★★★★★B+
Accredited By NAAC

SHIVAJI UNIVERISTY, KOLHAPUR-416 004. MAHARASHTRA
PHONE : EPABX-2609000 GRAM : UNISHIVAJI
FAX 0091-0231-2691533 & 0091-0231-2692333 – BOS - 2609094
शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४.
दुरध्वनी : (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग– २६०९०९४) तार : युनिशिवाजी
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

---

Ref.No./SU/BOS/Engg./4901 **Date: 22.8.2007**

To
The Principals
All Affiliated Engineering Colleges.

Subject : Regarding the modified syllabus of FE Part- I and II of all branches (except Textile & Architecture) under the Faculty of Engineering and Technology.

Ref:- Ref. No./ SU/BOS/Engg./ 2997 dated 4.7.2007 Regarding revision of Syllabus of F.E. Part I & II.

Sir,

With reference to the subject mentioned hereabove, I am directed to inform you that, the University authorities have accepted and approved few modifications in the revised syllabus of FE Part- I and II of all branches (except Textile & Architecture) under the Faculty of Engineering and Technology.

The modified syllabus at FE Part- I of all branches (except Textile & Architecture) will come into force from the academic year 2007-08 i.e. from July, 2007 onwards and the modified syllabus FE Part- II of all branches (except Textile & Architecture) course will come into force from the academic year 2007-08 i.e. from Jan, 2008 onwards.

However, two more chances will be given to the students of the pre-revised course to appear for the examinations to be held during the period shown below:-

1) **F.E. Part - I :- Oct./Nov. 2007 and April/May 2008**
2) **F.E. Part –II :- April/May 2008 and Oct./Nov. 2008**

It is also hereby informed that all the above syllabus & relevant information is available on university website http : // www. unishivaji. ac. in. i.e. ONLINE SYLLABUS link.

You are, therefore, requested to bring this to the notice of all the teachers and students concerned.

Thanking you,

Yours faithfully,

Deputy Registrar
BOS Section

Copy f.w.cs to : **for information only**
1) **Dr.C.R.Rao,**
   Dean, Faculty of Engineering & Technology
2) **Shri………………….**
   Chairman, BOS/Ad-hoc Board in ……………. Engg.

Copy to : **for information and necessary action.**
1) **Appointment Section**
2) **O.E.- 4 Section**
3) **Affiliation Section**

E:\eback\Syllabi 2007-08\Engg\F.E. Syllabus 2007-08\Modified FE sylla 2007-08.doc --

SHIVAJI UNIVERSITY, KOLHAPUR

FIRST YEAR ENGINEERING

Modified

Syllabus

With effect from

Academic Year 2007-2008

Shivaji University, Kolhapur

ENGINEERING

Syllabus Structure

(From the Academic Year 2007-2008)

(Course common to all branches except Architecture and Textile Engineering.)

INSTRUCTIONS :

A]

There are two groups in each semester : 1. Physics Group and
2. Chemistry Group

Allotment of groups to students:

a) **Semester – I :** 50% students from each college will be admitted to Physics Group and remaining 50% will be admitted to Chemistry Group. The concerned College will decide the number and names of the students to be admitted in physics and chemistry groups and inform the same to the University.

b) **Semester – II :** The students for Physics group in semester-I will be admitted to Chemistry Group in semester-II. The students for Chemistry Group in semester-I will be admitted to Physics Group in semester-II

B]

- + The duration of theory paper for the subject Engineering Graphics will be 4 Hrs.
- ✡ Practical hours in the Subject 'Basic Electronics and Computer Programming in 'C'' are to be utilized for Computer Programming in 'C' only and the term work will be assessed on the basis of computer programming in 'C' only.

C]

Term Work :

The term work shall be assessed based on a) the record of attendance, b) term work done, c) the written/ practical / oral tests on the term work to decide the depth of understanding. The term work is to be assessed weekly.

INSTRUCTIONS ONLY TO EXAMINATION SECTION OF UNIVERSITY
AND PAPER SETTERS

A) Nature of the question papers :

1. There should be two sections carrying 50 marks each.

2. There should be four questions in each section and three questions should be attempted from each section.

B) Guidelines for setting the "Engineering graphics (Semester–I)" question paper for University Examinations :

1. Four questions (Question No. 1 to 4) should be set based on Section-I and four question (Question No. 5 to 8) should be set based on Section-II.

2. Three questions from Section-I and three questions from Section-II should be solved by the students in the examination.

3. Out of these. Question No. 1 should be compulsory which will be based on Topic No. 2 and 3 (carrying 24 marks) and remaining 3 questions from Section-I will be based on Topics No. 1, 3 and 4. (carrying 13 marks each). Out of these 3 questions, any 2 questions can be solved, by the students.

4. Question No. 5 from Section-II should be compulsory which will be based on Topic No. 5 (Orthographic views) carrying 24 marks. The remaining 3 questions from Section-II should be set on Topic No. 6, 7, and 8. (carrying 13 marks each). Out of these 3 questions any 2 questions can be solved by the students.

5. The size of the answers sheets (Drawing sheets) for solving the questions in the examination should be of half imperial size (A3 size).

FIRST YEAR ENGINEERING

Scheme of Teaching and Examination

Semester –I : Physics Group

Sr. No.	Subject	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	**T**	**P**	**Total**	**Theory**	**TW**	**Total**
1	Engineering Physics	4	-	2	6	100	25	125
2	Engineering Mathematics-I	3	1	-	4	100	25	125
3	Applied Mechanics	3	-	2	5	100	25	125
4	Engineering Graphics +	3	-	2	5	100	25	125
5	Basic Electronics and Computer Programming in 'C'✡	4	-	2	6	100	25	125
6	Professional Communication-I	1	-	2	3	-	25	25
7	Workshop Practice-I	-	-	2	2	-	25	25
	Total	**18**	**1**	**12**	**31**	**500**	**175**	**675**

Semester – I : Chemistry Group

Sr. No.	Subject	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	**T**	**P**	**Total**	**Theory**	**TW**	**Total**
1	Engineering Chemistry	4	-	2	6	100	25	125
2	Engineering Mathematics-I	3	1	-	4	100	25	125
3	Applied Mechanics	3	-	2	5	100	25	125
4	Engineering Graphics +	3	-	2	5	100	25	125
5	Basic Electronics and Computer Programming in 'C'✡	4	-	2	6	100	25	125
6	Professional Communication-I	1	-	2	3	-	25	25
7	Workshop Practice-I	-	-	2	2	-	25	25
	Total	**18**	**1**	**12**	**31**	**500**	**175**	**675**

Semester – II : Physics Group

Sr. No.	Subject	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	**T**	**P**	**Total**	**Theory**	**TW**	**Total**
1	Engineering Physics	4	-	2	6	100	25	125
2	Engineering Mathematics-II	4	1	-	5	100	25	125
3	Basic Civil Engineering	3	-	2	5	100	25	125
4	Basic Mechanical Engineering	3	-	2	5	100	25	125
5	Basic Electrical Engineering	3	-	2	5	100	25	125
6	Professional Communication-II	1	1	-	2	-	25	25
7	Workshop Practice-II	1	-	2	3	-	25	25
	Total	**19**	**2**	**10**	**31**	**500**	**175**	**675**

Semester – II : Chemistry Group

Sr. No.	Subject	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	**T**	**P**	**Total**	**Theory**	**TW**	**Total**
1	Engineering Chemistry	4	-	2	6	100	25	125
2	Engineering Mathematics-II	4	1	-	5	100	25	125
3	Basic Civil Engineering	3	-	2	5	100	25	125
4	Basic Mechanical Engineering	3	-	2	5	100	25	125
5	Basic Electrical Engineering	3	-	2	5	100	25	125
6	Professional Communication-II	1	1	-	2	-	25	25
7	Workshop Practice-II	1	-	2	3	-	25	25
	Total	**19**	**2**	**10**	**31**	**500**	**175**	**675**

First Year Engineering
SEMESTER –I

First Year Engineering : Semester-I
1. ENGINEERING PHYSICS

Teaching Scheme :	Hrs.	Examination Scheme :	Marks
Lectures	: 4	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

1. Acoustics and Ultrasonic :

Acoustics :

Basic requirement for the acoustically good hall, reverberation and time of reverberation, Sabine's formula (no derivation), absorption coefficient, factors affecting the architectural acoustics and their remedy.

Ultrasonics :

Production of ultrasonic waves by magnetostriction method and piezo-electric method, properties of ultrasonic waves, determination of wavelength and velocity of ultrasonic waves, applications of ultrasonic waves such as flow detection, drilling, welding, soldering, cleaning. **(7)**

2. Diffraction, Polarization and Photometry :

Diffraction :

Diffraction (review), diffraction grating - construction, theory and determination of wavelength, resolving power, resolving power of plain transmission grating.

Polarization :

Polarization (review), double refraction, Huygens' theory, photo elasticity, optical activity, Laurent's half shade polarimeter.

Photometry :

Standard candle, secondary standards, luminous flux, lumen etc., inverse square law, units of intensity of illumination, photo voltaic photometer. **(6)**

3. Laser :

Interaction of radiation with matter - absorption, spontaneous emission, stimulated emission, meta stable state, pumping energy, population inversion, characteristics of laser, types of LASER – Ruby laser, semiconductor laser, applications of laser - industrial and medical, Holography - principle, construction, reconstruction, properties and applications. **(7)**

4. Fibre optics :

Principle, concept and cross sectional view of fibre optics, propagation of light through cladded fibre, acceptance angle and acceptance cone (no derivation), fractional refractive index change, numerical aperture, modes of propagation, types of optical fibre, applications (medical, military, entertainment, communication), optical fibre sensors, advantages. **(8)**

SECTION – II

5. Nuclear Energy :

Nuclear Fission :

Discovery of fission, energy released by 1 Kg. of U^{235} , chain reaction, explosive chain reaction and critical size, nuclear reactor and their classification, essentials of nuclear reactor, power reactor.

Nuclear Fusion :

Nuclear fusion (p-p chain, c-n cycle), controlled fusion reaction (DD and DT chain), ignition temperature, Lawson criterion, inertial confinement. **(8)**

6. Crystallography – I :

Space lattice, the basis and the crystal structure, unit cell, the seven crystal system and Bravais space lattice, number of atoms per unit cell, atomic radius, coordination no., packing factor calculation of lattice constants, directions, planes and Miller indices - procedure, features and sketches for different planes and directions, relation between interplaner distance and Miller indices, the symmetry elements in a cubic crystals- centre, plane, axis of symmetry. **(8)**

7. Crystallography – II :

X-ray diffraction (Laue method), Bragg's law, Bragg's x-ray spectrometer, Bragg's law and crystal structure, crystallography by powder method. **(5)**

8. Superconductivity :

Discovery, zero electrical resistance, persistent current, effect of temperature and external magnetic field, Meissner effect, type-I and type-II superconductors, the BCS theory, Josephson effect, applications. **(7)**

Term work :

List of Experiments ;

1. Biprism.
2. Cylindrical obstacle.
3. Calculation of divergence of LASER beam.
4. Determination of wavelength of LASER using diffraction grating.
5. Diffraction grating.
6. Polarimeter.
7. Verification of inverse square law of intensity of light.
8. Resolving power of plain transmission grating.
9. Measurement of band gap energy.
10. Study of crystal structure.
11. Study of symmetry elements of cube.
12. Determination of ‘d’ (interplaner distance) using XRD pattern.
13. Determination of e/m of an electron.

Out of the above, a minimum of 8 experiments are to be performed .

References :

1. Resnick Halliday, Physics Volume-I, Krane -John Wiley & Sons Pub.
2. Resnick Halliday, Physics Volume-II, Krane -John Wiley & Sons Pub.
3. R. K. Gaur & Gupta S. L, Engineering Physics -.
   Dhanapat Rai Publication.
4. M. N. Avadhanulu & P. G. Kshirsagar - A Text Book of Engineering Physics -S. Chand Publication.
5. B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi.
6. Subramanyam & Brij Lal, A Text Book of Optics –
   S. Chand & Company (P.) Ltd.
7. S. O. Pillai, Solid State Physics : Structure & Electron Related Properties, Eastern Ltd,, New Age International Ltd.
8. Charles Kittle, Introduction to Solid State Physics - Wiley India Pvt. Ltd.
9. L. Tarasov, M. R. Shrinivasan, Physics for Engineers -
   New Age International (P) Ltd.
10. L. Tarasov, Laser Physics and Applications - Mir Publishers.
11. Gerd Keiser, Optical Fibre Communication -,
    Mc-Graw Hill International Edition

First Year Engineering : Semester-I
1. ENGINEERING CHEMISTRY

Teaching Scheme :	Hrs.	Examination Scheme :	Marks
Lectures	: 4	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

1. Water **(10)**

Introduction, water quality parameters (definition, causes and estimation) like total solids, acidity, alkalinity, chlorides, dissolved oxygen and hardness. Hardness: Types of water, causes of hardness, types, units, calculation of hardness, ill effects of hard water in various industries and in boilers. Treatment of hard water for domestic purposes by sedimentation, coagulation and sterilization (chlorination), treatment of water for industrial purposes by cold and hot lime soda, zeolite and ion exchange process. [Numerical problems on calculation of hardness].

2. Instrumental methods of Chemical Analysis **(8)**

Introduction, advantages and disadvantages of instrumental and non-instrumental methods, pH-metry: Introduction, equation and working of pH meter, Glass electrode: principle, construction, working, advantages and disadvantages, applications of pH-metry. Potentiometry : Introduction, measurement of e.m.f. by potentiometer, application to acid-base titration. Spectrometry: Laws of spectrometry, single beam spectrophotometer, Chromatography: introduction, classification, Partition Chromatography: Paper, thin layer and column, Thin layer Chromatography (TLC) and Gas Liquid Chromatography (GLC).

3. Lubricants **(6)**

Introduction, classification, types of lubrications (fluid film, boundary and extreme pressure), characteristics of lubricants: viscosity, viscosity index, flash point, fire point, cloud point and pour point, general criteria for selection of lubricants and selection of lubricants for delicate machines, IC engines, steam turbines and cutting tools.

4. Metallic Materials **(4)**

Introduction, alloys, purposes of making alloys, classification of alloys, composition, properties and applications of plain carbon steels (mild, medium and high carbon steel), Copper alloys: Brass and bronze, Aluminium alloys: Duralumin and alnico, Nickel alloys : Nichrome.

SECTION – II

5. Fuels **(6)**

Introduction, classification, calorific value and its units, characteristics of good fuels, comparison among solid, liquid and gaseous fuels, types of calorific value (higher and lower), calculation of calorific value by Dulong's formula, determination of calorific value by Bomb and Boy's calorimeter, proximate and ultimate analysis of coal. [Numerical problems on Dulong's formula, Bomb and Boy's calorimeter].

6. Polymers (7)

Introduction, polymers and polymerization, addition and condensation polymerization, Plastics: definition, types, (thermosetting and thermosoftening), compounding of plastics. Rubbers: Definition, types, properties of natural rubbers, vulcanization, synthetic rubber, Important thermosoftening polymers like polythene, polystyrene, polyvinyl chloride, phenol formaldehyde and urea formaldehyde. Important thermosetting polymers like polyurethane, silicone rubber, conducting polymers and biopolymers (preparation, properties and applications).

7. Ceramic Materials **(5)**

Introduction, classification, properties of ceramics (polymorphism, ceramic bonding, insulation etc.), Cement: Types of cement (natural, puzzolonic, slag, Portland and special type of cements) and their applications, Portland cement: Chemical and compound composition, manufacture of Portland cement by wet process, setting and hardening of Portland cement with chemical reactions.

8. Corrosion and its prevention **(10)**

Introduction, corrosion and its causes, classification, Atmospheric corrosion: Corrosion due to oxygen and other gases (Hydrogen embrittlement and decarburisation), Electrochemical corrosion: Hydrogen evolution and oxygen absorption mechanism, factors influencing corrosion, testing and measurement of corrosion by weight loss method, Prevention of corrosion by proper design and material selection, cathodic and anodic protection, application of metallic coatings by hot dipping, metal cladding, spraying and electroplating.

A) Laboratory work : (Any EIGHT out of following)

1) Determination of total hardness of a sample of water using disodium salt of EDTA.
2) Determination of chloride content of a water sample.
3) Determination of acidity of a water sample.

4) Determination of alkalinity of a water sample.
5) Preparation of phenol formaldehyde resin
6) Preparation of urea formaldehyde resin
7) Estimation of rate of corrosion of aluminium in acidic and basic medium.
8) Estimation of copper from brass by using standard sodium thio sulphate solution.
9) Estimation of zinc in brass solution.
10) Determination of viscosity of a lubricant by Ostwald's viscometer.
11) Proximate analysis of coal moisture, volatile matter.
12) Proximate analysis of coal (ash)

B) Demonstration experiments : (Any TWO)

1) Demonstration of pH meter.
2) Demonstration of potentiometer.
3) Demonstration of photo-colorimeter / spectrophotometer.

References : (Subject)

1. M. M. Uppal, A textbook of Engineering Chemistry., Khanna Publishers, Delhi.
2. S. S. Dara, A textbook of Engineering Chemistry., S.Chand and Co. New Delhi.
3. Jain and Jain, Engineering Chemistry., Dhanpat Rai and Co. (Pvt.) Ltd, Delhi
4. Dr. A. K. Pahari and Dr. B. S. Chauhan, Engineering Chemistry. Laxmi Publications (P) Ltd., New Delhi
5. Shashi Chawla, A text Book of Engineering Chemistry, Dhanpat Rai and Co. (Pvt.) Ltd, Delhi
6. S. K. Singh, Fundamentals of Engineering Chemistry, New Age International (P) Ltd Publishers, New Delhi.
7. Chatwal and Anand, Instrumental Methods of Chemical Analysis., Himalaya Publishing House.

References : (Term Work)

1) S. S. Dara, Experiments and calculations in Engineering Chemistry., S.Chand and Co. New Delhi.
2) Dr. Sudha Rani, Laboratory manual on Engineering Chemistry.

First Year Engineering : Semester-I

2. ENGINEERING MATHEMATICS – I

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 3	Theory	: 100
Tutorials	: 1	Term Work	: 25

SECTION – I

1. **Matrix :**
   - 1.1 Rank of matrix, definition, normal form and Echelon form
   - 1.2 Consistency and solution of simultaneous linear homogeneous and Non-homogeneous equations **(6)**

2. **Eigen Values and Eigen vectors :**
   - 2.1 Linear dependence of vectors
   - 2.2 Eigen Values, Eigen vectors and properties
   - 2.3 Cayley-Hamilton's theorem **(6)**

3. **Complex Numbers :**
   - 3.1 Roots of complex numbers by De Moivre's Theorem
   - 3.2 Expansion of $\sin^n \theta$ and $\cos^n \theta$ in terms of sines and cosines of multiples of θ
   - 3.3 Expansion of $\sin n\theta$ and $\cos n\theta$ in powers of $\sin \theta$ and $\cos \theta$ **(6)**

4. **Hyperbolic Functions :**
   - 4.1 Definition
   - 4.2 Inverse Hyperbolic functions
   - 4.3 Separation into real and imaginary parts **(3)**

SECTION – II

1. **Successive Differentiation :**
   - 1.1 n^{th} order derivative of standard functions : (i) $(ax + b)^n$, (ii) $(ax + b)^{-1}$, (iii) $\log (ax + b)$, (iv) $\sin (ax + b)$, (v) $\cos (ax + b)$, (vi) e^{ax}, (vii) $e^{ax} \sin (ax + b)$, (viii) $e^{ax} \cos (ax + b)$
   - 1.2 Lebnitz theorem on n^{th} derivative of product of two functions **(5)**

2. **Expansion of Functions :**
   - 2.1 Taylor's theorem and Taylor's series
   - 2.2 Meclaurin's theorem and Meclaurin's expansion
   - 2.3 Indeterminate forms and L' Hospital's rule **(5)**

3. **Partial Differentiation :**
   - 3.1 Introduction
   - 3.2 Composite function, Chain Rule and Total derivative
   - 3.3 Euler's theorem on homogeneous function of two variables **(5)**
4. **Application of Partial Differentiation :**
   - 4.1 Jacobian, Properties of Jacobian, Jacobian of Implicit function, Partial derivatives of Implicit function using Jacobian
   - 4.2 Errors and Approximation

4.3 Maxima and Minima of functions of two variables **(6)**

General instructions :

1. Batchwise tutorials are to be conducted. The number of students per batch should be as per the university pattern for practical batches.
2. Minimum number of assignments should be 8 covering all topics.

References :

1. J. N. Wartikar - A text book of Applied Mathematics, Vol.-I and II Pune Vidyarthi Griha Prakashan, Pune.
2. Dr. B. S. Grewal - Higher Engineering Mathematics, Khanna Publishers, Delhi.
3. N. P. Bali, Iyengar - A textbook of Engineering Mathematics, Laxmi Publications (P) Ltd., New Delhi.
4. Erwin Kreyszig - Advanced Engineering Mathematics, New Age International (P) Ltd. Publishers.
5. H. K. Dass - Advanced Engineering Mathematics.

First Year Engineering : Semester-I
3. APPLIED MECHANICS

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 3	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

1. Basic concepts and fundamental laws, force, moment and couple, resolution and composition of force, system of forces, resultant, Varignon's theorem and law of moments. **(6)**
2. Lami's theorem, free body diagram, two force and three force members, Equilibrium of forces, equilibrium equations, surface friction. **(7)**
3. Types of loads, types of supports, analysis of simple and compound beams, virtual work method for support reactions. **(4)**
4. Centroid, moment of inertia of plane and composite figures, parallel and perpendicular axis theorems, moment of inertia of standard shapes from first principle, moment of inertia of composite figures, radius of gyration. **(4)**

SECTION – II

1. Kinematics of rectilinear motion, motion diagrams for under gravity constant acceleration motion, motion with variable acceleration : **(5)**

2. Kinetics of linear motion, Newton's Law. De Alembert's principle, work-energy principle, Impulse - momentum principle. **(6)**
3. Kinematics and kinetics of circular motion, rotation with constant and variable angular acceleration, centripetal and centrifugal force, condition of skidding and overturning. **(5)**
4. Collision of elastic bodies ; direct central impact, oblique impact, coefficient of restitution, loss of kinetic energy. **(5)**

Term work :

A) Experiments

Any four experiments from

1. Law of polygon of forces
2. Jib crane
3. Bell crank lever
4. Support Reactions of Beam
5. Fletures Trolley
6. Centrifugal force

B) Graphics Statics

1. To find resultant - 3 problems
2. To find support reactions - 3 problems

C) Assignments based on Section-II (A minimum of 4 assignments)

References :

1. S. S. Bhavikattis, Engineering Mechanics, New Age International Pvt. Ltd.
2. R. K. Bansal and Sanjay Bansal, Engineering Mechanics
3. F. P. Beer and E. R. Johnston, Vector Mechanics for Engineers Vol.-I and II, Tata Mc-Graw Hill Publication.
4. K. I. Kumar, Engineering Mechanics, Tata Mc-Graw Hill Publication.
5. S. B. Junnerkar, Engineering Mechanics.
6. Irving H. Shames, Engineering Mechanics, Prentice Hall of India, New Delhi.
7. S. N. Saluja, Applied Mechanics, Satya Prakashan, New Delhi.
8. Ferdinand Singer, Engineering Mechanics by Statics and Dynamics, Harper and Row Publications.

First Year Engineering : Semester-I
4. ENGINEERING GRAPHICS

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 3	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION-I

1. **Plane curves :** Regular Polygons up to hexagon. Ellipse, Parabola and Hyperbola, Involute, Archimedian spiral and Cycloid only. **(4)**

2. **Projections of lines :** Introduction to First angle and third angle methods of projection. Projections of points on regular and auxiliary-reference planes (Including coordinate system of points). Projections of lines (horizontal, frontal, oblique and Profile lines) on regular and auxiliary reference planes. True length of a line, Point View of a line, angles made by the line with reference planes. Projections of intersecting lines, Parallel lines, perpendicular lines, and skew lines. Distance between point and line, grade and bearing of a line. **(8)**

3. **Projections of planes :** Projections on regular and on auxiliary reference planes. (Including coordinate system). Types of planes (horizontal, frontal, oblique and Profile planes), Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Strike and Dip of the plane. **(4)**

4. **Projections of solids :** Prisms, Pyramids, Cylinder and Cones. **(5)**

SECTION-II

5. **Orthographic views :** Lines used, selection of views, spacing of views. ISI conventions used In drawing , dimensioning and sections. Drawing required views from given pictorial views (conversion of pictorial views in to orthographic views). **(8)**

6. **Isometric projections :** Isometric scale, Isometric projections and Isometric views / drawings. Circles in isometric view. Isometric views of simple solids and objects. **(6)**

7. **Sections of solids :** Prisms, Pyramids, Cylinders and Cones, in simple positions only. **(4)**

8. **Development of plane and curved surfaces :** Prisms, Pyramids, Cylinders and Cones along with cutting planes. **(3)**

Note : All the above syllabus is to be covered according to the first angle method of projection.

Term work :

The following eight sheets to be drawn based on the above topics. All these sheets should be drawn on half imperial (A3 size) drawing sheets only.

Sr. No.	Title of sheets	No. of sheets
1.	Plane curves	01
2.	Projections of lines	01
3.	Projections of planes	01
4.	Orthographic projections	01
5.	Isometric projections	01
6.	Projections of solids	01
7.	Sections of solids	01
8.	Development of Plane and curved surfaces of solids	01

References :

1. N. D. Bhatt, Engineering Drawing, Charotor Publication House, Bombay
2. W. J. Luzadder, Fundamentals of Engineering Drawing, Prentice Hall of India.
3. N. D. Bhatt, Machine Drawing, Charotor Publication House, Bombay
4. Rowes, Descriptive Geometry.
5. French and Vierck, Graphic Science, Mc-Graw Hill International.
6. Sevsen and Street, Engineering Drawing.
7. K. Venugopal, Engineering Drawing and Graphics, New Age Publication
8. R. K. Dhawan, A text book of Engineering Drawing, S. Chand and Co.
9. K. L. Narayana, Machine Drawing, New Age Publication
10. N. B. Shaha and B. C. Rana, Engineering Drawing, Pearson Education.

First Year Engineering : Semester-I

5. BASIC ELECTRONICS and COMPUTER PROGRAMMING

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 4	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

BASIC ELECTRONICS

1) Introduction to Passive Components (4)

Resistors - Fixed and Variable, Construction, Color coding, Specifications.
Capacitors - Various Types, Construction, Color coding. Specifications
Inductors - Types with Specification.

2) Semiconductor Diode (6)

VI characteristics, current components, drift and diffusion current, Diode current equation, temperature dependence of VI characteristics, diode equivalent circuits, diode resistance and capacitance, various breakdown mechanisms. Introduction to special semiconductor diodes - Zener diode, PIN diode, Photo diode, LED- construction, characteristics, symbol, equivalent circuits. (Numericals are expected).

3) Transistors (6)

a. Bipolar junction transistor - Construction, diode equivalent circuits. Operation. Different Transistor Configurations - CB, CE, CC. Input and output characteristics. Comparison between Configurations. Relation between α, β and γ. Specifications.

b. Field Effect Transistor - Construction, symbol. Types, working principle of JFET. Drain and transfer characteristics. Parameters of JFET. (Numericals are expected)

4) Measuring Instruments (3)

i) Introduction to volt meter, ammeter, ohm meter, multimeter.
ii) Cathode Ray Oscilloscope (CRO) -Block diagram, measurement of voltage and frequency, component testing.

5) Number Systems and Logic Gates (5)

Number systems - Conversion of Binary, Octal, Hexadecimal. Binary coded Decimal. Introduction to logic gates - Basic and Derived Gates.

6) Nano Technology (4)

a. Introduction, Importance, Applications.
b. Impact in various fields such as Medicine, Materials, Electronics, Computers etc.

c. Nano Technology – Tools.
d. Industrial Future and Market.
e. Limitations

SECTION – II

COMPUTER PROGRAMMING

1. Computer Fundamentals : (4)

a. Classification of computers –
Mini, Desktop, Micro, Mainframe, Super Computers

b. Computer System Components – CPU
Input Unit - keyboard, mouse, joystick, scanner
Output Unit- monitor, printer, plotter
Storage Unit - RAM, HDD, CDROM

c. Applications of Computers

2. Introduction to UNIX (2)

a. Introduction to UNIX Operating System

b. Study of basic UNIX / LINUX commands –
LS, CD ,CAT, MKDIR, RMDIR

c. Study of VI editor

3. Introduction to 'C' Language (6)

a. Importance of 'C' Language, Sample 'C' Program,
Structure of 'C' Program, Creation and Execution of 'C' Program.

b. Constants, variables and data types.

c. Operators and expressions.

d. Managing input / output operations - printf, scanf, getchar, putchar.

4. Decision and Control statements (5)

a. Decision statements - if, if else, nested if else, switch, break, continue.

b. Control statements - for, while, do while.

5. Arrays and functions (6)

a. Initialization and definition of one and two dimensional arrays,
Character array and strings, String handling functions.

b. Definition and declaration of function, types of functions, call by value.

6. Structures and Unions (5)

a. Declaration and initialization of structures, Array of structures,
Array within structures, Structure within structures.

b. Definition of union and its applications.

Practicals :

A minimum of 8 to 10 assignments as given below are to be carried out in the practical sessions on which the term work is to be assessed.

Assignments based on :

1. Use of Unix / Linux commands and vi editor.
2. I/O functions. Creation and execution of "Hello World" program with demonstration on compilation, execution and debugging.
3. Constants, variables and data types.
4. Operators and expressions.
5. Decision making statements.
6. Control statements.
7. Arrays.
8. Functions (call by value).
9. Structures and Unions,
10. Combinations of points mentioned in the assessments form 3 to 9.

References :

Basic Electronics:

1) Boylestad, Nashelsky - Electronics Devices and Circuit Theory. - Pearson Education, Asia.
2) H. S. Kalsi- Electronic Instrumentation -Tata Mc-Graw Hill Publication.
3) Floyd – Digital Fundamentals – Pearson Education, Asia..
4) Dr. Parag Diwan and Ashish Bhardwaj – The Nanoscope – Encyclopedia of Nano Science and Nano Technology – Pentagon Press.
5) B. Somnathan Nair – Electronic devices and applications – PHI publications.

Computer Programming:

1. ITL Education Solutions Ltd., Introduction to Information Technology, Pearson Education
2. K. Balaguruswamy, Programming in ANSI, C - (TGMH)
3. B.W. Kernigghan and D. M. Ritchie, The 'C' Programming Language - Pearson Education
4. Sunitabha Das, Unix concepts and applications - (TMGH)
5. Jason J. Manger, Unix the complete book - A guide for the professional user - (Galgotia)

First Year Engineering : Semester-I

6. PROFESSIONAL COMMUNICATION - I

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 1	Theory	: --
Practicals	: 2	Term Work	: 25

---

1) Communication :- **(3)**

Nature and Importance of Communication,
Process and barriers to Communication,
Forms of Communication

2) Techniques of Communication :- **(4)**

a. Verbal Communication - Techniques of Formal Speech, Meetings, Interviews, Group Discussion, Debate, Elocution, Extempore etc.
b. Non-verbal Communication – Body Language.

3) Rapid review of Grammar :- **(4)**

Corrections of common errors,
Use of phrases and idioms.

4) Précis writing :- **(3)**

Importance and Techniques of précis writing.

Term work :

1. Formal speech on following topics ;
   a. About myself, b. The problems I face while communicating
   c. Topics on current affairs
2. Group Discussion on current topics.
3. Vocabulary exercise – Synonyms, Antonyms, Phrases and Idioms.
4. Language Lab. Sessions on phonetics and grammar.
5. Precise writing exercises – Exercises of summarizing English Articles and News.
6. Games on team building, communication and public speaking.

References :

1. R. K. Chaddha, Communication Techniques and skills – Dhanpat Rai Publication, New Delhi.
2. Pravil S. R. Bhatia, Professional Communication Skills - S. Chand and Co., New Delhi.
3. J. D. O'Connor, Better English pronounciation.
4. Wren and Martin, High-school English Grammar and Composition – S. Chand and Co., New Delhi.
5. Sunita Mishra, C. Muralikrishna, Communication Skills for Engineers – Pearson Education.
6. Aspi Doctor, Principles and Practice of Business Communication - Rhoda Doctor, Sheth Publications, Mumbai.

First Year Engineering : Semester-I
7. WORKSHOP PRACTICE - I

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: ---	Theory	: --
Practicals	: 2	Term Work	: 25

A) Computers:

1. Introduction and identification of hardware components of a typical computer system.
2. Assembling and Disassembling the PC.
3. Handling and operating peripheral devices like printer, scanner, pen drives, CD-ROM, Multimedia Devices, UPS etc.
4. Identification and study of communication elements like Single pair wires (phone lines), multi-pair wires (UTP), fibre-optic cables, printer data cables, connectors- RJ-45, RJ-9, RJ-11, USB, 9-Pin and 25-Pin serial and parallel connectors; converters- serial to USB, 9-Pin to 25-Pin, Vice-Versa and others.
5. Troubleshooting and Maintenance of PC
   a) POST (power on self test) b) Virus c) Power related problems.
6. Demonstration of multimedia features – running and handling of audio and video clips, use of CD Read / Write operations etc.

B) Electronics :

1. Demonstration and use of electrical and electronics hand and power tools.
2. Measurement of resistor and capacitor, measurement of voltage and frequency using oscilloscope.
3. Assembly of Electronic components on the printed circuit board (PCB)
4. Demonstration and performance measurement of any two electronic components / devices –
   a. Diodes
   b. Transistor.
   c. Logic gates.

C) -1 Carpentry involving dovetail / butt joint such as a tray, frame etc.

Reference Books –

1) Mark Minasi, The complete PC upgrade and maintenance guide -- BPB. Publications.

Submission of Journal:-

The term work will consist of assignments for A , B and One Job in C

First Year Engineering

SEMESTER –II

First Year Engineering : Semester-II

1. ENGINEERING PHYSICS

Teaching Scheme :	Hrs.	Examination Scheme :	Marks
Lectures	: 4	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

1. Acoustics and Ultrasonic :

Acoustics :

Basic requirement for the acoustically good hall, reverberation and time of reverberation, Sabine's formula (no derivation), absorption coefficient, factors affecting the architectural acoustics and their remedy.

Ultrasonics :

Production of ultrasonic waves by magnetostriction method and piezo-electric method, properties of ultrasonic waves, determination of wavelength and velocity of ultrasonic waves, applications of ultrasonic waves such as flow detection, drilling, welding, soldering, cleaning. **(7)**

2. Diffraction, Polarization and Photometry :

Diffraction :

Diffraction (review), diffraction grating - construction, theory and determination of wavelength, resolving power, resolving power of Plain transmission grating.

Polarization :

Polarization (review), double refraction, Huygens' theory, photo elasticity, optical activity, Laurent's half shade polarimeter.

Photometry :

Standard candle, secondary standards, luminous flux, lumen etc., inverse square law, units of intensity of illumination, photo voltaic photometer. **(6)**

3. Laser :

Interaction of radiation with matter - absorption, spontaneous emission, stimulated emission, meta stable state, pumping energy, population inversion, characteristics of laser, types of LASER – Ruby laser, semiconductor laser, applications of laser - industrial and medical, Holography - principle, construction, reconstruction, properties and applications. **(7)**

4. Fibre optics :

Principle, concept and cross sectional view of fibre optics, propagation of light through cladded fibre, acceptance angle and acceptance cone (no derivation), fractional refractive index change, numerical aperture, modes of propagation, types of optical fibre, applications (medical, military, entertainment, communication), optical fibre sensors, advantages. **(8)**

SECTION – II

5. Nuclear Energy :

Nuclear Fission :

Discovery of fission, energy released by 1 Kg. of U^{235} , chain reaction, explosive chain reaction and critical size, nuclear reactors and their classification, essentials of nuclear reactor, power reactor.

Nuclear Fusion :

Nuclear fusion (p-p chain, c-n cycle), controlled fusion reaction (DD and DT chain), ignition temperature, Lawson criterion, inertial confinement. **(8)**

6. Crystallography – I :

Space lattice, the basis and the crystal structure, unit cell, the seven crystal system and Bravais space lattice, number of atoms per unit cell, atomic radius, coordination no., packing factor calculation of lattice constants, directions, planes and Miller indices - procedure, features and sketches for different planes and directions, relation between interplaner distance and Miller indices, the symmetry elements in a cubic crystals- centre, plane, axis of symmetry. **(8)**

7. Crystallography – II :

X-ray diffraction (Laue method), Bragg's law, Bragg's x-ray spectrometer, Bragg's law and crystal structure, crystallography by powder method. **(5)**

8. Superconductivity :

Discovery, zero electrical resistance, persistent current, effect of temperature and external magnetic field, Meissner effect, type-I and type-II superconductors, the BCS theory, Josephson effect, applications. **(7)**

Term work :

List of Experiments ;

1. Biprism.
2. Cylindrical obstacle.
3. Calculation of divergence of LASER beam.
4. Determination of wavelength of LASER using diffraction grating.
5. Diffraction grating.
6. Polarimeter.
7. Verification of inverse square law of intensity of light.
8. Resolving power of plain transmission grating.
9. Measurement of band gap energy.
10. Study of crystal structure.
11. Study of symmetry elements of cube.
12. Determination of 'd' (interplaner distance) using XRD pattern.
13. Determination of e/m of an electron.

Out of the above, a minimum of 8 experiments are to be performed .

References :

1. Resnick Halliday, Physics Volume-I, Krane -John Wiley & Sons Pub.
2. Resnick Halliday, Physics Volume-II, Krane -John Wiley & Sons Pub.
3. R. K. Gaur & Gupta S. L, Engineering Physics -. Dhanapat Rai Publication.
4. M. N. Avadhanulu & P. G. Kshirsagar - A Text Book of Engineering Physics -S. Chand Publication.
5. B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi.
6. Subramanyam & Brij Lal, A Text Book of Optics – S. Chand & Company (P.) Ltd.
7. S. O. Pillai, Solid State Physics : Structure & Electron Related Properties, Eastern Ltd,, New Age International Ltd.
8. Charles Kittle, Introduction to Solid State Physics - Wiley India Pvt. Ltd.
9. L. Tarasov, M. R. Shrinivasan, Physics for Engineers - New Age International (P) Ltd.
10. L. Tarasov, Laser Physics and Applications - Mir Publishers.
11. Gerd Keiser, Optical Fibre Communication -, Mc-Graw Hill International Edition

First Year Engineering : Semester-I

1. ENGINEERING CHEMISTRY

Teaching Scheme :	Hrs.	Examination Scheme :	Marks
Lectures	: 4	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

1. Water (10)

Introduction, water quality parameters (definition, causes and estimation) like total solids, acidity, alkalinity, chlorides, dissolved oxygen and hardness. Hardness: Types of water, causes of hardness, types, units, calculation of hardness, ill effects of hard water in various industries and in boilers. Treatment of hard water for domestic purposes by sedimentation, coagulation and sterilization (chlorination), treatment of water for industrial purposes by cold and hot lime soda, zeolite and ion exchange process. [Numerical problems on calculation of hardness].

2. Instrumental methods of Chemical Analysis (8)

Introduction, advantages and disadvantages of instrumental and non-instrumental methods, pH-metry: Introduction, equation and working of pH meter, Glass electrode: principle, construction, working, advantages and disadvantages, applications of pH-metry. Potentiometry : Introduction, measurement of E.M.F. by potentiometer, application to acid-base titration. Spectrometry: Laws of spectrometry, single beam spectrophotometer, Chromatography: introduction, classification, Partition Chromatography: Paper, thin layer and column, Thin layer Chromatography (TLC) and Gas Liquid Chromatography (GLC).

3. Lubricants (6)

Introduction, classification, types of lubrications (fluid film, boundary and extreme pressure), characteristics of lubricants: viscosity, viscosity index, flash point, fire point, cloud point and pour point, general criteria for selection of lubricants and selection of lubricants for delicate machines, IC engines, steam turbines and cutting tools.

4. Metallic Materials (4)

Introduction, alloys, purposes of making alloys, classification of alloys, composition, properties and applications of plain carbon steels (mild, medium and high carbon steel), Copper alloys: Brass and bronze, Aluminium alloys: Duralumin and alnico, Nickel alloys : Nichrome.

SECTION – II

5. Fuels (6)

Introduction, classification, calorific value and its units, characteristics of good fuels, comparison among solid, liquid and gaseous fuels, types of calorific value (higher and lower), calculation of calorific value by Dulong's formula, determination of calorific value by Bomb and Boy’s calorimeter, proximate and ultimate analysis of coal. [Numerical problems on Dulong's formula, Bomb and Boy’s calorimeter].

6. Polymers (7)

Introduction, polymers and polymerization, addition and condensation polymerization, Plastics: definition, types, (thermosetting and thermosoftening), compounding of plastics. Rubbers: Definition, types, properties of natural rubbers, vulcanization, synthetic rubber, Important thermosoftening polymers like polythene, polystyrene, polyvinyl chloride, phenol formaldehyde and urea formaldehyde. Important thermosetting polymers like polyurethane, silicone rubber, conducting polymers and biopolymers (preparation, properties and applications).

7. Ceramic Materials (5)

Introduction, classification, properties of ceramics (polymorphism, ceramic bonding, insulation etc.), Cement: Types of cement (natural, puzzolonic, slag, Portland and special type of cements) and their applications, Portland cement: Chemical and compound composition, manufacture of Portland cement by wet process, setting and hardening of Portland cement with chemical reactions.

8. Corrosion and its prevention (10)

Introduction, corrosion and its causes, classification, Atmospheric corrosion: Corrosion due to oxygen and other gases (Hydrogen embrittlement and decarburisation), Electrochemical corrosion: Hydrogen evolution and oxygen absorption mechanism, factors influencing corrosion, testing and measurement of corrosion by weight loss method, Prevention of corrosion by proper design and material selection, cathodic and anodic protection, application of metallic coatings by hot dipping, metal cladding, spraying and electroplating.

A) Laboratory work : (Any EIGHT out of following)

1) Determination of total hardness of a sample of water using disodium salt of EDTA.
2) Determination of chloride content of a water sample.
3) Determination of acidity of a water sample.
4) Determination of alkalinity of a water sample.
5) Preparation of phenol formaldehyde resin
6) Preparation of urea formaldehyde resin
7) Estimation of rate of corrosion of aluminium in acidic and basic medium.
8) Estimation of copper from brass by using standard sodium thio sulphate solution.
9) Estimation of zinc in brass solution.
10) Determination of viscosity of a lubricant by Ostwald's viscometer.
11) Proximate analysis of coal moisture, volatile matter.
12) Proximate analysis of coal (ash)

B) Demonstration experiments : (Any TWO)

1) Demonstration of pH meter.
2) Demonstration of potentiometer.
3) Demonstration of photo-colorimeter / spectrophotometer.

References : (Subject)

1. M. M. Uppal, A textbook of Engineering Chemistry., Khanna Publishers, Delhi.
2. S. S. Dara, A textbook of Engineering Chemistry., S.Chand and Co. New Delhi.
3. Jain and Jain, Engineering Chemistry., Dhanpat Rai and Co. (Pvt.) Ltd, Delhi
4. Dr. A. K. Pahari and Dr. B. S. Chauhan, Engineering Chemistry. Laxmi Publications (P) Ltd., New Delhi
5. Shashi Chawla, A text Book of Engineering Chemistry, Dhanpat Rai and Co. (Pvt.) Ltd, Delhi
6. S. K. Singh, Fundamentals of Engineering Chemistry, New Age International (P) Ltd Publishers, New Delhi.
7. Chatwal and Anand, Instrumental Methods of Chemical Analysis., Himalaya Publishing House.

References : (Term Work)

1) S. S. Dara, Experiments and calculations in Engineering Chemistry., S.Chand and Co. New Delhi.
2) Dr. Sudha Rani, Laboratory manual on Engineering Chemistry.

First Year Engineering : Semester-II
2. ENGINEERING MATHEMATICS – II

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 4	Theory	: 100
Tutorials	: 1	Term Work	: 25

SECTION – I

1. Differential Equations of first order and first degree :
- 1.1 Exact differential equations
- 1.2 Equations reducible to exact equations
- 1.3 Linear equations
- 1.4 Equations reducible to Linear form **(8)**

2. Application of Differential Equations of first order and first degree :
- 2.1 Applications to Orthogonal trajectories (Cartesian and Polar equations)
- 2.2 Simple Electrical Circuits **(4)**

3. Numerical Solution of Ordinary Differential Equations of first order and first degree :

Numerical Solution by
- 3.1 Picard's method
- 3.2 Taylor's series method
- 3.3 Euler's method
- 3.4 Modified Euler's method
- 3.5 Runge-Kutta fourth order formula **(8)**

4. Numerical Differentiation :
- 4.1 Definition
- 4.2 Numerical differentiation using
- a) Newton's forward difference interpolation formula
- b) Newton's backward difference interpolation formula
- c) Sterling's Central difference interpolation formula
- d) Newton's divided difference formula **(8)**

SECTION – II

1. **Special Functions :**
   1.1 Beta and Gamma functions
   1.2 Properties of Beta and Gamma functions
   1.3 Differentiation under integral sign **(7)**

2. **Curve Tracing and Rectification :**
   2.1 Tracing of curve in cartesian form
   2.2 Tracing of curve in polar form
   2.3 Rectification of plane curves (Cartesian and Polar form) **(6)**

3. **Multiple Integrals :**
   3.1 Introduction of Double Integrals
   3.2 Evaluation of Double Integrals
   3.3 Change of order of Integration
   3.4 Transformation of variables using Jacobians
   3.5 Change into Polar
   3.6 Evaluation of Triple Integrate with given limits **(8)**

4. **Application of Multiple Integrals :**
   4.1 Area under curves using Double integral
   4.2 Mass of Lamina
   4.3 Moment of Inertia of a Plane Lamina
   4.4 Volumes of solids of revolution. **(7)**

General instructions :

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per university pattern for tutorial batches.
2. Minimum number of assignments should be 8 covering all topics.

References :

1. J. N. Wartikar - A text book of Applied Mathematics Vol.-I and II
   Pune Vidyarthi Griha Prakashan, Pune.
2. Dr. B. S. Grewal - Higher Engineering Mathematics,
   Khanna Publishers, Delhi.
3. N. P. Bali, Iyengar - A textbook of Engineering Mathematics,
   Laxmi Publications (P) Ltd., New Delhi.
4. Erwin Kreyszig - Advanced Engineering Mathematics,
   New Age International (P) Ltd. Publishers.
5. H. K. Dass - Advanced Engineering Mathematics.
6. E. Rukmangadachari - Engineering Mathematics-I.

First Year Engineering : Semester-II

3. BASIC CIVIL ENGINEERING

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 3	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

1. Introduction to Civil Engineering :

Introduction, branches of civil engineering, application of civil engineering in other allied fields. **(2)**

2. Building Planning :

Principles of planning, orientation of buildings, introduction to Bye-Laws regarding building line, height of building, open space requirements, F.S.I., setbacks, ventilation, sanitation as per municipal corporation area requirement. **(4)**

3. Components of Buildings :

- **Sub-structure**

Types of soil and rocks as foundation strata, concept of bearing capacity, types of foundations i.e. shallow and deep and their suitability. Shallow foundation such as wall foundation, isolated foundation, deep foundation such as pile foundation.

- **Super-structure**

Elements of super-structures and their functions **(5)**

4. Building Design :

Introduction to types of loads, concepts of strength, stability, durability and factor of safety of building, load bearing and framed structures. **(5)**

5. Building Materials :

Use and properties of the following materials :

- Concrete – ingredients and grades, plain and reinforced cement concrete and ready mix concrete, bricks, steel, aluminum, plastic, timber, roofing materials etc.

(5)

SECTION – II

6. Surveying : (9)

- Principles of surveying
- Classification of surveys
- Chain Surveying

Introduction to metric chain and tapes, error in chaining, nominal scale and R.F., ranging, chaining and offsetting, index plan, location sketch and recording of field book

- Chain and compass survey

Meridian, bearing and its types, system of bearing,
Types of compass : prismatic and surveyor's compass.
Calculation of included angles, correction for local attraction.

7. Levelling : (8)

- Terms used in levelling, use of Dumpy level, temporary adjustments. methods of reduction of levels, types of levelling,
  Contours, characteristics of contours, use of contour maps.
- Introduction to Auto level and use
- Introduction and use of EDM's with special reference to Total Station.
- Measurement of area by planimeter – mechanical and digital.

8. Transportation Engineering : (4)

- Types of roads : introduction to NH, SH, MDR, ODR, VR, Express Way
- Cross section of road – in cutting and filling
- Railway – Gauges, Cross-section of railway track.

Practical work :

Practical exercises given be carried out and drawing sheets be plotted wherever necessary.

1. Plotting the outlines of building by chaining, ranging and offsetting.
2. Plotting of closed traverse by prismatic compass.
3. Plotting of closed traverse by surveyor's compass
4. Reduction of levels by rise and fall method.
5. Reduction of levels by collimation plane method.
6. Measurement of area by mechanical planimeter.
7. Measurement of area by digital planimeter.
8. Use of total station for various measurements.
9. Layout and setting out of small residential building.
10. Site visit to study various construction processes

    Report to be submitted on any under construction site.

References :

1. G. K. Hiraskar, Basic Civil Engineering, Dhanpat Rai Publication.
2. Civil Engineering Materials - Technical Teacher's Training Institute, Chandigarh
3. N. Basak, Surveying, Tata Mc-Graw Hill Publication.
4. B.C. Punmia, Surveying, Vol.- I, Vol.-II, Vol.-III Laxmi Publication

5. M. S. Palani Gamy, Basic Civil Engineering, Tata Mc-Graw Hill Publication
6. Arora, Building Material, S. Publication
7. P. R. Patankar, Elements of Civil Engineering, New Vrinda Publishing House.

First Year Engineering : Semester-II

4. BASIC MECHANICAL ENGINEERING

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 3	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

1. Thermodynamics
Heat, work and Internal Energy, Thermodynamic State, Process, Cycle, Thermodynamic System, First Law of Thermodynamics, Application of First Law to steady Flow and Non Flow processes, Limitations of First Law, PMM of first kind (Numerical Treatment), Second Law of Thermodynamics – Statements, Carnot Engine and Carnot Refrigerator, PMM of Second Kind. **(8)**

2. Gas Laws, Gas Processes
Carnot, Joule, Otto Cycle, Properties at salient points, Air Standard efficiency (Numerical treatment on gas processes and crnot, otto cycles only). **(6)**

3. Introduction to IC Engine
Two stroke, Four Stroke Cycles, Construction and Working of C.I. and S.I. Engines, Air-Fuel ratio, (Descriptive Treatment only) **(3)**

4. Introduction to Refrigeration and Air Conditioning
Vapour compression and vapour absorption system, Psychometric properties of moist air. (Descriptive Treatment only) **(3)**

SECTION-II

5. **Energy Sources :** Renewable and nonrenewable, solar flat plate collector, concentric collector – Parabolic and cylindrical, Photo voltaic cell, Solar energy application solar dryer, Solar pond, solar distillation, solar refrigeration, Solar cooker, Wind, Geothermal, Wave, Tidal, Hydro power, Bio-gas, Bio-Diesel, Fuel cell, (Descriptive Treatment Only)
(7)

6. **Steam Generation :** formation of steam, sensible head, latent heat, layout of steam power plant (Descriptive Treatment only) **(3)**

7. **Mechanical Power Transmission :** Type of Belt and belt drives, chain drive, Types of gears and gear Trains, Types of Coupling (Numerical Treatment on velocity ratio of belt drive and gear drive) **(5)**

8. **Pumps, compressor and Hydraulic Turbines :** Types, Construction, working and applications **(5)**

Term work :
Any 8 experiments from the following ;

1. Demonstration of Two stroke and four stroke engine with the help of models.
2. Demonstration of vapour compression refrigeration system and window air conditioner.
3. Demonstration of solar water heating system.
4. Industrial visit to Hydroelectric power plant
5. Industrial visit to steam power plant
6. Industrial visit to Diesel power plant
7. Estimation of velocity ratio and Gear ratio
8. Demonstration of pumps and compressor.
9. Demonstration of I.C. engine.

References :

1. Dr. S. P. Sukathame, Solar Energy, Tata Mc-Graw Hill Publication
2. G. D. Rai, Non Conventional Sources of Energy, Khanna Publication
3. R. Joel, Engineering Thermodynamics, The English Language Book Society.
4. Achultan, Engineering Thermodynamics, Prentice Hall of India.
5. R. K. Rajput, Thermal Engineering, Laxmi Publication, Delhi.
6. Patel and Karamchandani, Elements of Heat Engine (Vol. I, II, III) Acharya Book Depot.
7. Arora and Domkunwar, Power Plant Engineering, Dhanpat Rai and Sons.
8. S. Rao and Dr. B. B. Parulekar - Energy Technology, Khanna Publication

First Year Engineering : Semester-II
5. BASIC ELECTRICAL ENGINEERING

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 3	Theory	: 100
Practicals	: 2	Term Work	: 25

SECTION – I

1) **D.C. Circuits -**

Definition of EMF, current, resistance, power, energy. Factors affecting resistance, resistance temperature coefficient. (Numerical treatment) Series parallel circuits, division of current in two parallel branches.

Kirchhoff's Laws – KCL, KVL. (Numericals based on two variables) Numericals based on energy conversion between electrical, mechanical and thermal quantities. **(5)**

2) **Magnetic Circuits –**

Concept of magnetic circuit, MMF, reluctance, magnetic flux, flux density, magnetic field strength, Comparison between electrical and magnetic circuits, B H curve, magnetic leakage and fringing. Simple examples on series magnetic circuit. **(5)**

3) **A.C. Fundamentals -**

Faraday's laws of electromagnetic induction. Lenz's law, dynamically induced EMF, Fleming's right hand rule, statically induced EMF - self and mutually induced EMF, Concept of self and mutual inductance. Generation of single phase alternating EMF. Cycle, frequency, time period, amplitude, average value, RMS value, form factor, peak factor, phase, phase difference, phasor representation. (Only theoretical treatment) **(6)**

4) **A.C. Circuits -**

Analysis of purely resistive, inductive and capacitive circuits. R-L, R-C, R-L-C circuits, impedance triangle, power factor and its significance. Different powers in A.C. circuits. **(5)**

SECTION – II

5) **Single Phase Transformers -**

Operating principle, Construction, types of transformer, EMF equation, transformation ratio. Working of transformer at no load and with load. Losses in transformer, efficiency and voltage regulation.
(Numerical Treatment) Direct loading method for efficiency and regulation, O.C. / S.C. test for efficiency. **(7)**

6) D.C. Motors -

Principle of working, construction, types, circuit diagram. Speed and torque equations. Characteristics and applications. (Theoretical treatment only). **(5)**

7) Single Phase Motors -

Working principle, types, construction, applications of single phase induction motors. Universal motor- Construction, working and applications. (Theoretical treatment only) **(6)**

8) Domestic Wiring and Lamps -

Simple staircase and godown wiring. Necessity of earthing. Construction and working of fluorescent lamp, sodium vapour lamp, mercury vapour lamp, CFL and metal halide lamp. **(3)**

Term work :

Any 8 experiments.

1) Verification of Kirchoff's Laws.
2) Study of RLC series circuits.
3) Efficiency and voltage regulation of single phase transformer by direct loading.
4) Efficiency of single phase transformer by O.C. / S.C. test.
5) To plot B-H curve.
6) To plot characteristics of D.C. shunt motor.
7) Working of simple, staircase and godown wiring.
8) Load test on single phase induction motor.
9) Working of electric lamps.
10) Working of table fan, ceiling fan, electric iron, geyser etc.
11) Determination of resistance and inductance of a choke coil by voltmeter ammeter method.

References :

1) B. L. Theraja - A Text Book of Electrical Technology (Vol.-I and II)

2) V. K. Mehta - Fundamentals of Electrical Technology
– S. Chand Publications.

3) Ashfaq Hussein - Fundamentals of Electrical Engineering
- Dhanapat Rai Publication.

4) Edward Hughes – Electrical Technology – ELBS Longman.

First Year Engineering : Semester-II

6. PROFESSIONAL COMMUNICATION - II

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 1	Theory	: --
Tutorials	: 1	Term Work	: 25

---

1) Techniques of Professional Correspondence :-

Importance of professional correspondence,
Techniques of professional correspondence. **(3)**

2) Types of professional correspondence :-

Application Letter, Enquiries and replies, order, complaint and their reply, invitation letters and its reply. **(5)**

3) Report writing :-

Importance and Techniques of report writing,
Investigation Reports (Losses, Strikes, Declines)
Survey Reports (Examining feasibility of proposals),
Inspection Reports (of departments, branches, factory etc.) **(4)**

4) Paragraph writing :-

Techniques of paragraph writing. **(2)**

Term work :

1. A letter each on different types of professional correspondence should be practiced.
2. Report writing – At least one report on each types should be practiced.
3. Technical paragraph writing – At least four topics should be written out of following ;
   a. Nanotechnology
   b. Deforestration
   c. Metro Train
   d. Modern Civilization
   e. Green House Effect
   f. Waste Water Management
   g. Search Engines
   h. Hydropower
   i. Mobile Mania
   j. Energy Conservation
   k. Any other topic on recent technological development.
4. Presentation techniques.

References :

1. R. K. Chaddha, Communication Techniques and skills – Dhanpat Rai Publication, New Delhi.
2. Pravil S. R. Bhatia, Professional Communication Skills - S. Chand and Co., New Delhi.
3. J. D. O'Connor, Better English pronunciation.
4. Wren and Martin, High-school English Grammar and Composition – S. Chand and Co., New Delhi.
5. Sunita Mishra, C. Muralikrishna, Communication Skills for Engineers – Pearson Education.
6. Aspi Doctor, Principles and Practice of Business Communication - Rhoda Doctor, Sheth Publications, Mumbai.

First Year Engineering : Semester-II

7. WORKSHOP PRACTICE - II

Teaching Scheme : Hrs.		Examination Scheme : Marks	
Lectures	: 1	Theory	: --
Practicals	: 2	Term Work	: 25

---

1. **Safety :** Common hazards while working with engineering equipment and related safety measures. **(1)**

2. **Materials :** Brief introduction of materials used in Industries, steels and alloys, cast iron, non-ferrous metals, timber, plastics and polymers, glass etc. and; their applications. **(2)**

3. **Measuring Instruments :** Brief introduction to instruments like – Steel rule, Vernier Caliper, Micrometer, Dial indicator, Their least counts, common errors and care while using them, Use of marking gauge, 'V' block and surface plate. **(2)**

4. **Carpentry and Fitting :** Brief study of various hand tools like chisel, saw, planer and fitting tools like files, saw, drills, taps and dies. **(1)**

5. **Welding :** Classification and brief introduction to welding processes - Arc, Gas and Resistance. **(2)**

6. **Sheet Metal Working :** Specifications of metal sheets, Surface coatings ; Operations like cutting, bending, folding, punching, riveting ; Joining by brazing and soldering. **(2)**

7. **Smithy :** Introduction to smithy operations like upsetting, drawing, bending, Forming ; Tools- hammer, hot and cold chisels, swages, drifts, flatters, tongs, Anvils. **(2)**

8. **Brief introduction to machine tools and processes-** Metal removing, metal shaping, plastic molding. **(1)**

Term work :

One job each in :

1. Sheet metal working involving marking, cutting, bending, joining operations such as a tray bin, funnel etc.

2. Fitting involving marking, filing, hacksaw cutting, drilling and

tapping such as a male-female type pare.

3. Smithy involving upsetting, drawing, bending, forming such as a square / hexagonal headed bolt, hook etc.

4. Welding involving But / Tee / Lap joints and demonstration of welding processes – Arc, Gas, Spot, etc.

References :

1. B. S. Raghuvanshi, A Course in Workshop Technology, Vol – I, Dhanapat Rai and Sons.
2. Hajara Choudhari, Elements of Workshop Technology, Vol – I, Media Promoters.
3. Gupta and Kaushik, Workshop Technology, Vol – I, New Heights.
4. Chapman, Workshop Technology, Vol – I, The English Language Book Society.
5. H.S.Bawa, Workshop technology, Vol.-I, TMH Publications, New Delhi.

Equivalence of Subject F.E.Part I &II under the Faculty of Engineering & Technology

Part -I

Sr. No.	F.E. Part I Per-revised	F.E. Part I Revised
1	2	3
1	Engineering Physics-I	Engineering Physics
2	Engineering Chemistry-I	Engineering Chemistry
3	Engineering Mathematics-I	Engineering Mathematics-I
4	Applied Mechanics	Applied Mechanics
5	Engineering Graphics	Engineering Graphics
6	Communication Skill	Professional Communication - I [Term Work only]

Part -II

Sr. No.	F.E. Part II Per-revised	F.E. Part II Revised
1	2	3
1	Engineering Physics-II	Engineering Physics
2	Engineering Chemistry-II	Engineering Chemistry
3	Engineering Mathematics-II	Engineering Mathematics-II
4	Basic Civil Engineering	Basic Civil Engineering
5	Basic Mechanical Engineering	Basic Mechanical Engineering
6	Basic Electrical Engineering	Basic Electrical Engineering