University of Mumbai Syllabus Structure(R-2007) At F.E. (All Branches)
Semester-II

Subject: Engineering Drawing

Periods per week (01 Period of 60 minutes)	Lecture	3	
	Practical	4	
	tutorial	--	
		Hours	marks
Evaluation System	Theory	3	75
	Practical	2	50
	Oral Examination	--	--
	Term Work	--	25
	Total		150

Sr No	Topics	Hrs
01	**Module 1** • **Introduction**: Drawing instruments. symbolic lines. letterings. dimensioning systems as per I.S conventions, geometrical constructions and tangential arcs.	02
02	**Module 2** **Projections:** •Projection of points and lines inclined to both the reference planes including HT & VT. •Projection of right regular solids (cube, prism, pyramid, cylinder and cone) inclined to both HP & VP (excluding spheres, hollow and composite solids). • Development of surface (excluding reverse development)	11
03	**Module 3:** **Sections:** Section of solids (cube, prism, cylinder, cone) cut by plane perpendicular to at- least one reference plane (excluding curved cutting planes)	04
04	**Module 4:** **Orthographic projections:** • Multi-view orthographic projections of simple machine parts by first angle method as recommended by Indian standards. • Sectional views of simple machine parts(full section and half section only)	14

	• Reading of orthographic projections (missing views)	
05	**Module 5:** **Isometric projections:** Isometric projection / drawings of blocks (plain and cylindrical excluding spheres)	04
06	**Module 6:** **• Engineering Curves**: Parabola, Ellipse, Hyperbola, cycloid and involutes **Free hand sketches of fasteners** Thread profile – IS conventions of external and internal threads. drilled hole blind hole and tapped hole Bolts, Nuts, Set screws, Foundations bolts and locknuts,	03

Term work:

Term work shall consist of the following:

PART I: Drawing sheet

Five drawing sheets to be prepared on half imperial drawing sheet: (TO be completed in 30 Hrs.)

Sheet No.1: Curves (2 problems) & projections of lines (2 problems)
Sheet No. 2: Projections of solids (2 problems) & section of solids (1 problem)
Sheet No.3: Orthographic projections (1 problem) & sect. ortho. Projections (1 problem) Sheet No.4: Reading of orthographic projections (2 problems)
Sheet No.5: Isometric view (2 problems) & free hand sketches of fasteners.

Home –Work: one sketch book, A-3 consisting of minimum 3 problems from each module. Duly signed sketch book is part of term –work.

PART II: Computer Aided Drawing (Auto –CAD)

Practice on Auto –cad: Theory and practice to be completed during practical sessions.

Sr. No.	Topic	No of Hours
1	Introduction to Auto –Cad	06
2	Fundamental of 2 –D	04
3	Orthographic projections	06
4	Sectional orthographic projections	06
5	Reading of Orthographic	04
6	Fundamental of 3 –D drawing Isometric view	04

Printout of problems solved in the practical class to be attached in the Term work (on Sr. No. 3 4.5 & 6)

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 15 marks.
2. Only 5 questions need to be solved.
3. Q, 1 will be compulsory.
4. Remaining questions will be mixed in nature (e.g. suppose Q.2 has part (a) form, module 3 then part (b) will be form any module other then module3)
5. No. question to be asked from Module 1

Practical Examination:

Practical examination will be based on Part II of the list Term Work (Practice on Auto –Cad)

Term Work.

- The distribution of marks for term work shall be as follows,
- Part I & Part II work (Drawing sheets, sketch book and Printouts) : 10 Marks
- Test (at least one) : 10 Marks
- Attendance (Practical and Theory) : 05 Marks
- **Total** : 25 Marks.

- The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term –work.

Recommended Books:

1. Elementary Engineering drawing, N.D Bhatt, Charotar Publishing house.
2. Mastering auto CAD, G.Omura by Sybers (Autodesk Press), Wiley India.
3. Understanding AutoCAD, Sham Tiekou, Autodesk Press, Wiley India.
4. Machine Drawing, N.D Bhatt, Charotar Publishing house.
5. Engineering Drawing, M.B. Shah and B.C.Rana.
6. Engineering Graphics with Auto –Cad 2007 by James D.Bethune, 1st Edition, Pearson Education.

Subject: Applied Mathematics – II

Periods per week (01 Period of 60 minutes)	Lecture	4	
	Practical	--	
	Tutorial	1	
		Hours	Marks
Evaluation System	Theory	3	100
	Practical and Oral Examination	--	--
	Oral Examination	--	--
	Term Work	--	25
	Total		125

Sr No	Topics	Hrs
	Prerequisite: - Idea of curve tracing in Cartesian. Parametric and Polar forms. Standard curves such as Straight lines. Circles, Parabolas. Hyperbola, Catenary Clssoid, Astroid, Cycloid, Lommscate of Bernoulli, Cardiode, concept of Solid Geometry- Planes, Spheres, cones, Cylinders, Parabolloids,	02
01	**Beta and Gamma functions, Differentiation under integral sign.** 2.1.1 Definition of Beta and Gamma functions and properties 2.1.2 Relation between Beta and Gamma functions (with proof), duplication formula (with proof) 2.1.3 Differentiation under the integral sign with constant limits of integration.	06
02	**Differentiation Equations of first order and first degree** 2.2.1 Exact differential equations and those which can be reducible to the exact form by using integrating factors (four rules) 1. Homogeneous differential equations 2. F(xy)ydx+g (xy)xdy=0 3. $LF = e^{\int f(x)dx}$ $wheref(x) = \frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}$ 4. I.F.+ $e^{\int g(y)dy}$ $whereg(Y0 = \frac{\frac{\partial x}{\partial N} - \frac{\partial M}{\partial x}}{M}$ 2.2.2 Lmeat differential equations and differential equations reducible to the linear form	08

	2.2.3 Numerical solutions of differential equations using Taylor's series method.	
03	**Numerical solutions of differential equations of first order and first degree, Differential equations of order n.** 2.3.1 Euler's method, Modified Euler's method, Runge Kutta method of 4^{th} order. Comparison of numerical solutions with the exact solutions. 2.3.2 Linear differential equations with constant coefficients-Complimentary functions, particular integrals of differential equations of the type $f(D)y = X$ where X is e^{ax} sin (ax+b), cos (az+b),x^n, e^{ax} V, x^V	06
04	**Linear Differential equations with variable coefficients. Method of variation of parameters and Rectification.** 2.4.1 Cauchy's homogeneous Linear differential equation and Lavender's differential equation. 2.4.2 Method of variation of parameters 2.4.3 Simple application of differential equations of first and second order to electrical and mechanical engineering 0roblems (no formulation of differential equation) 2.4.4 Rectification of plane curves	07
05	**Integral Calculus-Double Integrals** 2.5.1 Double Integration-Definition, geometrical interpolation properties and evaluation. 2.5.2 Evaluation of double integrals by changing the order of integration and changing to polar form.	09
06	**Integral Calculus-Triple Integral and application of double and triple integrals, computer oriented techniques.** 2.6.1 Triple Integration- definition and evaluation (Cartesian, Cylindrical and Spherical polar coordinates), concept of Jacobeans. 2.6.2 Applications of double integrals to compute Volume 2.6.3 Computer oriented techniques in problem solving using Scilab.	08

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved.
3. Q, 1 will be compulsory and based on entire syllabus
4. Remaining questions will be mixed in nature (e.g. suppose Q.2 has part (a) form, module 3 then part (b) will be form any module other then module3)

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

Term Work.

- Attendance (Theory and Theory) : 05 Marks
- Tutorials covering entire portion : 05 Marks
- Programming Assignments using Scilab : 05 Marks
  -Curve Tracing. Intersection of surfaces. evaluation of double and Triple Integrals. Solution of Differential equations of 1^{st} order and 1^{st} degree
- Test (at least one) : 05 Marks

25

- The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term –work.

Recommended Books:

• Higher Engineering Mathematics. Dr. B.S. Grewal. Khanna Publications
• Differential Equation. Ross.. wiley India. 3^{rd} Ed.
• A textbook of Applied Mathematics, P.N. & J.N. Wartikar. volume 1 & @ . Pune vidyarthi Griha.
• Advanced Engineering Mathematics. Erwin Kreyszing. wiley India 8^{th} Ed.
• Elementary Differential Equation, E.d. rainville. P.E & R.E Bedient. Prentice Hall, 8^{th} edition.

Subject: Applied Physics – II

Periods per week 01 period of 60 minutes	Lecture	3	
	Practical	1	
	Tutorial	--	
		Hours	marks
Evaluation System	Theory	2	75
	Practical	--	--
	Oral Examination	--	--
	Term Work	--	25
	Total		100

Sr. No.	Details	Hrs
Module-01	**Optics:** ► Interference in thin films, wedge shaped films and Newton's rings, applications of interference. ► Fraunhoffer diffraction through double slit and diffraction grating. grating spectra, resolving power of grating. ► Total internal reflection materials & types of optical	12
Module-02	LASERs: ► Absorption, spontaneous & stimulated emission, population inversion, metastable state, pumping schemes, active medium, resonant cavity, derivation for Einstein's coefficients. ► He-Ne laser, Nd:UAG laser, semiconductor diode laser introduction to molecular and tuneable lasers.	08
Module-03	Foundations of Quantum mechanics: ► de' Broglie's hypothesis, group & phase velocity, wave packet. uncertainty principle & its applications. ► Wave function and probabilistic interpretation. one dimensional time dependent Schrödinger equation.	06
Module-04	Magnetic Materials & circuits: ►Atomic origin of magnetization, magnetic moment of atom diamagnetism. Langevin's theory of paramagnetism and curie's law' theory of ferromagnetism. ► Magnetic circuits, magnetomotive force, reluctance. permeance, Ohm's law for magnetic circuit, relation between mmf & "H", magnetic circuit due to solenoid,	06
Module-05	Bio- Physics. ► Introduction and scope molecular modeling, energy transfer & energy cycles, biomechanics, neurobiophysics. ► Tools spectroscopy- UV/Visible. IR , use of NMR microscopy- SEM,	04

Module-06	Vacuum technology: ►Basic definitions, units, low, high and ultrahigh vacuum, methods of production ► Vacuum pumps- rotary, diffusion. vacuum gauges piram penning thermocouple ► Application to thin films. , microelectronics. Nanotechnology. plasma physics	04

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 15 marks.
2. Only 5 questions need to be solved.
3. Q, 1 will be compulsory and based on entire syllabus
4. Remaining questions will be mixed in nature (e.g. suppose Q.2 has part (a) form, module 3 then part (b) will be form any module other then module3)
   In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term Work.

Term work shall consist of minimum five experiments and a written test. The distribution of marks for term work shall be as follows:

- Loboratory work (Experiments and journal : 10 Marks
- Test (at least one) : 10 Marks
- Attendance (Theory and Theory) : 05 Marks

  Total : 25 Marks
- The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term –work.

Recommended Books:

1. Fundamentals of Physics, Holliday/ Resnick white India 6th edi.
2. Fundamentals of optics, Jenkins & white Me Graw-Hill Int.
3. Understanding Physics, Cummins, wiley India
4. Modem Engineering physics A S Vasudeva S shand

Subject: Applied Chemistry – II

Periods per week 01 period of 60 minutes	Lecture	3	
	Practical	1	
	Tutorial	--	
		Hours	marks
Evaluation System	Theory	2	75
	Practical	--	--
	Oral Examination	--	--
	Term Work	--	25
	Total		100

Module	Details	Hrs
01	**Corrosion :** • Nemst theory, Standard Electrode potential, types of corrosion Dry or chemical corrosion wet or electrochemical corrosion Electrochemical, Galvanic cell, Concentration cell, Intergranular Stress cell corrosion Polarization, Over voltage. Factors affecting rate of corrosion. • Methods to decrease the rate of corrosion, cathodic and anodic Protection, cathodic and Anodic coatings. advanced coatings and protection methods, Only constituents and their function of a) Panints b) Varnishes c) Lacquors d) Enamels. • Metallic coatings: Methods of coating and study only electroplating method. Corrosion engineering of electronic and photonic devices.	08
02	**Alloys:** • Alloys, Types of alloys, alloys of Al, Cu & Pb. Their composition properties and uses. Recent advances in alloy related materials • Powder Metallurgy Methods of metal powder formation, Metal ceramic powders Technology of Powder metallurgy. Applications of powder metallurgy.	06
03	**Fuel** • definition classification, characteristic properties of a good fuel Calorific value, cross and Net calorific value, conversion. Proximate and altimate analysis of fuels, combustion calculations for requirement of oxygen and air for given solid, liquid gaseous fuel. • Liquid fuels: Crude petroleum oil, classification	10

	Separation and purification of Gasoline from crude oil. Thermal cracking Catalytic cracking. Fixed bed, moving method for obtaining gasoline. • Diesel, Bio diesel, methods to obtain bio diesel, production of ethanol using bio-mass production of hydrocarbons from plants, Knocking, Octane value. antiknocking agents and their function recent technology for catalytic converter.	
04	Composite Materials: • Introduction. Constitution, Characteristic properties classification Particle, fiber, reinforced composites structural composites, • Application of composite materials	05
05	Green chemistry: • Introduction, Goals Significance, Basic ideas in the field of green chemistry research with 3 examples. • Industrial applications of green chemistry.	05
06	Catalysis: • Introduction, Importance of catalysts and adsorbents in industry, Activation energy and catalysts. • Molecular design for catalysts and adsorbents, Molecular design by nature- Zeolites, zeotypes, pillared clays, Metal complexes and clusters, Oxide materials carbon materials, membranes.	06

Theory Examination:

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4. Remaining questions will be mixed in nature (e.g. suppose Q.2 has part (a) form, module 3 then part (b) will be form any module other then module3)
   In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term Work.

Term work shall consist of minimum five experiments and a written test. The distribution of marks for term work shall be as follows:

- Loboratory work (Experiments and journal : 10 Marks
- Test (at least one) : 10 Marks
- Attendance (Theory and Theory) : 05 Marks

Total : 25 Marks

- The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term –work.

Recommended Books:

1. Fundamentals of Physics, Holliday/ Resnick white India 6th edi.
2. Fundamentals of optics, Jenkins & white Me Graw-Hill Int.
3. Understanding Physics, Cummins, wiley India
4. Modem Engineering physics A S Vasudeva S shand

Subject – Communication Skill – II

Periods per week 01 period of 60 minutes	Lecture	2	
	Practical	--	
	Tutorial	2	
		Hours	marks
Evaluation System	Theory	2	75
	Practical	--	--
	Oral Examination	--	25
	Term Work	--	25
	Total	--	125

Sr. No.	Details	Hrs
Module-01	**Communication Theory** • Concept and meaning of communication, Objectives of communication. Methods of communication, Communication in a business organization (Internal, upward, downward horizontal, grapevine), Problems and solutions.	08
Module-02	**Techniques to improve communication** • Speaking (Phonetics), Writing, Reading and Listening. Introduction to Modern Communication Media, Netiquette, conferencing-Introduction, Importance, Techniques.	05
Module-03	**Summarization and Comprehension.** • Techniques to comprehend and summarize a given technical, scientific or industry oriented text, Questions to test analytical skills and expressions. (to test the ability to present the written matter in a brief and concise manner)	03
Module-04	**Vocabulary. Grammar & Aptitude test.**	03
Module-05	**Basic Official Correspondence.** • Principles of correspondence, Language and style in official letters. formats of letters (Complete block, Modified Block, semi-Block form), Types of letters (Enquiry, Reply to enquiry, Placing an order, claim and Adjustments).	08
Module-06	**Basic Technical Writing.** • framing definitions, Writing instructions, Types of expositions (description and explanation).	03

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 15 marks.
2. Only 5 questions need to be solved.
3. Q, 1 will be compulsory and based on entire syllabus
4. Remaining questions will be mixed in nature (e.g. suppose Q.2 has part (a) form, module 3 then part (b) will be form any module other then module3) In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Tutorials:

Topics to be assigned for speech practice to test diction. Modulation, fluency and non verbal communication
Practice for group discussion
Writing Assignments.

Term Work. 25 Marks

Each student to appear for at least one test during the term.
Term work shall consist of graded answer paper of the test and at least 06 hand assignments
(I assignment per module).

- Written test : 10 Marks
- Assignments : 10 Marks
- Attendance : 05 Marks

Oral Communication
(Only Internal Assessment for oral examination): 25 Marks.

10 marks for public speaking
15 marks for group Discussion.

Recommended Books:

1. Business communication, Lesikar and Petit: Mc Graw-Hill Publications. 1995
2. Communication Skills Handbood, summers, Wiley India.
3. Business Communication, (Revised Edition), Rai And Rai, Himalaya Publishing House
4. Business correspondence and report writing, R.C. Sharma and Krishna Mohan, tata McGraw-Hill, 2002 3rd edition.
5. English for Engineers and Technologists: A skills approach (Books 1 & 2) course authors (Humanities& social Sciences division, Anna University Madras) Orient Longman.
6. Modern Business Correspondence, Mc-commas and Satterwhite; Sixth Edition. McGraw- Hill publications.
7. Technical Writing and Professional communications, Huckins, Thomas, McGraw-Hill
8. Contemporary Business communication, Scott Ober, Wiley India.
9. Written Communication, Sarah , Orient Longman.

Subject –Computer Programming – II

Periods per week 01 period of 60 minutes	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	marks
Evaluation System	Theory	3	100
	Practical & Oral Examination	3	25
	Oral	--	--
	Term Work	--	25
	Total	--	150

Module	Contents	Hrs
01	**Introduction to Java** • Characterizing Java as a enabler of contemporary software engineering paradigms- as a platform, simple Programming Environment, Object- Oriented, Platform Independent, Safe. High Performance, Java is Multi- Threaded, dynamically linked, Java is Garbage Collected • Saving files on Windows, compiling and Running • Increment and decrement operators • Print statements, variables and Data Types, Comments • Command line arguments • Objects, Static Fields, Methods • Passing Arguments to Methods; Returning values from methods.	05
02	**Primitive Data Types in Java** • Java Operators, Literals, Identifiers. key words in Java • Addition of Integers in Java, Multiplication and division in Java • The Remainder or Modulus Operator in Java • Operator Precedence in Java, Mixing Data Types • Converting Strings to Numbers, The char data type in Java • The if, else, else-if statement in Java • The While loop, The for loop, The do while loop in Java • Booleans, Relational Operators, relational Operator Precedence • Break, Continue, The switch statement in Java • The? : operator in Java , Logical Operators in Java	15

	Object Oriented Programming • Constructing objects with new, Methods, Invoking Methods • Implied this , Member Variables vs. Local Variables • Passing Arguments to Methods, Returning Multiple Values From Methods, constructors • Access Protection, The four Levels of Access Protection	
03	**Arrays a Data Structure in JAVA** • Declaring Arrays, Creating Arrays, Initializing Arrays • System array copy () •Multi-dimensional arrays • Strings •Vectors •Exceptions • Try –catich •The finally keyword • Catching multiple exception • The throws keyword. Throwing exceptions	10
04	**Inheritance** • Inheritance : the superclass • Multilevel Inheritance • final and abstract keyword •Interfaces •Implementing Interfaces •Overriding Methods •Adding Methods • Subclasses and Polymorphism • To String () Methods • Using to siring() Methods •Rules for to String() Method • Static Members	05
05	**Multithreaded programming** • Creating threads. extending the thread class • Stopping and blocking a thread • Lifecycle of a thread • Using thread methods, thread exceptions. thread priority • Synchronization • The Java Packages & Class Library • Wrapping Your Own Packages •Naming Packages •Documentation for the class library • Importing classes •Package Imports • Name conflicts when importing packages •The java lang package,The lang Math , java util vector, java lang String, Java util Random, java util Hashtable java util date java util calendar.	10

06	**HTML** • Attributes , URLs, Links •Applet • The APPLET Element, Naming Applets •JAR Archives, The OBJECT Element • Passing Parameters to Applets • the Basic Applet Life Cycle, init(), start(), stop(), and destroy() • The coordinate system, Graphic Objects. Loading Images •Code and Document Bases, Drawing Images at Actual Size • Scaling Images, Color, fonts.	05

Term Work.

The work shall consist of graded answer paper of the test and at least five take – home assignments. 15 marks debugged program listing demonstrating Object oriented constructs and concepts. Programs should be debugged (hand written or computer printouts) and should have suitable comments.
Each student is to appear for at least one written test (preferably o-line) during the term.
The distribution of term work mark shall able as follows:

- Written test (at least one) : 10 Marks
- Attendance: (Practical and Theory) : 05 Marks
- Documentation of assignments and Debugged program (Laboratory work) : 10 Marks

Text books

1 Computing concepts with java 2 essentials by CAY HORSTMANN 2 Edition WILEY INDIA ISBN 81-265-0931-9
2. Programming with JAVA Primer, E Balagurusamy 3rd Edition, Tata McGRAW –Hill, ISBN 0-07-061713-9

Reference books:

1 Big java by CAY HORSTMANN, 2 Edition, WILEY INDIA ISBN 81-265-0879-5
2 The Complete reference JAVA , Herbert schildt, Seventh Edition , Tata McGRAW –Hill, ISBN 0-07-063677-X.