

SYLLABUS

FOR

B.TECH. PROGRAMME

IN

MECHANICAL ENGINEERING



INSTITUTE OF TECHNOLOGY
ZAKURA CAMPUS
UNIVERSITY OF KASHMIR
SRINAGAR J&K, 190006

**COURSE STRUCTURE FOR
B.Tech1stSemester Mechanical
AT UNIVERSITY OF KASHMIR**

CourseCode	CourseTitle	TeachingPeriodsperweek			Credits
		<i>L</i>	<i>T</i>	<i>P</i>	
MTH-1117	EngineeringMathematics-I	3	1	0	4
CHM-1217	EngineeringChemistry	2	1	0	3
ELE-1317	BasicElectricalEngineering	2	1	0	3
CSE-1417	IntroductiontoComputing	2	1	0	3
HUM-1517	CommunicationSkills	2	0	0	2
MEE-1617	EngineeringGraphics&Drawing	1	3	0	4
CHM-1217L	EngineeringChemistryLab	0	0	4	2
ELE-1317L	BasicElectricalEngineeringLab	0	0	4	2
CSE-1417L	IntroductiontoComputingLab	0	0	4	2
	Total	12	7	12	25

MTH-1117

Engineering Mathematics-I

UNIT-I

Calculus: Differential calculus of functions of several variables, partial differentiation, homogeneous functions and Euler's theorem, Taylor's and Maclaurin's series, Taylor's theorem and mean value theorem for functions of two variables, errors and approximations.

UNIT-II

Application's of Differential Calculus: Maxima and minima of several variables, Lagrange's method of multipliers for maxima and minima, curvature of cartesian curves, curvature of parametric & polar curves, curve tracing.

UNIT-III

Vector Calculus: Scalar and vector fields, differentiation of vectors, velocity and acceleration, vector differential operator, del, gradient and divergence, physical interpretation of the above operators, formulae involving del applied to product of point function, line, surface and volume integrals.

Text Books:

1. Kreyszig E., "Advanced Engineering Mathematics", 8th Ed., *John Wiley* (2001).
2. Jain, R.K. and Iyengar S., "Advanced Engineering Mathematics", 2nd Ed., *Narosa Publishing House* (2003).
3. Das & Mukherjee, "Differential Calculus", *U.N. Dhur & Sons Pvt. Ltd.* (2008).
4. Das & Mukherjee, "Integral Calculus", *U.N. Dhur & Sons Pvt. Ltd.* (2011).

CHM-1217

Engineering Chemistry

UNIT-I

Electrochemistry: Reduction potentials, redox stability in water, the diagrammatic presentation of potential data, the effect of complex formation on potentials, electrolyte and non-electrolyte solutions, kinds of electrodes, concentration cells, the lead storage cell and fuel cell, laws of photochemistry, photo physical processes, fluorescence and phosphorescence, photochemical reactions: photolysis of HI, photochemical reaction between H_2 and Br_2 , rotational and vibrational spectroscopy-principles and application to simple molecules, magnetic resonance UV-visible spectro-photometry, electronic transitions & electronic spectra, application to simple systems (analysis of Fe, Cu, Cr), Beer-Lambert's law & its applications. IR spectroscopy – IR spectrum, application of IR spectra (alcohols, acids, phenols, concept of vibrational spectra).

UNIT II

Environmental Chemistry: Environmental segments, composition of atmosphere, earth's radiation balance, particles, ions, & radicals in atmosphere, greenhouse effect, ozone layer in stratosphere—its significance and consequence of depletion, pollution: air pollution, natural and man-made pollutants (CO_x , NO_x , HC, SO_x , acid rains), effect of pollutants on human and plant life, sources and classification of water pollutants (organic, inorganic, sediments, radioactive materials, heat), water and its treatment: alkalinity of water, determination of alkalinity by using phenolphthalein and methyl orange indicators, hardness of water, its types, methods of estimation, treatment of water (municipal treatment, lime soda process, demineralization by ion exchange process).

UNIT III

Lubricants: Introduction, surface roughness, concept of friction and wear, lubrication, mechanism of hydrodynamics, boundary and extreme pressure lubrication, classification of lubricants, semi-solid & liquid lubricants, blended oils, synthetic lubricants, lubricating emulsions, properties of greases, liquid lubricants with special reference to flash point, viscosity and viscosity index, criteria for selection of lubricants for specific purposes, inorganic systems: transition metals, fundamental concepts of transition metal complexes, consequences of orbital splitting, color and magnetic properties, structure and bonding of organo-metallic complexes, the sixteen and eighteen electron rule, role of trace metals in biological systems, oxygen carrier, electron transfer.

Text Books:

1. Shriver D.F. and Atkin A.W., "Inorganic Chemistry", 3rd Ed., *Oxford Press* (1999).
2. Castellan G W "Physical Chemistry", 3rd Ed., *Narosa Publishing House* (1995).
3. Puri, Sharma & Kalia, "Inorganic chemistry", (2012).

4. Puri, Sharma & Pathania "Principles of Physical chemistry", (2012).
5. Skoog D.A., and Holles F.J., "Principles of Instrumental Analysis", 5th Ed., *Hercaurt Asia PTE Ltd.*, (2001).
6. Hill J.W. "Chemistry for changing times", 6th Ed., *Macmillan*, Canada (1995).
7. J.C. Kuriacose & J. Rajaraman, "Chemistry in engineering and technology", Volume-I & II, *Tata McGraw Hill Publishing Company Ltd.*, (2010).
8. P.C. Jain, "Engineering Chemistry", *Dhanpat Rai & Sons*, NaiSarak, (2015).
9. C.V. Agrawal, "Chemistry of Engineering materials", *Tata Publishing Works*, (2006).
10. L.A. Munro, "Chemistry in engineering", *Prentice Hall*, (2008).

ELE-1317

Basic Electrical Engineering

UNIT-I

D. C. Circuits: Ohm's law, Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL), circuit parameters (resistance, inductance and capacitance), series and parallel combinations of resistance, inductance and capacitance. ideal and practical voltage and current sources and their transformation, dependent voltage sources and dependent current sources, power and energy relations, analysis of series parallel D.C. circuits.

UNIT-II

Network topology: basic electric circuit terminology, nodes, junctions, paths, loops, branches, formation of incidence matrices, tie-set and cut-set formation, network theorems: linearity & superposition, source transformations, Thevenin's and Norton's equivalent circuit analysis, maximum power transfer, reciprocity & Millman's theorem, loop and nodal methods: nodal analysis, mesh analysis, super node, super mesh, delta-star(Y) transformation

UNIT-III

A.C. Circuit analysis: Basic terminology and definitions: behavior of capacitors and inductors to A.C., Basic RL, RC and RLC circuits and their step response, phasor and complex number representations, phasor relations for R,L&C, impedance, admittance parameters, solutions of sinusoidal excited, RC circuits, power and energy relation, sine A.C. circuits, concept of a 3 phase voltage, star (Y) and delta circuits, current and voltage relations in star and delta circuits.

Text Books:

1. W.H. Hayt, J.E. Kemmerly, S.M. Durbin, "Engineering Circuit Analysis", *Tata McGraw Hill* (2012).
2. Del Torro, "Electrical Engineering Fundamentals", 2nd Ed, *Prentice Hall of India Pvt. Ltd.*, (1994)
3. B.C. Theraja, "Principles of Electrical Engineering" (2006).
4. Kothari D.P. and Nagrath I.J., "Basic Electrical Engineering", *Tata McGraw Hill*, (2010).

CSE-1417

Introduction to Computing

UNIT-I

Computer organization: Computer and processor abstraction, generations of computers, hardware organization of computers, central processing unit, memory, types of primary memory, secondary storage, devices and their types, input devices and their types, output devices and their types, various types of ports and their specifications and usage, review of basic digital and analog signals, binary number system and digital arithmetic, digital coding schemes, microprocessors, microcontrollers, CPU, GPU, various applications of computers in aerospace, agriculture, finance, medical, media, industries and commerce.

UNIT-II

Operating systems and networking: Computer software and its various types, types of system and application software, file and directory operations on windows, DOS and Linux operating systems, use of various tools and utilities in Windows and Linux, fundamentals of networking, internet, and various services offered through the internet: LAN, PAN, WAN, SAN, VPN, WWW, INTERNET, INTRANET, email, search engines, introduction to various networking devices, OSI model, TCP/IP protocol stack.

UNIT-III

Introduction to programming and problem solving: Types of programming languages, machine level, assembly level, high level language, algorithms, flow charts, compilation, assembling linking and loading, testing and debugging documentation, algorithms for GCD (greatest common division) of two numbers, test whether a number is prime or not, sorting numbers, finding square root and factorial of a number, generation of Fibonacci sequence, finding largest number in an array, evaluation of a polynomial.

Text Books:

- 1) P.K.Sinha and P.Sinha, "Foundation of Computers", *BPB Publishers* (2014).
- 2) C.V Rajaraman, "Fundamentals of computers", *PHI publishers* (2015).

HUM-1517

Communication Skills

UNIT I

Communication: Meaning, its types, significance, process, channels, barriers to communication, making communication effective, role in society, business correspondence: elements of business writing, business letters, components and kinds, memorandum, reports writing, purchase order, quotation and tenders, job application letters, resume writing etc, discussion meeting and telephonic skills: group discussion, conducting a meeting, attending telephonic calls, oral presentation and role of audio visual aids, grammar: transformation of sentences, words used as different parts of speech one word substitution, abbreviations, technical terms etc.

UNIT II

Reading Skills: Process of reading, reading purposes, models, strategies, methodologies, reading activities, writing skills: elements of effective writing, writing style, scientific and technical writing, listening skills: the process of listening, the barrier to listening, the effective listening skills, feedback skills, speaking skills: speech mechanism, organs of speech, production and classification of speech sound, phonetic transcription, the skills of effective speaking, the components of effective talk.

UNIT III

Business Letters: Structure of business letters, language in business letters, letters of inquiry & their places, sales letters, memorandum, quotations/tenders, bank correspondence, letters of application and appointments, resume writing, report writing, conducting a meeting, minutes of meeting, oral presentation, group discussion.

Text Books:

1. Rodrigues M.V., "Effective Business Communication", *Concept Publishing Company*, 1992, reprint (2000).
2. Bhattacharya, Indrajit, "An Approach to Communication Skills", *Dhanpat Rai Co., Pvt. Ltd.*, (2005).
3. Wright, Chrissie, "Hand book of Practical Communication Skills", *Jai co. Publishing House*, (1996).
4. Gartside L., "Modern Business Correspondence", *Pitman Publishing*, (2012).
5. Day, Robert A., "How to Write and Publish Scientific Paper", *Cambridge University Press*, (1996).

MEE-1617

Engineering Graphics & Drawing

UNIT I

Introduction to Engineering drawing: Equipment and drafting tools, symbols and conventions in drawing, types of lines and their use, material section representation, introduction to dimensioning, using any available CAD software to draw simple machine parts and blocks, use of various fundamental commands to edit a drawing, e.g. erase, copy, mirror offset, array, move, trim, use of features, extrude, extrude cut and revolve, projection of points: projection of points in the first, the second, the third and the fourth quadrant, projection of lines: line parallel to both the planes– line parallel to the horizontal plane and perpendicular to the vertical plane, line parallel to HP and inclined to VP, line parallel to HP and inclined to profile plane, line parallel to VP and inclined to PP, line inclined to both the planes.

UNIT II

Projections: Projection on horizontal and vertical planes, principal views, different system of projections-symbols-notations, projection of planes in first and third quadrant, projection of solids, projection of solids in first and third quadrant, axis parallel to one and perpendicular to other, section of solids: definition of Sectioning and its purpose, procedure of sectioning, application of few typical examples, development of surfaces: purpose of development, parallel in method, insertion of new planes and drawing necessary features on the plane, sectioning and obtaining sectioned views, dimensioning 2D drawing and labeling.

UNIT III

Orthographic projections of simple machine parts: Drawing of blocks and machine parts, isometric projection: basic principle of isometric projection, isometric projection of simple machine parts for which orthographic views are given, introduction to temporary and permanent fasteners, representation of screw threads and threaded fasteners, rivets and riveted joints, welding symbols, introduction to shaft couplings and bearings: assembly of various components of universal coupling and Oldham's coupling, types of bearings, assembly of various components of bushed bearing and foot step bearing.

Text Books:

1. Gill P.S., "Engineering Graphics and Drafting", *Katria and Sons*, Delhi (2001).
2. Bhat N.D., "Elementary Engineering Drawing-Plane and Solid Geometry", *Chartota Publishing House*, (1988).
3. Naryana K.L. and Kanaiah P., "Engineering Graphics", *Tata McGraw Hill Publishing Company Limited*, New Delhi (1992).
4. Luzzadde Warren J., "Fundamentals of Engineering Drawing", *Prentice Hall of India Private Limited*, (1988).

5. K. Venkatta Reddy, A textbook of Engineering Drawing, *BS Publications* New Delhi, 2nd Edition, (2004).
6. Introduction to Engineering Graphics: A Drawing Workbook, *Wits University Press*, (2000).
7. M. Prabhu, Engineering Graphics, *JohnWiley publications limited*, (2005).

CHM-1217L
Engineering Chemistry Lab

The students are required to conduct experiments on following practical work:

1. To draw the pH-titration curve of strong acid vs. strong base
2. Standardization of KMnO_4 using sodium oxalate.
3. Determination of Ferrous iron in Mohr's salt by potassium permanganate.
4. Determination of partition coefficients of iodine between benzene and water.
5. Determination of amount of sodium hydroxide and sodium carbonate in a mixture.
6. Determination of amount of sodium hydroxide and sodium carbonate in a mixture.
7. To verify Beer's law for a colored solution and to determine the concentration of a given unknown solution.
8. Synthesis of some polymers like crazy ball.

ELE-1317L
Basic Electrical Engineering Lab

The students are required to conduct experiments on following practical work:

1. To get familiar with the working knowledge of the following instruments:
 - i. Digital storage oscilloscope
 - ii. Cathode ray oscilloscope (CRO)
 - iii. Multimeter (analog and digital)
 - iv. Function generator
 - v. Power supply.
2.
 - i. To study power supply in constant current and constant voltage mode, study of current limiting in power supplies series and parallel combination of power supplies.
 - ii. Measurement of various parameters (voltage, frequency) of a signal on DSO/CRO. Hands on with controls like volts/division, time/division, trigger, X_{mag} , positioning, time and voltage cursor measurements, saving and recalling of waveforms.
 - iii. Measurement of resistance, capacitance, voltage, current, continuity, frequency using bench type/hand held multimeter.
 - iv. Hands on with different controls (frequency, type of wave form, D.C. offset, duty cycle) of function generator.
3. Verification of Ohm's law for D.C. and A.C. circuits
4. Verification of KVL and KCL.
5. Verification of Thevenin's and Norton's theorem.
6. Verification of maximum power transfer theorem.
7. Calculation of RMS, peak to peak, average value of an A.C. signal using DSO/CRO.
8. To plot the resonance curve for a series and parallel resonance.
9. Measurement of current, voltages and power in R-L-C series circuit excited by (single phase) AC supply.

CSE-1417L

Introduction to Computing Lab

UNIT I

Introduction to computer organization: Familiarity with internal hardware organization of the computer viz. processor, RAM, ROM, harddisk, CD-ROM, motherboard, CPU, fan, buses, etc., familiarity with various types of I/O ports, office automation tools

MS Excel:

- a) Getting data into MS Excel
- b) Manipulating data in MS Excel
- c) Working with MS Excel functions, formulae and charts
- d) Problem solving using MS Excel
- e) Solving engineering problems using MS Excel

UNIT II

Operating systems and networking: Familiarity with various versions of windows, virtual machines (VirtualBox/VMWare), accessing various run commands of windows for faster and tricky access, familiarity with various flavors of Linux operating systems like Ubuntu, Fedora, etc., and usage of simple Linux commands, familiarity with networking devices like switch, hub, POE (power over ethernet), LAN Cable, LAN Connector, Ethernet card, office automation tools

Ms Access:

- a) Getting data into MS Access.
- b) Manipulating data in MS Access
- c) Problem solving using MS Excel
- d) Solving engineering problems using MS Excel

UNIT III

Introduction to problem solving: Writing algorithms and drawing flowcharts for stated problems.