



**Proposed Syllabus to be implemented from the Academic Year 2010**  
**(uploaded as pre-information for the Workshop)**

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First Year First Semester

<b>A. THEORY</b>							
Sl. No.	Field	Theory	Contact Hours/Week				Credit Points
			L	T	P	Total	
1	HU	English	2	0	0	2	2
2	Basic Science	Chemistry -1 (Gr-A) / Physics – 1 (Gr-B)	3	1	0	4	4
3		Mathematics-1	3	1	0	4	4
4	Engg. Science	Basic Electrical & Electronic Engineering – 1 (GrA+GrB)	3	1	0	4	4
5		Engg. Mechanics	3	1	0	4	4
<b>Total of Theory</b>						<b>18</b>	<b>18</b>
<b>B. PRACTICAL</b>							
6	HU	Language Laboratory	0	0	2	2	1
7		NSS	0	0	2	2	1
8	Basic Science	Chemistry -1 (Gr-A)/ Physics – 1 (Gr-B)	0	0	3	3	2
9	Engg. Science	Basic Electrical & Electronic Engineering -1	0	0	3	3	2
10		Engg Drawing & Computer Graphics (Gr-1) / Workshop Practice (Gr-2)	1	0	3	4	3
<b>Total of Practical</b>						<b>14</b>	<b>9</b>
<b>Total of Semester</b>						<b>33</b>	<b>27</b>



First Year Second Semester

<b>A. THEORY</b>							
Sl. No.	Field	Theory	Contact Hours/Week				Credit Points
			L	T	P	Total	
1	<b>Basic Science</b>	Basic Computation & Principles of Computer Programming	3	1	0	4	4
2		Physics - 1(Gr-A) / Chemistry-1(Gr-B)	3	1	0	4	4
3		Mathematics-2	3	1	0	4	4
4	<b>Engg. Science</b>	Basic Electrical & Electronic Engineering-II	3	1	0	4	4
5		Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
6		Basic Environmental Engineering & Elementary Biology(2+1) ( <i>Shifted to 2<sup>nd</sup> Year</i> )	3	0	0	3	3
<b>Total of Theory</b>						<b>24</b>	<b>20</b>
<b>B. PRACTICAL</b>							
7	<b>Basic Science</b>	Basic Computation & Principles of Computer Programming	0	0	3	3	2
8		Physics – 1 (Gr-A) / Chemistry-1 (Gr-B)	0	0	3	3	2
9	<b>Engg. Science</b>	Basic Electrical & Electronic Engineering- II	0	0	3	3	2
10		Workshop Practice (Gr-1) / Basic Engg Drawing & Computer Graphics (Gr-2)	1	0	3	4	3
<b>Total of Practical</b>						<b>13</b>	<b>9</b>
<b>Total of Semester</b>						<b>37</b>	<b>29</b>



**Syllabus**  
**First Semester**

**Theory**

**HU**

**English**

**Code Credits: Theory2+Practical1**

**PAPER CODE: HU 101**

**CONTACT:2L+2P**

**CREDI : 3**

**PAPER NAME: ENGLISH LANGUAGE & TECHNICAL COMMUNICATION**

**Guidelines for Course Execution:**

Objectives of the Course: This Course has been designed

1. To impart advanced skills of Technical Communication in English through Language Lab. Practice Sessions to 1<sup>st</sup> Semester UG students of Engineering & Technology.
2. To enable them communicate confidently and competently in English Language in all spheres.

Desired Entry Behaviour:

The students must have basic command of English to

1. Use at least 2500 General Purpose Words of English to talk about day-to-day events and experiences of life.
2. Comprehend Lectures delivered in English.
3. Read and understand relevant materials written in English.
4. Write grammatically correct English.

Strategies for Course Execution:

1. It is a Course that aims to develop Technical Communication Skills. It is, therefore, *Lab-* based and practical in orientation. Students should be involved in Practice Sessions.
2. The content topics should be conveyed through practical examples. Lecture classes should be conducted as Lecture cum Tutorial classes.
3. Keeping in view the requirements of students, the teachers may have to prepare some learning aids task materials.
4. Some time should be spent in teaching Phonetic symbols, stress, intonation etc.
5. In teaching 'Speaking skill,' emphasis should be on *clarity, intelligibility, fluency, as well as accepted pronunciation.*
  
6. Micro Presentation and Group Discussion Sessions should be used for developing Communicative Competence
7. The Language Lab, device should be used for giving audio-visual inputs to elicit students' responses by way of Micro-Presentation, Pair Conversation, Group Talk and Class Discussion.
8. The teacher must function as *a creative monitor in the Language Lab for the following:*
  1. Developing Listening Comprehension Skill;
    - a) Developing Listening Comprehension through Language Lab Device
    - b) Developing sub skills of the Listening Skill by Conversational Practice Sessions
    - c) Giving focus on intelligent and advanced Listening Sessions e.g. Seminars, Paper Presentation, Mock Interviews etc.
    - d) Conducting Conversational Practice: Face to Face & Via Media

2. Developing Speaking Competence:



- a) Helping students in achieving *clarity and fluency* ; manipulating paralinguistic features of speaking (*voice modulation ,pitch , tone stress , effective pauses* )
- b) Conducting *Task oriented interpersonal ,informal and semiformal Speaking / Classroom Presentation*
- c) *Teaching strategies for Group Discussion*  
*Teaching Cohesion and Coherence*  
*Teaching effective communication & strategies for handling criticism and adverse remarks*  
*Teaching strategies of Turn- taking, effective intervention, kinesics(use of body language) and courtesies*

3. Developing Reading Comprehension Skill:

- a) Developing Reading Skill through Technical & Non Technical Texts as well as Case Studies
- b) Guiding students for Intensive & Extensive Reading

4, Developing Writing Competence:

- a) Teaching Technical Report , Business Letters, (Expressing Ideas within restricted word limit through paragraph division , Listing Reference Materials through use of Charts , Graphs ,Tables , Using correct punctuation & Spelling, semantics of Connectives, Modifiers and Modals, variety of sentences and paragraphs
- b) Teaching Organizational Communication: Memo, Notice, Circular, Agenda / Minutes etc.

SYLLABUS DETAILS

GRAMMAR: 3 L+4P

Correction of Errors in Sentences; Building Vocabulary; Word formation; Single Word for a group of Words; Fill in the blanks using correct Words; Sentence Structures and Transformation; Active & Passive Voice; Direct & Indirect Narration

READING COMPREHENSION 3 L+ 4 P

Global / Contextual / Inferential Comprehension from Technical & Non Technical Texts

TECHNICAL COMMUNICATION

Theory of Communication 8L  
 -- Barriers --Models etc.  
 --Features of Effective Communication (Verbal / Non verbal)  
 -----Presentation / Public Speaking Skills

Technical Report (formal drafting)	2L+ 4P
Business Letter (formal drafting)	2L+ 2P
Job Application (formal drafting)	2L+2P
Organizational Communication	3L+5P
Group Discussion –Principle & Practice	3L+5P

MARKS SCHEME (Written Examination) Total Marks 70

- 1. 10 Multiple Choice Questions (Com. / Grammar) Marks 10
- 2. 3 Short Type Questions (Grammar) Marks 15
- 3. 3 Essay type Questions on Technical Communication Marks 45  
 (Technical Report / Business Letter / Job Application / Organizational Communication)

MARKS SCHEME (Internal Examination) Total Marks 30

- 1. Testing Reading Ability Marks 5



2. Testing Speaking Ability	Marks 5
3. Testing Listening Ability	Marks 5
4. Testing Communicative Competence	Marks 5
5. 2 Unit Tests 5+5=	Marks 10

**BOOKS -- RECOMMENDED:**

Dr. S. k. Dey : Technical Communication in English  
Pearson Education 2010  
Dr. D. Sudharani : Manual for English Language Laboratory  
Pearson Education (W.B. edition) 2010

**References:**

D. Thakur : Syntax Bharati Bhawan 1998  
Dr. K. Alex : Soft Skills S. Chand & Company 2009(Reprint 2010) Longman Dictionary of Contemporary English  
(New Edition) for Advanced Learners

**Basic Science**

**Chemistry-1(Gr-A/Gr-B)**

**Code:**

**Contacts: 3L + 1T = 4**

**Credits: 3.5/4**

**Chemical Thermodynamics**

Concept of Thermodynamic system: diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.

Introduction to first law of thermodynamics: different statements, mathematical form.

Internal energy: physical significance, mathematical expression (ideal and real gas), Enthalpy: physical significance, mathematical expression (ideal and real gas) 3L

$C_p$  and  $C_v$ : definition and relation; adiabatic changes; reversible and irreversible processes; Application of first law of thermodynamics to chemical processes: exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation, Kirchoff's law. 3L

2<sup>nd</sup> law of thermodynamics; Joule Thomson and throttling processes; inversion temperature .

Evaluation of entropy: characteristics and expression, entropy change in irreversible process, entropy change for irreversible isothermal expansion of an ideal gas, entropy change of a mixture of gases. 2L

Work function and free energy: physical significance, mathematical expression for ideal and real gases obeying Vander waals' equation, Gibbs Helmholtz equation.

Condition of spontaneity and equilibrium reaction. 2L



## **Electrochemistry**

### ***Conductance***

Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration.

Kohlrausch's law of independent migration of ions, transport numbers and hydration of ions.

Conductometric titrations: SA vs SB & SA vs WB; precipitation titration KCl vs AgNO<sub>3</sub>. 2L

### **Electrochemical cell**

Cell EMF and its Thermodynamic significance, single electrode potentials and its applications; hydrogen half cell, quinhydrone half cell and calomel half cell.

Storage cell, fuel cell. Application of EMF measurement. 3L

### **Reaction Dynamics**

Reaction laws: rate and order; molecularity; zero, first and second order kinetics. Arrhenius equation.

Mechanism and theories of reaction rates (Transition state theory, Collision theory).

Catalysis: Homogeneous catalysis and heterogeneous catalysis. 3L

### **Instrumental Methods of Analysis**

Introduction to instrumental methods such as IR, UV, VIS, NMR and Mass spectrometry. 4L

### **Structure and reactivity of Organic molecule**

Electronegativity, electron affinity, hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals.

Brief study of some addition, eliminations and substitution reactions. 3L

### **Polymerization**

Concepts, classifications and industrial applications.

Polymerization processes (addition and condensation polymerization), degree of polymerization, Copolymerization, stereo-regularity of polymer, crystallinity and amorphicity of polymer.

Preparation, structure and use of some common polymers: plastic(PE, PP, PVC, bakelite), rubber (natural rubber, SBR, NBR), fibre(nylon 6.6, polyester).

Conducting and semi-conducting polymers. 5L

### **Solid state Chemistry**

Introduction to stoichiometric defects (Schottky & Frenkel) and non – stoichiometric defects (Metal excess and metal deficiency).

Role of silicon and germanium in the field of semiconductor.

Transistor, rectifier and photovoltaic cells;



The process for preparing microminiaturized semiconductor devices: integrated circuits (IC) 5L

### **Industrial Chemistry**

Solid, liquid and gases fuels; constituents of coal, carbonization of coal. Coal analysis: Proximate and ultimate analysis.

Classification of coal, petroleum (LPG, CNG), gasoline, octane number, aviation fuel, diesel, cetane number.

Natural gas, water gas, Coal gas, bio gas.

Bio-diesel. 5L

**Or**

**Physics-1(Gr-B/Gr-A)**

**Code:**

**Contacts: 3L + 1T = 4**

**Credits: 3.5/4**

**To be introduced.**

**Mathematics**

**Code: M101**

**Contacts: 3L + 1T = 4**

**Credits: 3.5/4**

**(All Streams except Optometry, Food Technology, and Pharmacy)**

**Note 1: The whole syllabus has been divided into three modules.**

**Note 2: Structure of the question paper**

**There will be three groups in the question paper. In Group A, there will be one set of multiple choice type questions spreading the entire syllabus from which 10 questions (each carrying one mark) are to be answered. From Group B, three questions (each carrying 5 marks) are to be answered out of a set of questions covering all the three modules. Three questions (each carrying 15 marks) are to be answered from Group C. Each question of Group C will have three parts covering not more than two topics (marked in bold italics face). Sufficient questions should to be set covering the whole syllabus for alternatives.**

### **Module I**

**Matrix-I:** Introduction to matrices and their basic properties. Transpose of a matrix, verification of the properties of transposes:  $\left[ (A^T)^T = A, (cA + dB)^T = cA^T + dB^T, (AB)^T = B^T A^T \right]$ , Symmetric and Skew symmetric matrices and their properties. 3L

**Matrix-II:** Determinant of a square matrix, Minors and Cofactors, Laplace's method of expansion of a determinant, Product of determinants, Adjoint of a determinant, Jacobi's theorem on adjoint determinant.



Singular and non-singular matrices, Adjoint of a matrix, Inverse of a non-singular matrix and its properties, orthogonal matrix and its properties, Trace of a matrix. **5L**

**Matrix-III:** Rank of a matrix and its determination using elementary row and column operations, Solution of simultaneous linear equations by matrix inversion method, Consistency and inconsistency of a system of homogeneous and inhomogeneous linear simultaneous equations, Eigen values and eigen vectors of a square matrix (of order 2 or 3), Eigen values of  $A^n, A^T, kA, A^{-1}$ , Caley-Hamilton theorem and its applications, Diagonalisation of a square matrix with real and distinct eigen values ( up to 3<sup>rd</sup> order). **6L**

## Module II

**Successive differentiation:** Higher order derivatives of a function of single variable, Leibnitz's theorem (statement only and its application, problems of the type of recurrence relations in derivatives of different orders and also to find  $(y_n)_0$ ). **2L**

**Mean Value Theorems & Expansion of Functions:** Rolle's theorem(statement only) and its application, Mean Value theorems – Lagrange & Cauchy (statement only) and their application, Taylor's theorem with Lagrange's and Cauchy's form of remainders (statement only) and its application, Expansions of functions by Taylor's and Maclaurin's theorem, Maclaurin's infinite series expansion of the functions:  $\sin x, \cos x, e^x, \log(1+x), (a+x)^n, n$  being a positive integer or a fraction (assuming that the remainder  $R_n \rightarrow 0$  as  $n \rightarrow \infty$  in each case). **5L**

**Reduction formula:** Reduction formulae both for indefinite and definite integrals of types  $\int \sin^n x, \int \cos^n x, \int \sin^m x \cos^n x, \int \cos^m x \sin nx, \int \frac{dx}{(x^2 + a^2)^n}, m, n$  are positive integers. **2L**

**Calculus of Functions of Several Variables:** Introduction to functions of several variables with examples; Knowledge of limit and continuity, Partial derivatives and related problems; Homogeneous functions and Euler's theorem and related problems up to three variables, Chain rules, Differentiation of implicit functions, Total differentials and their related problems; Jacobians up to three variables and related problems; Maxima, minima and saddle points of functions of two variables and related problems, Lagrange's multiplier method – problems up to three variables only. **7L**





### Module III

**Infinite Series:** Preliminary ideas of sequence, Infinite series and their convergence/divergence, Infinite series of positive terms, Tests for convergence: Comparison test, Cauchy's Root test, D' Alembert's Ratio test and Raabe's test (statements and related problems on these tests), Alternating series, Leibnitz's Test (statement, definition) illustrated by simple example, Absolute convergence and Conditional convergence. **5L**

**Three dimensional co-ordinate geometry:** Direction cosines, Direction ratios, Equations of plane, straight line; Elementary ideas of the equations of the surfaces like sphere, cylinder and cone. Concept of cylindrical polar and spherical polar coordinates. **5L**

**Vector Analysis:** Scalar and vector fields – definition and terminologies; dot and cross products, scalar and vector triple products and related problems; Vector function of a scalar variable, Differentiation of a vector function, Scalar and vector point functions, Gradient of a scalar point function, divergence and curl of a vector point function, Directional derivative. Related problems on these topics. Green's theorem, Gauss Divergence Theorem and Stoke's theorem (Statements and applications). **8L**

**Total 48 Lectures**

#### Suggested Reference Books

1. **Advanced Engineering Mathematics**, Erwin Kreyszig, (Wiley Estern)
2. **Engineering Mathematics**, Babu Ram, (Pearson Education)
3. **Advanced Engineering Mathematics**, H. K. Dass (S.Chand & Co.)
4. **Engineering Mathematics**, B.S. Grewal (S. Chand & Co.)
5. **A Text book on Engineering Mathematics**, Vol. I, Pulak Kundu (Chhaya Prakashani)
6. **Engineering Mathematics**, Vol. I, Pal & Das (U.N. Dhar)
7. **Higher Engineering Mathematics**, John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)
8. **Mathematics Handbook**: for Science and Engineering, L. Rade and B. Westergren (5<sup>th</sup> edition, 1<sup>st</sup> Indian Edition 2009, Springer)
9. **Calculus**: M. J. Strauss, G. L. Bradley and K. L. Smith (3<sup>rd</sup> Edition, 1<sup>st</sup> Indian Edition 2007, Pearson Education)
10. **A text Book of Engineering Mathematics-I**: S. K. Adhikari (Dhanpat Rai and Co. (P) LTD)
11. **Engineering Mathematics**: S. S. Sastry ( PHI, 4<sup>th</sup> Edition, 2008)



**Subject Name: MATHEMATICS**

**Code: M 101A**

**Contacts: 3L +1T = 4**

**Credits: 3**

**(For Optometry, Pharmacy and Food Technology)**

**Note 1: The whole syllabus has been divided into three modules.**

**Note 2: Structure of the question paper**

**There will be three groups in the question paper. In Group A, there will be one set of multiple choice type questions spreading the entire syllabus from which 10 questions (each carrying one mark) are to be answered. From Group B, three questions (each carrying 5 marks) are to be answered out of a set of questions covering all the three modules. Three questions (each carrying 15 marks) are to be answered from Group C. Each question of Group C will have three parts covering not more than two topics (marked in bold italics faces). Sufficient questions should to be set covering the whole syllabus for alternatives.**

### **Module I**

**Matrix-I:** Introduction to matrices and their basic properties. Transpose of a matrix, verification of the properties of transposes:  $\left[ \left( A^T \right)^T = A, \left( cA + dB \right)^T = cA^T + dB^T, \left( AB \right)^T = B^T A^T \right]$ , Symmetric and Skew symmetric matrices and their properties. **4L**

**Matrix-II:** Determinant of a square matrix, Minors and Cofactors, Product of determinants. Singular and non-singular matrices, Adjoint of a matrix, Inverse of a non-singular matrix and its properties. **8L**

**Matrix-III:** Solution of simultaneous linear equations using Cramer's rule and Matrix inversion method. **4L**

### **Module II**

**Successive differentiation:** Higher order derivatives of a function of single variable, Leibnitz's theorem (statement only and its application, problems of the type of recurrence relations in derivatives of different orders). **4L**

**Mean Value Theorems & Expansion of Functions:** Rolle's theorem(statement only) and its application, Mean Value theorems – Lagrange & Cauchy (statement only) and their application, Taylor's theorem with Lagrange's form of remainder (statement only) and its application. Expansion of functions by Taylor's and Maclaurin's theorem (for the functions  $\exp(x)$ ,  $\sin x$ ,  $\cos x$ ,  $\log(1+x)$ ,  $(1+x)^n$  only). **5L**



**Integration:** Standard integrals, Integration by rational fraction and integration of the following

types:  $\int \frac{dx}{a + b \cos x}$ ,  $\int \frac{dx}{a \cos^2 x + b \sin x \cos x + c \sin^2 x}$ ,  $\int \frac{a \cos x + b \sin x + c}{a' \cos x + b' \sin x + c'} dx$ ,  $\int \frac{dx}{P\sqrt{Q}}$

where  $P$  is linear and  $Q$  is either linear or quadratic. Definite integral and its properties, Definite integral as a limit of a sum. 7L

### Module III

**Differential equation:** Formation of differential equations, Degree and order of differential equations. 2L

**Ordinary Differential Equation (ODE) - First order and first degree:** Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. 5L

**ODE-Higher order and first degree:** General linear ODE of order two with constant coefficients  $\left( f(D)y = F(x), D \equiv \frac{d}{dx} \right)$ , C.F. & P.I., D-operator methods for finding P.I. where

$$F(x) = e^{ax}, \sin ax, \cos ax, x^m, x^m e^{ax}, e^{ax} \sin ax, e^{ax} \cos ax.$$

9L

**Total 48 Lectures**

**Suggested Reference Books:**

1. **Advanced Engineering Mathematics**, Erwin Kreyszig, (Wiley Eastern)
2. **Engineering Mathematics**, Babu Ram, (Pearson Education)
3. **Advanced Engineering Mathematics**, H. K. Dass (S.Chand & Co.)
4. **Engineering Mathematics**, B.S. Grewal (S. Chand & Co.)
5. **Higher Engineering Mathematics**, John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)
6. **Mathematics Handbook:** for Science and Engineering, L. Rade and B. Westergren (5<sup>th</sup> edition, 1<sup>st</sup> Indian Edition 2009, Springer)
7. **Calculus:** M. J. Strauss, G. L. Bradley and K. L. Smith (3<sup>rd</sup> Edition, 1<sup>st</sup> Indian Edition 2007, Pearson Education)
8. **Integral Calculus:** B. C. Das and B. N. Mukherjee, ( U. N. Dhar & Sons Pvt. Ltd.)



## Engineering Science

### **Basic Electrical and Electronics Engineering-I**

**Code: Contacts: 3L + 1T = 4**

**Credits: 3.5/4**

#### Basic Electrical Engineering-I

**DC Network Theorem:** Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, Kirchhoff's law, Principle of superposition. Source equivalence and conversion, Thevenin's theorem, Norton Theorem, nodal analysis, mesh analysis, star-delta conversion. Maximum power transfer theorem with proof. 7L

**Electromagnetism:** Biot-savart law, Ampere's circuital law, field calculation using Biot-savart & ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faraday's law, Self and mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses, Lifting power of Electromagnet. 5L

**AC fundamental:** Production of alternating voltage, waveforms, average and RMS values, peak factor, form factor, phase and phase difference, phasor representation of alternating quantities, phasor diagram, behavior of AC series, parallel and series parallel circuits, Power factor, Power in AC circuit, Effect of frequency variation in RLC series and parallel circuits, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit. 9L

#### Basic Electronics Engineering-I

##### **Introduction:**

Crystalline material: mechanical properties, energy band theory, Fermi levels;

Conductors, Semiconductors and Insulators: electrical properties, band diagrams. Semiconductors: intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers, mass action law and continuity equation. 5L

Formation of P-N junction, energy band diagram, built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics, junction capacitance and varactor diode. 3L

Simple diode circuits, load line, linear piecewise model; rectifiers: half wave, full wave, its PIV, DC voltage and current, ripple factor, efficiency. 2L

##### **Introduction to Transistors:**

Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, early effect. 4L

Biasing and Bias stability: calculation of stability factor; CE, CB, CC and their properties; small signal low frequency operation of transistors; equivalent circuits h parameters as a two port network.

Transistors as amplifier: expression of voltage gain, current gain, input impedance and output impedance, frequency response for CE amplifier with and without source impedance. 8L

##### **Introduction to Field Effect Transistor:**

Structure and characteristics of MOSFET, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles. 5L

**22L**



### **Recommended Books:**

Text:

1. Sedra & Smith: Microelectronics Engineering.
2. Millman & Halkias: Integrated Electronics.

References:

1. Malvino: Electronic Principle.
2. Schilling & Belove: Electronics Circuits.
3. Millman & Grabal: Microelectronics.
4. Salivahanan: Electronics Devices & Circuits.

### **Engineering Mechanics**

**Code:**

**Contacts: 3L + 1T = 4**

**Credits: 3.5/4**

**To be introduced.**

### **Practical**

**HU**

**Language laboratory**

**Code Credits: 1**

**NSS/NCC/NSO**

**Code Credits: 1**

**To be introduced.**

### **Basic Science**

**Chemistry-1(Gr-A/Gr-B)**

**Code:**

**Contacts:**

**Credits: 2**

1. Acid –base titration ( estimation of commercial caustic soda)
2. Red-ox titration (estimation of iron using permanganometry)
3. Complexometric titration ( estimation of hardness of water using EDTA titration)
4. Chemical Kinetics (determination of relative rates of reaction of iodide with hydrogen peroxide at room temperature (clock reaction).
5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water)
6. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)
7. Conductometric titration for
  - (a) determination of the strength of a given HCl solution by titration against a standard NaOH solution.
  - (b) analysis of a mixture of strong and weak acid by strong base.
8. Preparation of a homo-polymer by free radical initiated chain polymerization and determination of its molecular weight by viscosity average molecular weight method.
9. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.



Or

**Physics-1(Gr-B/Gr-A)**

**Code:**

**Contacts:**

**Credits: 2**

**To be introduced.**

**Engineering Science**

**Basic Electrical and Electronics Engineering-I**

**Code: Contacts:**

**Credits: 2**

**Basic Electrical Engineering Laboratory-I**

List of Experiments:

Sl. No Name of the Experiments

1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. (a) Verification of Thevenin's theorem.  
(b) Verification of Norton's theorems.
4. Verification of Maximum power theorem.
5. Verification of Superposition theorem
6. Study of R-L-C Series circuit
7. Study of R-L-C parallel circuit

**Basic Electronics Engineering Laboratory-I**

**To be introduced.**

**Engineering Drawing & Computer Graphics(Gr-A)/Workshop Practice(Gr-B)**

**Code: Contacts:**

**Credits: 3**

**To be introduced.**



## Second Semester

### Theory

#### Basic Science

#### **Basic Computation & Principles of Computer Programming**

**Code: M (CS) 212**

**Contacts: 3L + 1T = 4**

**Credits: 3.5/4**

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#### **Module-I**

***Errors and Approximation:*** Computer representation of numbers, Fixed and floating point arithmetic. Exact and approximate numbers, Errors: Absolute, Relative and Percentage errors; Truncation, Significant and Round-off error; General formula for estimation of error (statement only) and its application in fundamental operations of arithmetic. Overflow and underflow, Propagation and control of truncation errors; Pitfalls (hazards) in numerical computations (ill conditioned and well conditioned problems). **4L**

***Interpolation:*** Forward and backward differences; Operators:  $\Delta$ ,  $\nabla$ ,  $E$ ,  $\delta$ ,  $\mu$  and their relationships. Interpolation and Extrapolation, Error in interpolation (statement only), Newton's forward & backward Interpolation formula, Lagrange's Interpolation formula. **6L**

#### **Module-II**

***Numerical Solutions of Algebraic and Transcendental Equations:*** Iterative methods, Condition of convergence (statement only), Order of convergence (definition only); Extraction of simple roots using Bisection, Secant, Regula-Falsi and Newton-Raphson methods; Order of convergence of these methods (statement only). **6L**

***Solution of Simultaneous Linear Equations:*** Gauss Elimination method (reducing to upper triangular matrix), Gauss-Seidal Iterative method (statement of the sufficient condition for its convergence). **4L**



### Module-III

**Numerical Integration:** Concept of numerical integration; Numerical integration using Trapezoidal rule (composite), Simpson's  $\frac{1}{3}$  rule (composite) and statement of the corresponding orders of error; Weddle's rule with order of error (statement only). **5L**

**Numerical Solution of Initial Value Problems of First Order Ordinary Differential Equations:** Euler's Method; Modified Euler's Method; Runge-Kutta Method (4th order). **5L**

**Numerical Computation of Eigen values & Eigen vectors:** Computation of largest eigen value and the corresponding eigen vector of a real symmetric matrix using Power method. **2L**

### Module-IV

**Overview of C Programming Language:** Character set, Constants, Variables and Data types; Operators and expressions, I/O statements, Control statements (branching and looping); Recursion; Function; Array; Pointers; Structures and Unions; Various types of File Access Methods: Sequential, Indexed Sequential, Random, Binary. (Programming examples of numerical methods (algorithms) mentioned in Modules I, II and III are to be implemented.) **16L**

**Total 48 lectures**

#### Suggested Reference Books:

1. **Numerical Mathematical Analysis**, J. B. Scarborough, (Oxford & IBH Pub. Co.)
2. **Introductory Numerical Analysis**, Dutta & Jana (Shreedhar Prakashani)
3. **Numerical Analysis and Programming with C**, Pulak Kundu (Chhaya Prakashani)
6. **Numerical Methods (Problems and Solution)**, Jain, Iyengar, & Jain (New Age Int. (P) Ltd.)
7. **Numerical Methods in Computer Applications** – P.U. Wayse. EPH
8. **Programming with C**, Byron Gottfried (TMH)
9. **Programming in ANSI C**, Balaguruswamy (TMH)
10. **Computer Oriented Numerical Methods**: P. Thangaraj ( PHI, 2008)
11. **Engineering Mathematics**: S. S. Sastry (PHI, 2008, 4<sup>th</sup> edition).
12. **Introduction to Numerical Analysis**: A. Gupta and S. C. Bose ( academic Publishers, Calcutta).

#### Chemistry-1(Gr-B/Gr-A)

Code:

Contacts: 3L + 1T = 4

Credits: 3.5/4

Or

#### Physics-1(Gr-A/Gr-B)

Code:

Contacts: 3L + 1T = 4

Credits: 3.5/4

**To be introduced.**





## Mathematics

Code: M201

Contacts: 3L + 1T = 4

Credits: 3.5/4

(All Streams except Optometry, Food Technology, and Pharmacy)

**Note 1: The whole syllabus has been divided into three modules.**

**Note 2: Structure of the question paper**

There will be three groups in the question paper. In Group A, there will be one set of multiple choice type questions spreading the entire syllabus from which 10 questions (each carrying one mark) are to be answered. From Group B, three questions (each carrying 5 marks) are to be answered out of a set of questions covering all the three modules. Three questions (each carrying 15 marks) are to be answered from Group C. Each question of Group C will have three parts covering not more than two topics (marked in bold italics faces). Sufficient questions should to be set covering the whole syllabus for alternatives.

### Module I

**Ordinary differential equations (ODE)- First order and first degree:** Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation). **7L**

**ODE- Higher order and first degree:** General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Euler equations. Solution of simultaneous linear differential equations. **9L**

### Module II

**Basics of Graph Theory:** Graphs, digraphs, weighted graph, connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph,; Walks, Paths, Circuits; Euler Graph, Cut sets and cut vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph; Graph isomorphism; Bipartite graph.

**Tree:** Definition and properties, binary graph, spanning tree, minimal spanning tree, properties of trees; Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using DFS, BFS, Kruskal's and Prim's algorithms. **16L**

### Module III

**Improper Integral:** Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations. **4L**



**Laplace Transform (LT):** Definition and existence of LT; LT of elementary functions; First and second shifting properties; Change of scale property; LT of  $\frac{f(t)}{t}$ , LT of  $t^n f(t)$ , LT of derivatives of  $f(t)$ , L.T. of  $\int f(u)du$ . Evaluation of improper integrals using LT, LT of periodic and step functions. Inverse LT: Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT; Solution of linear ODE with constant coefficients (initial value problem) using LT. 12L

**Total 48 Lectures**

**Suggested Reference Books:**

1. **Advanced Engineering Mathematics**, Erwin Kreyszig, (Wiley Eastern)
2. **Graph Theory**: V. K. Balakrishnan, (Schaum's Outline, TMH)
3. **A first course at Graph Theory**: J. Clark and D. A. Holton (Allied Publishers LTD)
4. **Introduction to Graph Theory**: D. B. West (Prentice-Hall of India)
5. **Graph Theory**: N. Deo (Prentice-Hall of India)
6. **Engineering Mathematics**: Babu Ram, (Pearson Education)
7. **Advanced Engineering Mathematics**: H. K. Dass (S. Chand & Co.)
8. **Engineering Mathematics**: B.S. Grewal (S. Chand & Co.)
9. **A Text book on Engineering Mathematics**: Vol. II, Pulak Kundu (Chhaya Prakashani)
10. **Engineering Mathematics**: Vol. II, Pal & Das (U.N. Dhar)
11. **Higher Engineering Mathematics**: John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)
12. **Calculus**: Strauss, Bradley and Smith (3<sup>rd</sup> edition, Pearson Education)
13. **Integral Transforms for Engineers**: L. C. Andrews and B. K. Shivamoggi (Prentice-Hall of India)
14. **Engineering Mathematics (Volume 2)**: S. S. Sastry (Prentice-Hall of India)

**Mathematics**

**Code: M201A**

**Contacts: 3L + 1T = 4**

**Credits: 3.5/4**

**(For Optometry, Pharmacy and Food Technology)**

**Note 1: The whole syllabus has been divided into three modules.**

**Note 2: Structure of the question paper**

**There will be three groups in the question paper. In Group A, there will be one set of multiple choice type questions spreading the entire syllabus from which 10 questions (each carrying one mark) are to be answered. From Group B, three questions (each carrying 5 marks) are to be answered out of a set of questions covering all the three modules. Three questions (each carrying 15 marks) are to be answered from Group C. Each question of Group C will have three parts covering not more than two topics (marked in bold italics faces). Sufficient questions should to be set covering the whole syllabus for alternatives.**



### Module I

**Three dimensional co-ordinate geometry:** Three dimensional co-ordinates, Direction cosines, Direction ratios; Equations of planes and straight lines; Elementary ideas of the equations of spheres. **6L**

**Vector Algebra:** Preliminary ideas of vectors, Vector addition, Position vector of a point in 3-D, Scalar and vector products of two vectors. **4L**

### Module II

**Probability:** Random experiment, Events, Sample space; Classical and axiomatic definition of probability; Complement of an event, Union and intersection of two or more events, Collectively exhaustive events, Mutually exclusive events; Theorem of total probability; Compound events, Conditional probability, Multiplication theorem of probability, Stochastically independent events; Baye's theorem. **10L**

**Probability Distribution:** Random variable, Discrete and continuous random variables; Probability distribution, Probability mass function and probability density function, Distribution function; Expectation, variance and their properties, Binomial, Poisson, Uniform, Normal and Standard Normal distributions, Mean and variance of these distributions; Poisson distributions as a limiting case of Binomial distribution (without proof), Normal approximation to Binomial distribution (without proof). **8L**

### Module III

**Elements of Statistics:** Introduction, Primary and secondary data, Population and sample, Census and sample survey, Representation of data – Chart and diagram, Graph, Bar diagram, Pie chart. **2L**

**Frequency Distribution:** Variables and attributes, Frequency distribution of attributes, Frequency distribution of discrete and random variables, Cumulative frequency, histogram, frequency polygon and histogram. **3L**

**Measures of Central Tendency and Dispersions:** Mean, Median, Mode, Quartiles and Percentiles; Range, Mean deviation, Standard deviation; Coefficient of variation. **4L**

**Moments, Skewness and Kurtosis:** Raw and central moments; Skewness and its measures; Kurtosis and its measures.

**3L Correlation and Regression:** Bivariate data and its analysis, Scatter diagram, Concept of bivariate distribution; Correlation between two variates, Karl Pearson's coefficients of linear correlation, Properties of correlation coefficient; Concept of Rank Correlation, Spearman's rank correlation coefficient. Interpretation and significance of regression, Linear regression–two lines of regression, Coefficients of regression and their properties. **8L**

**Total 48 Lectures**



### **Suggested Reference Books:**

1. **Basic Statistics:** A.M Goon, M.K Gupta & B, Dasgupta, World Press
2. **Complete Business Statistics:** Amir D. Aczel & Jayavel Sounderpandian, Tata McGraw- Hill
3. **Fundamentals of Mathematical Statistics:** S. C. Gupta & V. K. Kapoor, S. Chand & Sons
4. **Basic Statistics,** B. L. Agarwal, New Age International (P) Ltd.
5. **Analytical Co-ordinate Geometry:** Ghosh & Chakraborty, U. N. Dhar & Sons
6. **Higher Engineering Mathematics,** John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)
9. **A brief course in mathematical Statistics:** E. A. Tanis and R. V. Hogg (Pearson Education)

### **Engineering Science**

#### **Basic Electrical and Electronics Engineering-II**

**Code:**

**Contacts:** 3L + 1T = 4

**Credits:** 3.5/4

#### **Basic Electrical Engineering-II**

**Electrostatics:** Coulomb's law, Electric Field Intensity, Electric field due to a group of charges, continuous charge distribution, Electric flux, Flux density, Electric potential, potential difference, Gauss's law, proof of Gauss's law, its applications to electric field and potential calculation, Capacitor, capacitance of parallel plate capacitor, spherical capacitor, isolated spheres, concentric conductors, parallel conductors. Energy stored in a capacitor. 5L

**DC Machines:** Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Speed-torque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control) 6L

**Single phase transformer:** Core and shell type construction, EMF equation, no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation. 4L

**3 phase induction motor:** Types, Construction, production of rotating field, principle of operation, equivalent circuit and phasor diagram, rating, torque-speed characteristics (qualitative only). Starter for squirrel cage and wound rotor induction motor. Brief introduction of speed control of 3 phase induction motor (voltage control, frequency control, resistance control) 5L

**Three phase system:** Voltages of three balanced phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams. Power measurement by two watt meters method. 3L

**General structure of electrical power system:** Power generation to distribution through overhead lines and under ground cables with single line diagram. 1L

#### **Text books:**

1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition
2. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
3. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
4. Basic Electrical Engineering, J.P. Tewari, New age international publication



**Reference books:**

1. Basic Electrical Engineering(TMH WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH
2. Electrical Engineering Fundamental, Vincent.D.Toro, Pearson Education, Second Edition.
2. Hughes Electrical & Electronics Technology, 8/e, Hughes, Pearson Education.
3. Basic Electrical Engineering, T.K. Nagsarkar & M.S. Sukhija, Oxford
4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH
5. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

**Basic Electronics Engineering-II**

**Feed Back Amplifier and Oscillators:**

Concept (Block diagram), properties, positive and negative feed back, loop gain, open loop gain, feed back factors; topologies of feed back amplifier; effect of feed back on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth stability; effect of positive feed back: instability and oscillation, condition of oscillation, Barkhausen criteria.

5L

**Operational Amplifier:**

Introduction to integrated circuits, operational amplifier and its terminal properties. Application of operational amplifier; inverting and non-inverting mode of operation, voltage summing, difference, constant gain multiplier, voltage follower, comparator, integrator, differentiator, Schmitt trigger; Logarithmic amplifier.

6L

**Introduction to Digital Electronics:**

Introduction to binary number; Basic Boolean algebra; Logic gates; Complex logic CKTs; Multivibrators; Introduction to flip flops and basic memory elements.

6L

**Introduction to Instruments:**

Digital Multimeter; CRO; Function Generator.

5L

22L

**Recommended Books:**

Text:

3. Sedra & Smith: Microelectronics Engineering.
4. Millman & Halkias: Integrated Electronics.

References:

5. Malvino: Electronic Principle.
6. Schilling & Belove: Electronics Circuits.
7. Millman & Grabal: Microelectronics.
8. Salivahanan: Electronics Devices & Circuits.

**Engineering Thermodynamics & Fluid Mechanics**

**Code:**

**Contacts: 3L + 1T = 4**

**Credits: 3.5/4**

**To be introduced.**



## Practical

### Basic Science

#### **Basic Computation & Principles of Computer Programming Lab**

**Code: M (CS) 292**

**Contacts: Credits: 2**

#### **Developing C-programming for the following Problems:**

1. *Assignments on Interpolation:* Lagrange's Formula, Newton forward & backward formulae.
2. *Assignments on Numerical Integration:* Trapezoidal Rule, Simson's 1/3 Rule, Weddle's Rule.
3. *Assignments on Numerical solution of a system of linear equations:* Gauss elimination, Gauss-Seidal.
4. *Assignments on Numerical solution of Algebraic & Transcendental Equations:* Bisection, Secant, Regular-Falsi, Newton Raphson

#### **Chemistry-1(Gr-B/Gr-A)**

**Code:**

**Contacts:**

**Credits: 2**

Or

#### **Physics-1(Gr-A/Gr-B)**

**Code:**

**Contacts:**

**Credits: 2**

**To be introduced.**

### Engineering Science

#### **Basic Electrical and Electronics Engineering-II**

**Code: Contacts:**

**Credits: 2**

#### **Basic Electrical Engineering Laboratory-II**

List of Experiments:

Sl. No Name of the Experiments

1. Calibration of ammeter and voltmeter.
2. Open circuit and Short circuit test of a single phase Transformer.
3. No load characteristics of D.C shunt Generators
4. Starting and reversing of speed of a D.C. shunt
5. Speed control of DC shunt motor.
6. Measurement of power in a three phase circuit by two wattmeter method.

#### **Basic Electronics Engineering Laboratory-I**

**To be introduced.**

#### **Engineering Drawing & Computer Graphics(Gr-B)/Workshop Practice(Gr-A)**

**Code: Contacts:**

**Credits: 3**

**To be introduced.**