE/IT)

P: 3-1-0

Term

1. **Algebra of matrices:** Elementary transformation, inverse by row transformation, canonical reduction, rank, solution of simultaneous equations, characteristic equation, eigen values & eigen vectors, Caley's Hamilton theorem, similarity transformation, reduction to diagonal matrices. **Lecture: 12**
2. **Differential Calculus:** Higher order derivatives (successive differentiation) and Leibnitz theorem, tangent and normal, review of maxima and minima, concavity and convexity of a curve point of inflexion, curvature and radius of curvature (Cartesian and polar), pedal equation, asymptotes (for Cartesian curve only), Taylor's series and Maclaurin's series, partial derivatives, Euler's theorem on homogeneous functions, Taylor's expansion of several variables, maxima and minima of several variables, Lagrange's method for undetermined multipliers, **Lecture: 20**

ond Term

3. **Differential equation:** First order equation, separable, homogeneous, exact, linear and Bernoulli's form, second and higher order equation with constant coefficients, Euler's equation: methods of their solution, dependent and independent of solution, Wronskian's system of first order equation. **Lecture: 15**
4. **Integral Calculus-I:** Convergence of improper integral- comparison test. Abel's test, beta and gamma functions (definition and related problems), error function, differentiation under integral sign- Leibnitz rule. **Lecture: 15**

ext books:

1. Advanced engineering mathematics by E Kreyszig, 8th edition, John Wiley.
2. Advanced engineering mathematics by Willey & Barratt, TMH.
3. Linear algebra by K Hoffman and R Kunze, PHI.

eference books:

1. Higher engineering mathematics by B S Grewal, Khanna pub.
2. Differential calculus by Das & Mukherjee, U N Dhar & sons.
3. Integral calculus by Das & Mukherjee.
4. U N Dhar & sons.

Subject: Mathematics-II **Branch Code: 103** (ECE/CSE/EE/ME/CE/IT)

LTP: 3-1-0

First Term

1. **Infinite series:** Notion of convergence and divergence of infinite series- Ratio test, comparision test, Rabbe's test, Root test, alternating series- Leibnitz test absolute and conditional convergence. Uniform convergence. **Lecture: 15**
2. **Fourier analysis:** Periodic function: functions of arbitrary period, even and odd functions, half range expansions, harmonic analysis, complex fourier series. Laplace transform: definition and properties, multiplication by t^n, division by t, evaluation of integrals by L.T, Inverse transforms. **Lecture: 20**

Second Term

3. **Integral Calculus-II:** Double & triple integrals, rectification, computation of surfaces and volumes, change of variables in double integrals, Jacobians of transformations, integrals dependent on parameters- applications. **Lecture: 15**
4. **Vector Calculus:** Scalar and vector point function, differentiation of vector, velocity and acceleration, direct derivatives, concept of gradient, divergence curl, line integral, Greens theorem in plane, Gauss's & Stoke's theorem and simple applications. **Lecture: 15**

Text books:

1. Higher engineering mathematics by Wiley & Barratt, TMH.
2. Advance engineering mathematics by E Kreyszig 8th edition, John Wiley

Reference books:

1. Advance engineering mathematics by Wiley & Barratt, TMH..
2. Vector analysis 2nd edition by Chatterjee, PHI.
3. Advance engineering mathematics by R K Jain & S R K Iyengar, Narosa.

Subject: Engineering Chemistry Branch Code: 104 (ECE/CSE/EE/ME/CE/IT)

L-T-P: 2-1-3

First Term

1. **Water treatment** : Introduction , Characteristics impurities in water , Hardness of water, Unit of hardness, Estimation of hardness of water , Disadvantage of hard water , scale and slidge formation in boiler , Caustic embrittlement , boiler corrosion , priming and foaming , Softening method(soda lime process) , Numerical problem. Lec :6
2. **Colligative Properties** : Osmosis : osmotic pressure , Determination of Osmotic pressure , isotonic soln , Hypertonic solution , Hypotonic solution , Lowering of Vapour pressure , Determination of moleculer weight , Elevation in B.P. , Depression in F.P. And their uses in the determination of molecular weight , Abnormal behavior. Lec :6
3. **Electro Potential And Cells :Single** electrode potential Definition, sign convention , construction of Galvanic cell – Classification – Primary , Secondary and Concentration cell , E.M.F. of a cell , definition of Galvanic cell notation and convention of Galvanic cell. Measurement of single electrode potential and standard efectrode potential by Nernst equation , Numerical problems. Lec : 6
4. **Thermodynamics** : Introduction of 1st , 2nd and 3rd law of thermodynamics, Isothermal and adiabatic process , Carnot's cycle , Definition and application of entropy and Gibb's Free Energy Lec :9

Second Term

5. **Fuels** : Definition , Classification.
   Analysis of coal : Proximate and Ultimate analysis of coal.
   Synthesis of Petrol :Bergius process and Fischer Tropsch process.
   Calorific Value : Definition, Gross and net calorific value , Determination of calorific value of solid/liquid fuel using Bomb Calorimeter.
   Combustion calculation : Analysis of flue gas by Orsat's apparatus.
   Numerical problems . Lec : 6
6. **High Polymers** : Definition , Classification , - Natural and synthetic polymers with example.
   Polymerization : Definition, Types of polymerization , addition and condensation with example. Mechanism of polymerization- free radical mechanism (ethylene as an example)
   Glass transition temperature , compounding of resins synthesis – property and application of Teflon , PMMPA and phenol Formaldehyde Resin. Lec :7
7. **Corrosion Science** : corrosion- definition , chemical corrosion and electro chemical theory of corrosion . Types of corrosion – Differential aeration corrosion , pitting corrosion , water line corrosion , stress corrosion . Factors affecting the rate of corrosion

Protection measures against corrosion by (i) Modification of environment (ii) Protective coatings. **Lec : 7**

Engineering Chemistry LAB

1. TO determine relative viscosity of liquid by OSTWALD VISCOMETER.
2. TO determine The ALKALINITY of WATER.
3. TO determine The EQUIVALENT WEIGHT and BASICITY of POLYBASIC ACID.
4. Determination of SODIUM CARBONATE and SODIUM HYDROXIDE in a mixture by INDICATOR METHOD.
5. Determination of relative surface tension of liquids by STALAGMOMETER.
6. Estimation of percentage of chlorine in Bleaching powder.
7. Determination of HARDNESS of WATER by Na_2 EDTA.
8. Analysis of FLUE GAS by ORSAT APPARATUS.
9. To determine electrode potential of Ag/Ag^+ or Cu/Cu^+ or Zn/Zn^{++}.
10. Test of Organic Functional groups.
11. Determination of Chemical Oxygen Demand (COD) of value of Sewage Volumetrically.

Text Book :

1. Chemistry in Engineering and technology ; VOL-I and II , by J.C .Kuriacose and J. Rajram; Pub: TMH
2. Engineering Chemistry ; by Jain and Jain : Pub: Dhanpat Rai Publication
3. A Text book of Engineering chemistry by Shashi Chawla; Pub: Dhanpat Rai & Co.
4. Engineering Chemistry by B.K. Sharma; Pub: Krishna Prakashan Media(P) Ltd.
5. Essential of Experimantal engineering chemistry by Shashi Chawla , Pub: Dhanpat Rai and co.
6. Lab manual of Engineering Chemistry by Dr. Sudha Rani and Dr.S.K.Basin Pub: Dhanpat Rai Publication.

ject: Engineering Physics Branch Code: 105 (ECE/CSE/EE/ME/CE/IT)

-P: 2-1-3

t Term

1. **Electrostatics and Electromagnetic theory:** Dielectrics- The three electric vectors(D,E,P), Gauss's law in dielectrics, energy stored in electrostatic field, boundary conditions and refraction of electric lines of force, displacement current, Maxwell's equations in differential and integral form and their physical significance, Maxwell's equations in free space and speed of plane electromagnetic waves travelling in vacuum. Poynting theorem and Poynting vectors, electromagnetic waves propagation in dielectrics and conductors. **Lecture: 10**
2. **Optics & LASER:** Michelson's interferometer for measurement of wave length of source and line width, Temporal coherence , spatial coherence, measurement of spatial coherence using young's interference , Fraunhofer diffraction by single slit, double slit and grating. Laser and laser light, Einstein A and B coefficient, population inversion, light amplification by optical resonator, Characteristics of Laser, Ruby laser, working principle of He-Ne laser **Lecture: 6**
3. **Polarisation:** Unpolarised light, production of plane polarized light by Polaroid technique, (principle of action should be emphasized) Brewster's law, Malu's law, Double refraction, production of plane, circular and elliptical polarized light, polarimeter, Magneto-optic effect, electro optic effect and photo elastic effect. **Lecture: 8**

econd Term

4. **Quantum physics:** Plank's theory of black body radiation, Compton effect, photo electric effect, Einstein photo electric equation and its experimental verification. Wave particle duality, de-Broglie relation ,wave and group velocity, Davision and Germer experiment, Heisenberg's uncertainty principle , application of uncertainty principle. Wave functions, physical interpretation of wave function and normalization condition, expectation values, Schrodinger's wave equation (time dependent and time independent) application of Schrodinger equation in one dimension, particle in a box, finite potential well, finite potential barrier and tunneling. **Lecture: 13**
5. **Special theory of relativity:** Michelson-Morley experiment, postulates of special theory of relativity, Gallican transformation, Lorentz transformation and its applications. (length contraction ,time dilation and relativistic addition of velocities) ,variation of mass with velocity. **Lecture: 7**
6. **Nano physics:** Introduction and basic definition of nano technology, properties of nano particles, elementary ideas of synthesis of nano particles, application of nano technology. **Lecture: 4**

Text books:

1. Concept of modern physics by Arthur Beiser, PHI.
2. Elements of electromagnetic by Mathew N O Sadiku, Oxford.
3. Introduction to electrodynamics by David J Griffiths, Pearson.
4. Optics by Ajoy Ghatak TMH.
5. Fundamentals of physics extended volume by Resnick, Halliday and Walker, Jonh Wiley pub.

ence books:

1. Modern Physics by G Aruldhas & P Rajagopal, PHI.
2. Quantum physics by H C Verma, Surya pub.
3. Laser and Non linear optics by B B Laud, New age pub.
4. Principles of electricity by Leigh Page and Normal Isley Adams, Eurasia pub.

gineering Physics Lab:

1. To determine acceleration due to gravity by a bar / Kater's pendulum.
2. To determine input and output characteristics of a PNP junction transistor in CE mode of operation.
3. To determine Plank's constant.
4. To determine capacitance and permittivity.
5. To determine the numerical aperture of an optical fiber.
6. To determine the wave length of laser source using grating.
7. To obtain the particle size by laser.
8. To obtain the forbidden energy gap of semiconductor diode.
9. To obtain loss of energy from transformer and ferrites.
10. To obtain dielectric constant.
11. To obtain Curie temperature.
12. To obtain focal length by convex mirror using u-v method.

ENGINEERING MECHANICS (CSE/EE/ME/CE/ECE/IT)

L-T-P 2-1-3

BRANCH CODE-106

FIRST TERM :STATICS

1. Force system : moments of a force about a point and an axis equivalent force and moment wrench. Lecture :8
2. **Equilibrium** : Free body diagram equations of equilibrium problems in two and three dimension plane frames and trusses . Lecture : 8
3. **Friction :** laws of coulomb friction ,impending motion problems involving large and small contact surfaces
   Square threaded screw principle of virtual work and stability. Lecture : 8

SECOND TERM : DYNAMICS

4. Kinematics and kinetics of particles dynamics in rectangular coordinates cylindrical coordinates and in terms of path variables . Lecture :8
5. **Properties of areas :** center of mass; moments of inertia: Kinematics of rigid bodies ; kinetics of rigid bodies, concept of fixed vector ;velocity and acceleration of particles in different frames of references . Lecture :8
6. Work & Energy and impulse and momentum methods for particles and rigid bodies :conservation (vector approach to mechanics will be followed for all the topics) Lecture :8

Text book :

1. Engineering mechanics by shames , Pearson's education
2. Mechanics for engineers. Beer , F. P and Johnston. Tata McGraw hill. New Delhi

Reference Books :

1. Engineering mechanics. Timoshenko. McGraw hill Inc.

Practical :

Minimum of 8 Journals (Including experiments and assignment) Based on theory.

BASIC ELECTRICAL ENGINEERING (CSE/EE/EE/ECE/ME/CE/IT)

L-T-P:2-1-3

Subject code -107

First term

1. **Introduction** :Electrical elements and their Classification , KCL,KVL equation and node voltage method ,DC circlets steady state analysis with independent and dependent sources , series and parallel circuits star delta conversion ,superposition theorem, Thevenin's theorem ,Norton ,dc circuits steady states analysis with independent and dependent sources series and parallel circuits ,star delta conversion ,superposition theorem , theorem , Thevenin's theorem Norton's theorem ,maximum power transfer theorem . **lecture:12**
2. **A.C circuits** : common signals and their waveform ,R.M.S AND average value ,from factor and peak factor of sinusoidal wave impedance of series and parallel circuits, Phasor diagram , power, power factor power transfer theorem for A.C circuits. **lecture:12**

SECOND TERM

3. **A .C circuits :** Line and phase rotation in star –delta connection, phase sequence, analysis of balance and unbalanced 3—phase circuits **lecture:08**
4. **Magnetic circuits:** Introduction , series & parallel magnetic circuits. Analysis of linear and non linear magnetic circuits. Energy storage A.C excitation. Eddy current and hysteresis losses. **lecture:08**
5. **Transformer:** Construction, principle of operation e.m.f equation, voltage regulation, auto – transformer, three phase transformer **lecture:08**

Text book:

1 Basic electrical engineering by Fitzerald, et al, Tata McGraw hill.

Reference books: Tata Fitzerald

1 Fundamental of Electrical Engg. By Leonard S. Bobrow, Ooxford.

2 Fundamentals of Electrical Engg. By R. Prasad, PHI Publication.

Practical :

Minimum of 5 to 8 Journals (Including experiments and assignment) Based on theory.

ENGINRRING DRAWING (CSE/EE/ME/CE/ECE/IT)

L-T-P:2-1-3

BRANCH CODE -108

FIRST TERM:

1 Introduction, drawing instruments, sheet layout, lines, lettering, dimensioning, engineering curves (ellipse, parabola, hyperbola, spiral), scale.
2 Orthographic projection; projection of points, projection of straight line.
3 Projection of planes.
4 Projection of solids (prism, pyramid, cone, cylinder)axis inclined to one reference plane.
5 Section of solid (Prism, pyramid. Cone, cylinder) axis inclined to one reference plane.

SECOND TERM

6 Development of surface.
7 Intersection of surfaces .axes of both solids at right angles.
8 Isometric projection.
9 Conversion of pictorial view into orthographic view; simple cases.
10 Introduction to computer aided drawing.

Practical

Minimum 8 sheets on the topic mentioned above.
Understanding the auto CAD windows and the drafting tools, drawing 2D objects.

Text Book :

1 Engineering drawing by ND Bhatt.
2 Engineering drawing by KL Narayna & Kannaiah.

WORK SHOP PRACTICE - I

RANCH CODE -109 L-T-P: 0-0-3

1. **Black smithy shop:** Introduction,. Study &use of smithy forging tools, anvil , swage block, chisels, punches, hammers, sledge hammer, study of air blower M/C &sheering M/C
   Job making-(I)Ring (ii)screw driver(iii)U-Type hook
2. **Carpentry shop:** Introduction study &use of various tools like cutting tools, planning tools, striking tools, drilling and boring tools, holding tools etc. study of wood turning lather machine, Job making - (I) Half lap joint (II) Dovetail joint (III) File handle.(iv) Mortise joint
3. **Fitting shop:** Introduction, study &use of different tools, cutting tools, marking tools, drill, bit, die & tap & types of files.
   Job making – (I) Matching gauge (II) Chipping & filing .(III)Solid Hexagon
4. **Foundry shop**: introduction, study &use of cupola furnace, various tools, pattern making moulding boxes job making. (I) stuffing gland box (II) Vee block (iii)Gear patterns(iv) T-Pattern

Text book/ Reference Book:

1. Workshop technology by Hazra Chaudhary.
2. Workshop technology by Raghubansi.
3. Manual on work shop practice by kannaiah .
4. Workshop manual by kannaiah.

PRACTICAL

Minimum 2 jobs in each slop as mentioned aboye

FUNDAMENTAL OF INFORMATION TECHNOLOGY

BRANCH CODE-110 L-T-P:0-0-3

FIRST TERM

1.COMPUTER BASICS Evolution of computers,generation of computersand classification of computers,application of computers and etc.

2.INFORMATION TECHNOLOGY AND STORAGE

Information technology, role of information technology, role of information technology,information technology and internet and etc

3. COMPUTER MEMORY AND STORAGE

Memory, hierarchy, RAM,ROM,types of secondary storage and devices andetc

4. THE INTERNET AND ITS TOOLS:

Introduction,evolution of internet,basic internet terms,getting connected to internet, internet applications data over internet, web browser, browing internet,using internet explorer, e-mail, searcg engines, instant messaging

5. EMERGING TRENDS IN IT

E- commerce electronic data interchange, smarts cards, mobile communication and etc

SECOND TERM

6. COMPUTER PROGRAMMING AND LANGUAGES

Algoritbms,flow charts,pseudo code,program control, structure programming languages, generation of programming languages and etc

7. C LANGUAGES:

Basics, constants, variables and data types, operators and expressions, input & output operations

8. CONTROL STRUCTURES:

Decision making & branching, decision making & looping

9. ARRAYS

One dimensional and two dimensional arrays

10.FUNCTION

User defined functions, concepts of recursion

TEXT BOOKS:

1. INTRODUCTORY OF INFORMATION TECHNOLOGY BY ITL EDUCATION SOLUTION LTD.
2. PROGRAMMING IN ANSI-C

IT LAB

PRACTICAL BASED ON SYLLABUS