

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned							
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total				
FEC201	Engineering Mathematics-II	3	--	1*	3	1	--	4				
Course Code	Course Name	Examination Scheme										
		Theory			End Sem. Exam.	Exam. Duration (in Hrs)	Term Work	Pract. /oral				
		Internal Assessment										
		Test1	Test 2	Avg.								
FEC201	Engineering Mathematics-II	20	20	20	80	3	25	--	125			

### Course Objectives

1. The course is aimed to develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience in using SCILAB software to handle real life problems.

### Course Outcomes: Students will be able to...

1. Apply the concepts of First Order and first degree Differential equation to the problems in the field of engineering.
2. Apply the concepts of Higher Order Linear Differential equation to the engineering problems.
3. Apply concepts of Beta and Gamma function to solve improper integrals.
4. Apply concepts of Double integral of different coordinate systems to the engineering problems like area and mass.
5. Apply concepts of triple integral of different coordinate systems to the engineering problems and problems based on volume of solids.
6. Solve differential equations and integrations numerically using SCILAB software to experimental aspect of applied mathematics.

Module	Detailed Contents	Hrs.
01	<b>Differential Equations of First Order and First Degree</b> 2.1 Exact differential Equations, Equations reducible to exact form by using integrating factors. 1.2 Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation. <b># Self learning topics:</b> Simple application of differential equation of first order and first degree to electrical and Mechanical Engineering problem	4  2
02	<b>Linear Differential Equations With Constant Coefficients and Variable Coefficients Of Higher Order</b> 2.1. Linear Differential Equation with constant coefficient- complementary function, particular integrals of differential equation of the type $f(D)y = X$ where $X$ is $e^{ax}$ , $\sin(ax + b)$ , $\cos(ax + b)$ , $x^n$ , $e^{ax}V$ , $x V$ . 2.2. Method of variation of parameters.	4  2

	# <b>Self learning topics:</b> Cauchy's homogeneous linear differential equation and Legendre's differential equation, Applications of Higher order differential equation.	
03	<b>Beta and Gamma Function, Differentiation under Integral sign and Rectification</b> <b>Pre-requisite:</b> Tracing of curves 3.1 Beta and Gamma functions and its properties. 3.2 Differentiation under integral sign with constant limits of integration. 3.3 Rectification of plane curves.(Cartesian and polar) <b># Self learning topics:</b> Rectification of curve in parametric co-ordinates.	2 2 2
04	<b>Multiple Integration-1</b> 4.1. Double integration-definition, Evaluation of Double Integrals.(Cartesian & Polar) 4.2. Evaluation of double integrals by changing the order of integration. 4.3. Evaluation of integrals over the given region.(Cartesian & Polar)  <b># Self learning topics:</b> Application of double integrals to compute Area, Mass.	2 2 2
05	<b>Multiple Integration-2</b> 5.1. Evaluation of double integrals by changing to polar coordinates. 5.2. Application of double integrals to compute Area 5.3. Triple integration definition and evaluation (Cartesian, cylindrical and spherical polar coordinates). <b># Self learning topics:</b> Application of triple integral to compute volume.	2 2 2
06	<b>Numerical solution of ordinary differential equations of first order and first degree, and , Numerical Integration</b>  6.1. Numerical solution of ordinary differential equation using (a) Euler's method (b) Modified Euler method, (c) Runge-Kutta fourth order method 6.2. Numerical integration- by (a) Trapezoidal (b) Simpson's 1/3rd (c) Simpson's 3/8th rule (all with proof). <b># Self learning topics:</b> Numerical solution of ordinary differential equation using Taylor series method.	3 3

### Term Work:

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practicals.
2. Students must be encouraged to write SCILAB Programs in tutorial class only. Each Student has to write at least 4 SCILAB tutorials (including print out) and at least 6 class tutorials on entire syllabus.
3. SCILAB Tutorials will be based on (i) Euler Method, (ii) Modified Euler Method, (iii) Runge-Kutta Method of fourth order , (iv) Trapezoidal Rule , (v) Simpson's 1/3<sup>rd</sup> Rule (vi) Simpson's 3/8th rule

The distribution of Term Work marks will be as follows –

1.	Attendance (Theory and Tutorial)	: 05 marks
2.	Class Tutorials on entire syllabus	: 10 marks
3.	SCILAB Tutorials	: 10 marks

## **Assessment:**

### **Internal Assessment Test:**

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 20 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein 4 sub-questions of 5 marks each will be asked.
4. Remaining questions will be randomly selected from all the modules.
5. Weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

### **References:**

1. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley EasternLimited, 9<sup>th</sup>Ed.
3. Engineering Mathematics by Srimanta Pal and SubodhBhunia, Oxford University Press
4. Applied Numerical Methods with MATLABfor Engineers and Scientists by Steven Chapra, McGraw Hill
5. Elementary Linear Algebra with Application by Howard Anton and Christ Rorres. 6th edition.
6. John Wiley & Sons,INC.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned							
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total				
FEC202	Engineering Physics-II	2	--	--	2	--	--	2				
Course Code	Course Name	Examination Scheme										
		Theory			End Sem. Exam.	Exam. Duration (in Hrs)	Term Work	Pract. /oral				
		Internal Assessment										
		Test 1	Test 2	Avg.								
FEC202	Engineering Physics-II	15	15	15	60	2	--	--	75			

### Rationale:

Most of the engineering branches are being off-spring of basic sciences where physics is playing a pivotal role in concept and understanding of foundation of core engineering branches. This syllabus is developed by keeping in mind, needs of all branches that we offer in University of Mumbai.

The topic distribution is being done in systematic manner and whenever required, prerequisite to the topic are mentioned for frictionless teaching–learning process. In the distribution of topics, core physics and its applied form are given priority. At the same time few modules are introduced over emerging trends in the field of technology.

For the purpose of emphasis on applied part, list of suggestive experiments is added. As per new guidelines of AICTE, a scope is kept in the syllabus for simulation technique and use of information technology to supplement laboratory practices. Further, it is ensured that these modules will cover prerequisites needed for engineering courses to be introduced in higher semesters as core subjects or as interdisciplinary subjects in respective branches.

### Objectives

1. To give exposure to the topics of fundamental physics in the area of electrodynamics and relativity.
2. To give exposure to fundamentals of physics related with current technology in the field of Nanotechnology and Physics of Sensor Technology.

### Outcomes: Learners will be able to...

1. Describe the diffraction through slits and its applications.
2. Apply the foundation of laser and fiber optics in development of modern communication technology.
3. Relate the basics of electrodynamics which is prerequisite for satellite communications, antenna theory etc.
4. Explain the fundamentals of relativity.
5. Assimilate the wide scope of nanotechnology in modern developments and its role in emerging innovating applications.
6. Interpret and explore basic sensing techniques for physical measurements in modern instrumentations.

Module	Detailed Contents	Hrs.
01	<b>DIFFRACTION</b> <b>(Prerequisites :</b> Wave front and Huygen's principle, reflection and refraction, diffraction, Fresnel diffraction and Fraunhoffer diffraction)	04

	Diffraction: Fraunhofer diffraction at single slit, Diffraction Grating, Resolving power of a grating; Applications of diffraction grating; Determination of wavelength of light using plane transmission grating	
02	<p><b>LASER AND FIBRE OPTICS</b></p> <p><b>(Prerequisites:</b> Absorption, recombination, energy bands of p-n junction, refractive index of a material, Snell's law)</p> <p>Laser: spontaneous emission and stimulated emission; metastable state, population inversion, types of pumping, resonant cavity, Einsteins's equations; Helium Neon laser; Nd:YAG laser; Semiconductor laser, Applications of laser- Holography</p> <p>Fibre optics: Numerical Aperture for step index fibre; critical angle; angle of acceptance; V number; number of modes of propagation; types of optical fibres; Fibre optic communication system;</p>	06
03	<p><b>ELECTRODYNAMICS</b></p> <p><b>(Prerequisites :</b> Electric Charges, Coulomb's law-force between two point charges, Electric field, electric field due to a point charge, electric field lines, electric dipole, electric field due to a dipole, Gauss's law, Faraday's law)</p> <p>Scalar and Vector field, Physical significance of gradient, curl and divergence in Cartesian co-ordinate system, Gauss's law for electrostatics, Gauss's law for magnetostatics, Faraday's Law and Ampere's circuital law; Maxwell's equations (Free space and time varying fields).</p>	05
04	<p><b>RELATIVITY</b></p> <p><b>(Prerequisites:</b> Cartesian co-ordinate system)</p> <p>Special theory of Relativity: Inertial and Non-inertial Frames of reference, Galilean transformations, Lorentz transformations (space – time coordinates), Time Dilation, Length Contraction and Mass-Energy relation.</p>	02
05	<p><b>NANOTECHNOLOGY</b></p> <p><b>(Prerequisites :</b> Scattering of electrons, Tunneling effect, Electrostatic focusing, magneto static focusing)</p> <p>Nanomaterials : Properties (Optical, electrical, magnetic, structural, mechanical) and applications, Surface to volume ratio; Two main approaches in nanotechnology -Bottom up technique and Top down technique;</p> <p>Tools for characterization of Nanoparticles: Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM).</p> <p>Methods to synthesize Nanomaterials: Ball milling, Sputtering, Vapour deposition, Solgel</p>	04
06	<p><b>PHYSICS OF SENSORS</b></p> <p><b>(Prerequisites :</b> Transducer concept, meaning of calibration, piezoelectric effect)</p> <p>Resistive sensors:</p> <ul style="list-style-type: none"> <li>a) Temperature measurement: PT100 construction, calibration,</li> <li>b) Humidity measurement using resistive sensors,</li> </ul> <p>Pressure sensor: Concept of pressure sensing by capacitive, flex and inductive method, Analog pressure sensor: construction working and calibration and applications.</p> <p>Piezoelectric transducers: Concept of piezoelectricity, use of piezoelectric transducer as ultrasonic generator and application of ultrasonic transducer for distance measurement, liquid and air velocity measurement.</p> <p>Optical sensor: Photodiode, construction and use of photodiode as ambient light measurement and flux measurement.</p> <p>Pyroelectric sensors: Construction and working principle, application of pyroelectric sensor as bolometer.</p>	05

## **Assessment**

### **Internal Assessment Test**

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

### **End Semester Examination**

**In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.**

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Question number 1 will be compulsory and based on maximum contents of the syllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

## **References**

1. A text book of Engineering Physics-Avadhanulu&Kshirsagar, S.Chand
2. Optics - Ajay Ghatak, Tata McGraw Hill
3. A textbook of Optics - N. Subramanyam and Brijlal, S.Chand
4. Concepts of Modern Physics- ArtherBeiser, Tata Mcgraw Hill
5. Introduction to Electrodynamics- D. J. Griffiths, Pearson publication
6. Introduction to Special Relativity- Robert Resnick, John Wiley and sons
7. Advances In Nano Materials And Applications: History of Nanotechnology From Pre-Historic to Modern Times, Madhuri Sharon, Wiley, USA
8. Nano: The essentials, understanding Nanoscience and Nanotechnology, T. Pradeep, Tata McGraw Hill, 2007.
9. Electronic Instrumentation –H.S. Kalsi, Tata McGraw-Hill Education
10. Handbook of Modern Sensors Physics design and application- Jacob Fraden, Springer, AIP press.
11. Instrumentation & Measurement Techniques by Albert D. Helfrick& William D. Cooper (PHI) Edition

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned							
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total				
FEC203	Engineering Chemistry-II	2	-	-	2	-	-	2				
Course Code	Course Name	Examination Scheme										
		Theory			End Sem. Exam.	Exam. Duration (in Hrs)	Term Work	Pract. /oral				
		Internal Assessment										
		Test 1	Test 2	Avg.								
FEC203	Engineering Chemistry-II	15	15	15	60	2	--	--	75			

## Objectives

The concepts developed in this course will aid in quantification as well as understand the applications of several concepts in Chemistry that have been introduced at the 10 + 2 levels in schools.

## Outcomes: Learners will be able to...

1. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
2. Illustrate the concept of emission spectroscopy and describe the phenomena of fluorescence and phosphorescence in relation to it.
3. Explain the concept of electrode potential and nernst theory and relate it to electrochemical cells.
4. Identify different types of corrosion and suggest control measures in industries.
5. Illustrate the principles of green chemistry and study environmental impact.
6. Explain the knowledge of determining the quality of fuel and quantify the oxygen required for combustion of fuel.

Module	Detailed Contents	Hrs.
01	<b>Principles of Spectroscopy:</b> Introduction: Principle of spectroscopy, Definition, Origin of spectrum, Classification of spectroscopy – atomic and molecular, selection rules. Table of relation between electromagnetic spectrum, types of spectroscopy and energy changes.	02
02	<b>Applications of Spectroscopy</b> Emission spectroscopy- Principle, Instrumentation and applications ( Flame Photometry) Introduction to fluorescence and phosphorescence, Jablonski diagram, application of fluorescence in medicine only.	04
03	<b>Concept of Electrochemistry</b> Introduction, concept of electrode potential, Nernst equation, types of electrochemical cells, concept of standard electrode with examples, electrochemical series, simplenumericals.	02

04	<p><b>Corrosion:</b>          Definition, Mechanism of Corrosion- (I) Dry or Chemical Corrosion-i) Due to oxygen ii)Due to other gases.          (II)Wet or Electrochemical corrosion- Mechanism          i) Evolution of hydrogen type ii) Absorption of oxygen.</p> <p>Types of Corrosion- Galvanic cell corrosion, Concentration cell corrosion (differential aeration principle), Pitting corrosion, Intergranular corrosion, Stress corrosion.</p> <p>Factors affecting the rate of corrosion- (i)Nature of metal, (ii)Nature of corroding environment.</p> <p>Methods of corrosion control- (I)Material selection and proper designing,(II) Cathodic protection- i) Sacrificial anodic protection ii) Impressed current method,(III) Metallic coatings- only Cathodic coating (tinning) and anodic coatings (Galvanising)</p>	06
05	<p><b>Green Chemistry and Synthesis of drugs</b>          Introduction – Definition, significance          Twelve Principles of Green chemistry, numerical on atom economy,          Conventional and green synthesis of Adipic acid, Indigo, Carbaryl, Ibuprofen, Benzimidazole, Benzyl alcohol, % atom economy and their numericals.          Green fuel- Biodiesel.</p>	04
06	<p><b>Fuels and Combustion</b>          Definition, classification, characteristics of a good fuel, units of heat (no conversions).          Calorific value- Definition, Gross or Higher calorific value &amp; Net or lower calorific value, Dulong's formula &amp; numerical for calculations of Gross and Net calorific values.          Solid fuels- Analysis of coal- Proximate and Ultimate Analysis- numerical problems and significance.          Liquid fuels- Petrol- Knocking, Octane number, Cetane number, Antiknocking agents, unleaded petrol, oxygenates (MTBE), catalytic converter.          Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid &amp; gaseous fuels.</p>	06

## Assessment

### Internal Assessment Test

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

### End Semester Examination

**In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.**

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Question number 1 will be compulsory and based on maximum contents of the syllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

## **Recommended Books :**

1. Engineering Chemistry - Jain & Jain, DhanpatRai
2. Engineering Chemistry – Dara & Dara, S Chand
3. Green Chemistry: A textbook – V.K.Ahluwalia, Alpha Science International
4. Fundamentals of Molecular Spectroscopy ( 4th Edition) - C.N.Banwell, Elaine M. McCash,  
Tata McGraw Hill.
5. Elementary Organic Spectroscopy- Y.R.Sharma, S.Chand and Co.
6. A Text Book of Engineering Chemistry - ShashiChawla, DhanpatRai
7. Engineering Chemistry – Payal Joshi &Shashank Deep (Oxford University Press)

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned							
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total				
FEC204	Engineering Graphics	2	--	--	2	--	--	2				
Course Code	Course Name	Examination Scheme										
		Theory			End Sem. Exam.	Exam. Duration (in Hrs)	Term Work	Pract. /oral				
		Internal Assessment										
		Test1	Test 2	Avg.								
FEC204	Engineering Graphics	15	15	15	60	3	--	--	75			

### Objectives

1. To impart and inculcate proper understanding of the theory of projection.
2. To impart the knowledge of reading a drawing
3. To improve the visualization skill.

**Outcomes:** Learners will be able to...

1. Apply the basic principles of projections in Projection of Lines and Planes
2. Apply the basic principles of projections in Projection of Solids.
3. Apply the basic principles of sectional views in Section of solids.
4. Apply the basic principles of projections in converting 3D view to 2D drawing.
5. Read a given drawing.
6. Visualize an object from the given two views.

Module	Detailed Contents	Hrs.
01	<b>Introduction to Engineering Graphics</b> Principles of Engineering Graphics and their significance, usage of Drawing instruments, Types of Lines, Dimensioning Systems as per IS conventions. Introduction to plain and diagonal scales. <b>Engineering Curves</b> Basic construction of Cycloid, Involutes and Helix (of cylinder) only.	2
02	<b>Projection of Points and Lines</b> Lines inclined to both the Reference Planes (Excluding Traces of lines) and simple application based problems on Projection of lines. <b>@ Projection of Planes</b> Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular planes inclined to either HP or VP only. (Exclude composite planes).	5
03	<b>Projection of Solids</b> (Prism, Pyramid, Cylinder, Cone only) Solid projection with the axis inclined to HP and VP. (Exclude Spheres, Composite, Hollow solids and frustum of solids). Use change of position or Auxiliary plane method	5
04	<b>Section of Solids</b> Section of Prism, Pyramid, Cylinder, & Cone cut by plane perpendicular to at least one reference plane (Exclude Curved Section Plane). Use change of position or Auxiliary plane method.	5

<b>05</b>	<b>#Orthographic and Sectional Orthographic Projections:</b> - Fundamentals of orthographic projections. Different views of a simple machine part as per the first angle projection method recommended by I.S. Full or Half Sectional views of the Simple Machine parts.	<b>3</b>
<b>06</b>	<b>#@ Missing Views:</b> The identification of missing views from the given views. Create the third view from the two available views so that all the details of the object are obtained.	<b>1</b>
<b>07</b>	<b>#Isometric Views:-</b> Principles of Isometric projection – Isometric Scale, Isometric Views, Conversion of Orthographic Views to Isometric Views(Excluding Sphere ).	<b>3</b>
<b>@ only in Term Work ( i.e; Questions will not be asked for any examination.)</b>		
<b># more problems should be discussed during practical hours to strengthen the concepts.</b>		

### **Assessment:**

#### **Internal Assessment Test:**

Assessment consists of two class tests of 15 marks each.

Among the two tests One is Conventional (manual drawing) and Second using CAD software.

#### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 15marks.
2. Any 4 questions need to be solved. There won't be any compulsory Question
3. Total 04 questions need to be solved.
4. Remaining questions will be mixed in nature.( e.g. Suppose Q.2 has part (a) from module3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

#### **Text Books.**

1. N.D. Bhatt, "Engineering Drawing (Plane and solid geometry)", Charotar Publishing House Pvt. Ltd.
2. N.D. Bhatt & V.M. Panchal, "Machine Drawing", Charotar Publishing House Pvt. Ltd.

#### **Reference Books**

3. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publisher.
4. Prof. Sham Tickoo (Purdue University) & Gaurav Verma, "( CAD Soft Technologies) : Auto CAD 2012 (For engineers and Designers)", Dreamtech Press New Delhi.
5. Dhananjay A Jolhe, "Engineering Drawing" Tata McGraw Hill.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned					
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total		
FEC205	C Programming	2	--	--	2	--	--	2		
Course Code	Course Name	Examination Scheme								
		Theory				Term Work	Pract. /oral	Total		
		Internal Assessment			End Sem. Exam.					
		Test1	Test 2	Avg.	Exam. Duration (in Hrs)					
FEC205	C Programming	15	15	15	60	2	--	--		

### Objectives

To provide exposure to problem-solving by developing an algorithm, flowchart and implement the logic using C programming language.

**Outcomes:** Learner will be able to...

1. Formulate simple algorithms for arithmetic, logical problems and translate them to programs in C language
2. Implement, test and execute programs comprising of control structures.
3. Decompose a problem into functions and synthesize a complete program.
4. Demonstrate the use of arrays, strings and structures in C language.
5. Understand the concept of pointers

Module	Detailed Contents	Hrs.
1	<b>Introduction</b> <ul style="list-style-type: none"> <li>● Introduction to components of a Computer System</li> <li>● Introduction to Algorithm and Flowchart</li> </ul>	5
	<b>Fundamentals of C Programming</b> <ul style="list-style-type: none"> <li>● Keywords, Identifiers, Constants and Variables</li> <li>● Data types in C</li> <li>● Operators in C</li> <li>● Basic Input and Output Operations</li> <li>● Expressions and Precedence of Operators</li> <li>● In-built Functions</li> </ul>	
	<b>Control Structures</b> <ul style="list-style-type: none"> <li>● Introduction to Control Structures</li> </ul>	
	<b>Branching and looping structures</b> <ul style="list-style-type: none"> <li>● If statement, If-else statement, Nested if-else, else-if Ladder</li> <li>● Switch statement</li> <li>● For loop, While loop, Do while loop</li> <li>● break and continue</li> </ul>	
	<b>Functions</b> <ul style="list-style-type: none"> <li>● Introduction to functions</li> <li>● Function prototype, Function definition, Accessing a function and parameter passing.</li> <li>● Recursion.</li> </ul>	
3		4

4	<b>Arrays and Strings</b> <ul style="list-style-type: none"> <li>● Introduction to Arrays</li> <li>● Declaration and initialization of one dimensional and two-dimensional arrays.</li> <li>● Definition and initialization of String</li> <li>● String functions</li> </ul>	4
5	<b>Structure and Union</b> <ul style="list-style-type: none"> <li>● Concept of Structure and Union</li> <li>● Declaration and Initialization of structure and union</li> <li>● Nested structures</li> <li>● Array of Structures</li> <li>● Passing structure to functions</li> </ul>	4
6	<b>Pointers</b> <ul style="list-style-type: none"> <li>● Fundamentals of pointers</li> <li>● Declaration, initialization and dereferencing of pointers</li> <li>● Operations on Pointers</li> <li>● Concept of dynamic memory allocation</li> </ul>	4

### **Assessment:**

#### **Internal Assessment Test:**

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

#### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 15marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 marks will be asked.
4. Remaining questions will be mixed in nature.( e.g. Suppose Q.2 has part (a) from module3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

#### **Text Books:**

1. E. Balaguruswamy, Programming in ANSI C, McGraw-Hill
2. Kernighan , Ritchie, “The C programming Language”, Prentice Hall of India
3. Sumitabha Das, Computer Fundamentals and C Programming, McGraw-Hill
4. Pradeep Day and ManasGosh ,“Programming in C”, Oxford University Press.

#### **References:**

1. Byron Gottfried, “Programing with C”, McGraw Hill ( Schaum’s outline series)
2. Venugopal K.R, Prasad Sudeep, “Mastering C”, McGraw-Hill
3. KanetkarYashwant,” “Let Us C”, BPB Publication.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned							
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total				
FEC206	Professional Communication and Ethics- I	2	--	--	2	--	--	2				
Course Code	Course Name	Examination Scheme										
		Theory			End Sem. Exam.	Exam. Duration (in Hrs)	Term Work	Pract. /oral				
		Internal Assessment										
		Test1	Test 2	Avg.								
FEC206	Professional Communication and Ethics- I	10	10	10	40	2	--	--	50			

### Objectives

1. To demonstrate the fundamental concepts of interpersonal and professional communication.
2. To encourage active listening with focus on content, purpose, ideas and tone.
3. To facilitate fluent speaking skills in social, academic and professional situations.
4. To train in reading strategies for comprehending academic and business correspondence.
5. To promote effective writing skills in business, technology and academic arenas.
6. To inculcate confident personality traits along with grooming and social etiquettes.

**Outcomes:** Learners will be able to understand how to...

1. Eliminate barriers and use verbal/non-verbal cues at social and workplace situations.
2. Employ listening strategies to comprehend wide-ranging vocabulary, grammatical structures, tone and pronunciation.
3. Prepare effectively for speaking at social, academic and business situations.
4. Use reading strategies for faster comprehension, summarization and evaluation of texts.
5. Acquire effective writing skills for drafting academic, business and technical documents.
6. Successfully interact in all kinds of settings, displaying refined grooming and social skills.

Module	Detailed Contents	Hrs.
	<b>FUNDAMENTALS OF COMMUNICATION</b>	
1	<p><b>1.1. Introduction to Theory of Communication</b></p> <ul style="list-style-type: none"> <li>● Definition</li> <li>● Objectives</li> <li>● Postulates/Hallmarks</li> <li>● The Process of Communication</li> <li>● Organizational Communication <ul style="list-style-type: none"> <li>○ Formal (Upward, Downward and Horizontal)</li> <li>○ Informal (Grapevine)</li> </ul> </li> </ul> <p><b>1.2. Methods of Communication</b></p> <ul style="list-style-type: none"> <li>● Verbal (Written &amp; Spoken)</li> <li>● Non-verbal <ul style="list-style-type: none"> <li>○ Non-verbal cues perceived through the five senses: (Visual, Auditory, Tactile, Olfactory and Gustatory cues)</li> <li>○ Non-verbal cues transmitted through the use of: (The Body, Voice, Space, Time and Silence)</li> </ul> </li> </ul> <p><b>1.3. Barriers to Communication</b></p> <ul style="list-style-type: none"> <li>● Mechanical/External</li> </ul>	12

	<ul style="list-style-type: none"> <li>● Physical/Internal</li> <li>● Semantic &amp; Linguistic</li> <li>● Psychological</li> <li>● Socio-Cultural</li> </ul> <p><b>1.4. Communication at the Workplace</b></p> <ul style="list-style-type: none"> <li>● Corporate Communication - Case Studies</li> <li>● Listening Tasks with Recordings and Activity Sheets</li> <li>● Short Speeches as Monologues <ul style="list-style-type: none"> <li>○ Informative Speeches that Center on People, Events, Processes, Places, or Things</li> <li>○ Persuasive Speeches to Persuade, Motivate or Take Action</li> <li>○ Special Occasion Speeches for Ceremonial, Commemorative, or Epideictic purposes</li> </ul> </li> <li>● Pair-work Conversational Activities (Dialogues)</li> <li>● Short Group Presentations on Business Plans</li> </ul>	
2	<p><b>VERBAL APTITUDE FOR EMPLOYMENT</b></p> <p><b>2.1. Vocabulary Building</b></p> <ul style="list-style-type: none"> <li>● Root words (Etymology)</li> <li>● Meaning of Words in Context</li> <li>● Synonyms &amp; Antonyms</li> <li>● Collocations</li> <li>● Word Form Charts</li> <li>● Prefixes &amp; Suffixes</li> <li>● Standard Abbreviations</li> </ul> <p><b>2.2. Grammar</b></p> <ul style="list-style-type: none"> <li>● Identifying Common Errors <ul style="list-style-type: none"> <li>○ Subject - Verb Agreement</li> <li>○ Misplaced Modifiers</li> <li>○ Articles</li> <li>○ Prepositions</li> </ul> </li> <li>● Tautologies</li> <li>● Pleonasms (Redundancies)</li> <li>● Idioms</li> <li>● Cliches</li> </ul>	02
3	<p><b>DEVELOPING READING AND WRITING SKILLS</b></p> <p><b>3.1. Reading Comprehension</b></p> <ul style="list-style-type: none"> <li>● Long Passages</li> <li>● Short Passages</li> <li>● MCQs on Inferential Questions with 4 Options</li> </ul> <p><b>3.2. Summarization of reading passages, reports, chapters, books</b></p> <ul style="list-style-type: none"> <li>● Graphic Organizers for Summaries <ul style="list-style-type: none"> <li>○ Radial Diagrams like Mind Maps</li> <li>○ Flow Charts</li> <li>○ Tree Diagrams</li> <li>○ Cyclic Diagrams</li> <li>○ Linear Diagrams like Timelines</li> <li>○ Pyramids</li> <li>○ Venn Diagrams</li> </ul> </li> <li>● Point-form Summaries</li> <li>● One-sentence Summaries of Central Idea</li> </ul> <p><b>3.3. Paraphrasing</b></p> <ul style="list-style-type: none"> <li>● Understanding Copyrights</li> <li>● Running a Plagiarism Check on Paraphrased Passages</li> <li>● Generating Plagiarism Reports</li> </ul>	02

	<ul style="list-style-type: none"> <li>• Basic APA and MLA Referencing Style and Format</li> </ul>	
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4	<p><b>BUSINESS CORRESPONDENCE</b></p> <p><b>4.1. Seven Cs of Business Correspondence</b></p> <ul style="list-style-type: none"> <li>• Completeness</li> <li>• Conciseness</li> <li>• Consideration</li> <li>• Concreteness</li> <li>• Clarity</li> <li>• Courtesy</li> <li>• Correctness</li> </ul> <p><b>4.2. Parts of a Formal Letter and Formats</b></p> <ul style="list-style-type: none"> <li>• Parts/Elements of a Formal Letter <ul style="list-style-type: none"> <li>○ Letterheads and/or Sender's Address</li> <li>○ Dateline</li> <li>○ Inside Address</li> <li>○ Reference Line (Optional)</li> <li>○ Attention Line (Optional)</li> <li>○ Salutation</li> <li>○ Subject Line</li> <li>○ Body</li> <li>○ Complimentary Close</li> <li>○ Signature Block</li> <li>○ Enclosures/Attachments</li> </ul> </li> <li>• Complete/Full Block Format</li> </ul> <p><b>4.3. Emails</b></p> <ul style="list-style-type: none"> <li>• Format of Emails</li> <li>• Features of Effective Emails</li> <li>• Language and style of Emails</li> </ul> <p><b>4.4. Types of Letters in Both Formal Letter Format and Emails</b></p> <ul style="list-style-type: none"> <li>• Claim &amp; Adjustment Letters</li> <li>• Request/Permission Letters</li> <li>• Sales Letters</li> </ul>	06
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5	<p><b>BASIC TECHNICAL WRITING</b></p> <p><b>5.1. Introduction</b></p> <ul style="list-style-type: none"> <li>• What is Technical Writing?</li> <li>• Importance and Principles of Technical Writing</li> <li>• Difference between Technical Writing &amp; Literary Writing</li> <li>• Framing Definitions</li> <li>• Difference between Technical Description &amp; Instructions</li> </ul> <p><b>5.2. Description of a Technical Object</b></p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Diagram</li> <li>• Discussion of Parts/Characteristics</li> </ul> <p>Working</p> <p><b>5.3. Writing User Instructions</b></p> <ul style="list-style-type: none"> <li>• User Instructions</li> <li>• Special Notices (Note, Warning, Caution and Danger)</li> <li>• Styles of Presentation <ul style="list-style-type: none"> <li>○ Impersonal</li> <li>○ Indirect</li> <li>○ Direct</li> </ul> </li> <li>• Imperative</li> </ul> <p><b>5.4. Description of a Technical / Scientific Process</b></p>	02
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	<ul style="list-style-type: none"> <li>● Definition</li> <li>● Diagram</li> <li>● Tools/ Apparatus/Software/ Hardware Used</li> <li>● Working</li> <li>● Result</li> </ul>	
6	<p style="text-align: center;"><b>PERSONALITY DEVELOPMENT AND SOCIAL ETIQUETTES</b></p> <p><b>6.1. Personality Development</b></p> <ul style="list-style-type: none"> <li>● Introducing Self and/or a Classmate</li> <li>● Formal Dress Code</li> </ul> <p><b>6.2. Social Etiquettes</b></p> <ul style="list-style-type: none"> <li>● Formal Dining Etiquettes</li> <li>● Cubicle Etiquettes</li> <li>● Responsibility in Using Social Media</li> <li>● Showing Empathy and Respect</li> <li>● Learning Accountability and Accepting Criticism</li> <li>● Demonstrating Flexibility and Cooperation</li> <li>● Selecting Effective Communication Channels</li> </ul>	02

### **Assessment:**

#### **Internal Assessment Test:**

Assessment consists of two class tests of 10 marks each.

**TEST I** -Public speech on general topics (Maximum 5 mins. per student)

**TEST II** - Written test covering modules 1 - 6

The second test should be based on theory and application exercises as mentioned in the syllabus. (Note: Summarization should be a compulsory question in Test II and not in the End Semester Theory Examination.)

#### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 15marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 marks will be asked.
4. Remaining questions will be mixed in nature.( e.g. Suppose Q.2 has part (a) from module3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus
6. The first module (Fundamentals of Communication) will carry 40 % weightage.

#### **Text Books.**

1. Sanjay Kumar & Pushp Lata (2018). Communication Skills with CD. New Delhi: Oxford University Press.
2. Hemphill, P.D., McCormick, D. W., & Hemphill, R. D. (2001). Business Communication with writing improvement exercises. Upper Saddle River, NJ: Prentice Hall.
3. Locker, Kitty O. Kaczmarek, Stephen Kyo. (2019). Business Communication: Building Critical Skills. Place of publication not identified: McGraw-hill.
4. Murphy, H. (1999). Effective Business Communication. Place of publication not identified: McGraw-Hill.
5. Raman, M., & Sharma, S. (2016). Technical Communication: Principles and practice. New Delhi: Oxford University Press.

6. Kaul, A. (2015). Effective Business Communication. Place of publication not identified: Prentice-Hall of India.
7. Rizvi, A. M. (2010). Effective Technical Communication: A guide for Scientists and Engineers. New Delhi: Tata McGraw Hill.
8. Lewis, N. (2014). Word power made easy. Random House USA.