UNIVERSITY OF CALICUT

Abstract
Faculty of Engineering - B.Tech Degree course - Scheme & Syllabi of Combined I and II Semesters of B.Tech Regular courses - Revised - With effect from 2014 admissions - approved - implemented - orders issued.

G & A - IV - E
U.O.No. 7314/2014/Admn
Dated, Calicut University.P.O, 30.07.2014

Read:- 1. U.O.No. 3139/2014/CU dated, 27.03.2014.
2. Minutes of the meeting of the Board of Studies in Engineering (UG) held on 18.12.2013. (item No. 1)
3. Minutes of the meeting of the Faculty of Engineering held on 20.01.2014 (item No. 1).
4. Minutes of the meeting of the Board of Studies in Engineering (UG) held on 13.02.2014 (item No. 1).
5. Minutes of the meeting of the Academic Council held on 20.03.2014 (item No. 1 (23) & II G respectively).
6. Minutes of the meeting of the Faculty of Engineering held on 25.06.2014 (item No. 1)
7. Letter from the Dean, Faculty of Engineering dt. 15.07.2014.
8. Orders of the Vice Chancellor in the file of even No. dt. 22.07.2014.

ORDER
Vide paper read 1 above, the revised Regulations of the B.Tech Degree course (Regular) was implemented with effect from 2014 admission onwards.

Vide paper read 2 above, the Board of Studies in Engineering (UG) at its meeting held on 18.12.2013, vide item No 1, after detailed discussion, approved the Curriculum and the Syllabus for the B.Tech Combined First and Second Semester B.Tech programme.

The Faculty of Engineering at its meeting held on 20.01.,2014, vide item No.1approved the minutes of the Board of Studies in Engineering (UG) held on 18.12.2013. As there was a difference of opinion in the meeting of the Faculty of Engineering held on 20.01.2014 regarding the omission of Physics and Chemistry laboratory papers, the Faculty decided to request the Chairpersons of the Boards concerned to revise the respective Syllabus and entrust the Dean, Faculty of Engineering to present the same in the Academic Council held on 20.03.2014, vide paper read 3 above.

Vide paper read 4 above, The Board of Studies in Engineering (UG) at its meeting held on 13.02.2014 unanimously felt that Combined first and second semester B.Tech Curriculum and syllabus common to all branches was framed and drafted after lot of serious deliberations and discussions to meet the academic objectives of Engineering students and resolved the Dean, Faculty of Engineering to make necessary modifications in this regard.

The Academic Council at its meeting held on 20.03.2014, vide item No.1(23), considered the minutes of the meeting of the Board of Studies in Engineering (UG) held on 13.02.2014 pertaining
to the omission of Physics and Chemistry laboratory papers from the revised syllabus and referred the matter back to the Dean, Faculty of Engineering, and vide item No. II G approved the minutes of the Board of Studies in Engineering (UG) held on 18.12.2013 as per paper read 5 above.

Vide paper read 6 above, Faculty of Engineering at its meeting held on 25.06.2014, vide item No. 1 considered the matter pertaining to the revision of Physics & Chemistry syllabus and resolved to constitute a committee to study and to submit the revised first year B.Tech syllabus of Physics and Chemistry theory and practicals to the Dean, Faculty of Engineering, for presenting the same in the meeting of the Academic Council.

The committee has submitted the report to the Dean, Faculty of Engineering. The Dean has forwarded the corrected version of the syllabus of combined first and second semester syllabus after incorporating the changes proposed by the committee and requested for its implementation w.e.f. 2014 admission onwards. As per the request from the Dean, Faculty of Engineering, the Vice Chancellor, considering the exigency and exercising the powers of the Academic Council, has approved and accorded sanction to implement the resolution of the minutes of the Faculty of Engineering (item No. 1), subject to the ratification of the Academic Council, vide paper read as 7 & 8 above.

Sanction has therefore been accorded for implementing the Scheme & Syllabus of the Combined I and II Semesters of B.Tech Regular courses with effect from 2014 admissions.

Orders are issued accordingly. (The Scheme & Syllabus of the Combined I and II Semesters are available in the University Website)

Muhammed S
Deputy Registrar

To

1. The Principals of all affiliated Engineering colleges.
2. The Controller of Examinations/ EX Section

Copy to :- PS to VC/ PA to PVC/ PA to Regr/ EG 1 Sn/ DR- B.Tech Branch/JCE VI, B.Tech/B.Tech Tabulation Sn/ Dean, F/ Engg/ The Chairmen of all the BOS in Engg/ System Administrator (With a request to upload the U.O. and the Syllabus of all branches in the University Website)/ SF

Forwarded / By Order

Section Officer
Syllabus and Curriculum

of

B.Tech in Engineering

Common to all branches

(Combined 1\textsuperscript{st} and 2\textsuperscript{nd} semesters)

University of Calicut

(2014 admission)
<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours/ Week</th>
<th>Marks</th>
<th>Duration of End Semester examination</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EN14 101</td>
<td>Engineering Mathematics I</td>
<td>2 L 1 T 0</td>
<td>50 100</td>
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<tr>
<td>EN14 102</td>
<td>Engineering Mathematics II</td>
<td>2 L 1 T 0</td>
<td>50 100</td>
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<td>Engineering Physics</td>
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<td>Engineering Chemistry</td>
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<td>Engineering Chemistry Lab.</td>
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<tr>
<td>EN14 105</td>
<td>Engineering Mechanics</td>
<td>2 L 1 T 0</td>
<td>50 100</td>
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<tr>
<td>EN14 106</td>
<td>Basics of Civil and Mechanical Engg.</td>
<td>2 L 0 T 0</td>
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<td>EN14 107</td>
<td>Basics of Electrical and Electronics &amp; Communication Engg.</td>
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<td>EN14 108</td>
<td>Engineering Graphics</td>
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<tr>
<td>EN14 109</td>
<td>Humanities and Communication Skills</td>
<td>2 L 1 T 0</td>
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<td>EN14 110 (P)</td>
<td>Mechanical Workshops</td>
<td>0 L 0 T 2</td>
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<td>Electrical &amp; Civil Workshops</td>
<td>0 L 0 T 2</td>
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</table>
EN14 101 ENGINEERING MATHEMATICS I
(Common for all B.Tech. programmes)

Teaching scheme
2 hours lecture and 1 hour tutorial per week

Credits: 4

Objective

- To provide an avenue to scientific knowledge which opens new vistas of mental activity.

A sound knowledge of engineering mathematics is a “sine qua non” for the modern engineer to attain new heights in all aspects of engineering practice

- To provide the student with plentiful opportunities to work with and apply the concepts, and to build skills and experience in mathematical reasoning and engineering problem solving.

Module I: Differential Calculus (18 hours)

Indeterminate forms – L’Hopitals rule – Radius of curvature in Cartesian form (No proof) – Center of curvature (No proof) – Evolute – Functions of more than one variables - Idea of Partial Differentiation – Euler’s theorem for Homogeneous functions – Chain rule of Partial differentiation – Jacobians – Maxima and Minima of functions of two variables.

Module II: Infinite Series (18 hours)


Module III: Matrices (24 hours)


Module IV: Fourier series and Harmonic Analysis (18 hours)

Reference books


Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

University Examination Pattern

**PART A:** Analytical/problem solving SHORT questions 8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE questions 4 x 15 marks=60 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 100
EN14 102 ENGINEERING MATHEMATICS II
(Common for all B.Tech. Programmes)

Teaching scheme
2 hours lecture and 1 hour tutorial per week

Credits: 4

Objective

- To apply the subject at the proper place and time, while keeping him/her aware to the needs of the society where he/she can lend his/her expert service, and also to those who can be useful to the community without even going through the formal process of drilling through rigorous treatment of mathematics.

Module I: Ordinary Differential Equations (24 hours)

Equations of first order – Separable, Homogeneous, reducible to Homogeneous and Linear, Bernoulli’s and Exact Equations – Orthogonal trajectories – Linear second order equations – Homogeneous Linear equation of second order with constant coefficients – Non-Homogeneous Linear equation of second order with constant coefficients – Solutions of Linear equations of second order with variable coefficients (Only Cauchy’s equation) – method of variation of parameters.

Module II: Laplace transforms (18 hours)


Module III: Vector Differential Calculus (18 hours)


Module IV: Vector Integral Calculus (18 hours)

Line, Surface and Volume integrals – Line integrals independent of the Path – Green's Theorem in the plane – Gauss Divergence Theorem – Stoke's Theorem (Proofs of these theorems are excluded).

Reference books

9. Thomas A. Garrity, All the Mathematics you missed, Cambridge University Press.
**Internal Continuous Assessment (Maximum Marks-50)**

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

**University Examination Pattern**

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks=40 marks  
Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  
4 x 15 marks=60 marks  
Two questions from each module with choice to answer one question.

*Maximum Total Marks: 100*
EN 14 103: ENGINEERING PHYSICS  
(Common to all Branches)

Teaching scheme : 2 hours per week  
Credits: 3

Objectives

- To impart the basic concepts and ideas in physics.
- To develop scientific attitudes and enable the students to correlate the concepts of physics with the core programmes.

Module-1 (13 hours)


Diffraction of light-Fresenls and Fraunhoffer classes-Diffraction grating-Simple theory of plane transmission grating (normal incidence)-Resolving and dispersive powers of a grating with expressions (no derivation)-Determination of wavelength of monochromatic light using plane transmission grating.

Ultrasonics -Properties of ultrasonic waves- Piezo-electric and magnetostriction effect-Production of ultrasonic waves by piezo-electric effect method. Acoustic grating-Determination of velocity of ultrasonic waves in a liquid using ultrasonic diffractometer.- Important engineering applications of ultrasonic waves.

Module-2. (13 hours)

Polarisation-Basic concepts-Production of polarised light-Double refraction-Optic axis and principle plane-Huyghens explation of double refraction in uniaxial crystals-Positive and negative crystals-Nicol prism-Construction and working (as polarizer and analiser)-Quarter wave and Half wave plates-Superposition of plane polarised light-Theorie (analytical analysis) of elliptical and circularly polarised light- Experimental methods for producing and detecting linearly, elliptically and circularly polarized lights-Polaroids-Optical activity-Biot’s laws-specific rotation-Laurent’s half shade polarimeter-Determination of concentration of sugar solution-Applications of plane polarised light.

Quantum mechanics-Introduction-Duality of radiation and matter-Uncertainty principle-Concept of wave packet-Group and phase velocities –Wave function in quantum mechanics and its physical significance-Operators in quantum mechanics (basic concepts only)-Schroedinger equation for a free particle, time dependant and independent (steady/stationary) forms and their derivations –Expectation values-Application-Particle in one dimensional box (potential well) -Eigen values and eigen functions.

Statistical mechanics -Introduction-Macroscopic and microscopic systems -Phase space-Statistical distributions-Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics-Basic postulates and distribution functions (no derivation)-Bosons and fermions.

Module-3. (13 hours)

Laser-Introduction-Spontaneous and stimulated emissions-Population inversion-Optical resonant cavity -Basic component of a laser- Characteristics of laser-Intensity, spatial and temporal coherence-
coherence length-monochromaticity-convergence-Einstein coefficients and the analysis of lasing conditions-Different laser system-Construction, working and features of Ruby, He-Ne, Nd:YAG and Semi conductor lasers Application of lasers in medicine-industry, science and communications-Holography-Basic principle-Construction and reconstruction of hologram-applications.

Optical fibre-Basic structure-Light propagation through optic fibre-Step index and graded index fibres-Single mode and multi mode fibres-Acceptance angle and numerical aperture of a fibre. Expression for numerical aperture for a step index fibre.-Normalised frequency number (V number) of a fibre-Transmission losses in fibres-Attenuation and distortion-Fibre optic communication system-application of optic fibres.

Nano science-Basic ideas -Nano clusters-variation of properties of nano materials -Carbon nano tubes-Applications of nano materials and nano technology (qualitative ideas only).

Module-4. (13 hours)

Semi conductor physics-Formation energy bands in solids and their classifications-Intrinsic and extrinsic semi conductors-Density of states functions of electrons and holes in the energy bands (expressions only)-Concentration of electrons in the conduction band and holes in valence band-Fermi energy - Fermi level in intrinsic and extrinsic semiconductors-Donor and acceptor levels-Variation of Fermi level with temperature and doping


Superconductivity-Introduction-Transition temperature-Effect of magnetic field (magnetic field and critical current density)-Meissner effect-Type I and type II super conductors-Isotopic effect-Persistent current-Flux quantization-Josephons effects-SQUID-High temperature super conductivity-Applications of super conductivity.

Text Books

Reference books.
3. Introduction to solid state physics- Charles Kittel-Wiley Eastern
5. Lasers and non linear optics-B.B.Laud-Wiley Eastern

University of Calicut B.Tech Syllabus - Combined First & Second Semesters - 2014
6. Introduction to Semiconductor materials and Devices-Tyagi M.S. John Wiley and Sons.
9. Engineering Physics - G.S.Raghuvarshni - Printice Hall of India
10. Book of Optics - Brijjal and Subramanyam - S.Chand publishers

**Internal Continuous Assessment (Maximum Marks-50)**

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

**University Examination Pattern**

*PART A: Analytical/problem solving SHORT questions*  
8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

*PART B: Analytical/Problem solving DESCRIPTIVE questions*  
4 x 15 marks=60 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 100*
EN 14 103 (P): ENGINEERING PHYSICS  LAB
(Common for all branches)

Teaching scheme: 1 hour practical per week  Credit: 1

Objectives
☐ To develop scientific and experimental skills of the students
☐ To correlate the theoretical principles with application based studies.

List of experiments:
1. Young’s modulus of a bar by non-uniform bending
2. Rigidity modulus – Torsion pendulum
3. Study of surface tension of liquids (capillary method)
4. Characteristics of a solar cell
5. Study of Zener characteristics
6. Voltage regulation using Zener diode
7. LED characteristics
8. Determination of band gap energy in semi conductor using a reverse biased p-n junction.
10. Diameter of a thin wire or thickness of a thin strip of paper using air wedge method.
11. Determination of the refractive indices of ordinary and extra ordinary rays in quarts/calcite prism using spectrometer.
12. Determination of spectral lines of a composite source using diffraction grating and spectrometer.
13. Determination of resolving power of a plane transmission grating.
14. Determination of dispersive power of a plane transmission grating.
15. Determination of specific rotatary power or concentration of cane sugar solution using polarimeter.
16. Wave length and velocity measurement of ultrasonic waves in a liquid using ultrasonic diffractometer
17. Wave length measurement of laser using plane transmission grating standardized by sodium light
18. Static characteristics of a transistor in common emitter configuration.
19. Frequency of electrically maintained tuning fork (transverse and longitudinal modes)
20. Measurement of numerical aperture of an optical fibre

(Any 10 experiments should be done at the minimum)
Only one record need to be written by the students and there is no need of separate rough record and fair record.

Reference books:-
1. Practical physics with viva voce, Dr. S.L. Gupta and Dr. V. Kumar, Pragati Prakashan publishers
2. Experiments in Engineering Physics
   M.N. Avadhanulu, A.A. Dani and R.M. Pokley, S. Chand & Co.

Internal Continuous Assessment (Maximum Marks-50)
50% - Laboratory practical and record
40% - Test
10% - Regularity in the class

University of Calicut B.Tech Syllabus - Combined First & Second Semesters - 2014
EN 14 104: ENGINEERING CHEMISTRY
(Common for all branches)

Teaching scheme
2 hours lecture per week

Credits: 3

Objectives
- To familiarize the students on application oriented themes like the chemistry of materials used in engineering discipline
- To focus the students on the chemistry of compounds resulting from pollution, waste generation and environmental degradation and to apply the knowledge in solving these current environmental problems effectively.

Module I (15 hours)

**Organo Metallic Compounds:** Definition – classification based on the nature of metal-carbon bond. Metal carbonyls – 18 electron rule – Mononuclear and polynuclear carbonyls (give examples of Fe, Co, Ni). (3 Hrs.)

**Bio-Inorganic chemistry:** Metal ions in biological system – trace and bulk metal ions – Haemoglobin and myoglobin (elementary idea only). (3 Hrs.)

**Green chemistry** – Goals of green chemistry – Limitations. Twelve principles of green chemistry with their explanations and examples – Designing a green synthesis – Prevention of waste / byproducts – Atom economy (maximum incorporation of materials used in the process) – Minimization of hazardous / toxic products – prevention of chemical accidents – Green synthesis (9 Hrs.)

Module II (15 hours)

**Polymers** – classification – Types of polymerization – addition, condensation, co-polymerisation, co-ordination polymerization. Polymerisation techniques – Bulk, solution, suspension and emulsion. Concept of Tg. Factors affecting Tg. Crystallinity in polymers, physical and mechanical properties (density, tensile, tear, abrasion resistance, resilience). (9 Hrs.)

**Lubricants** – Theories of friction – Mechanism of lubrication Thick film, thin film, extreme pressure. Classification – solid, liquid, semisolid – properties – viscosity, flash point, fire point, cloud and pour point, Aniline point, corrosion stability. (3 Hrs.)

**Fuels:** Classification-Calorific Value – Cracking and Reforming-Petrol Knock and octane number-Diesel knock and cetane number. Bio-Diesel. (3 Hrs.)

Module III (11 hours)


Module IV (11 hours)


University of Calicut B.Tech Syllabus - Combined First & Second Semesters - 2014
Reference Books.

1. Industrial Chemistry – B K Sharma
11. V. Kumar, Introduction to Green Chemistry, Vishal Publishing House.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**  
8 x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  
4 x 15 marks = 60 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 100*
EN 14 104 (P): ENGINEERING CHEMISTRY LAB  
(Common for all branches)

Teaching scheme
1 hour practical per week  
Credit: 1

Objectives
- To equip the students with the working knowledge of chemical principles, nature and transformation of materials and their applications.
- To develop analytical capabilities of students so that they can understand the role of chemistry in the field of Engineering and Environmental Sciences

1. Estimation of iron in Mohr’s salt using standard K₂Cr₂O₇
2. Estimation of iron in a sample of iron ore
3. Estimation of copper in a given sample of brass
4. Estimation of total hardness in a given sample of water using EDTA.
5. Estimation of chloride ions in domestic water
6. Determination of dissolved oxygen present in a given sample of water (Winkler’s Method)
7. Determination of available chlorine in a sample of bleaching powder
8. Determination of flash point and fire point of an oil using Pensky Martens flash point apparatus
9. Determination of EMF of a cell by Poggendorf’s compensation method
10. Preparation of buffers and standardization of pH meter
11. Estimation of iron, chromium, lead and Cadmium in water – Colorimetrically
12. Preparation of urea - formaldehyde and phenol formaldehyde resin

- Minimum 8 experiments should be completed.
- Only one record need to be written by the students and there is no need of separate rough record and fair record.

Reference Books

Internal Continuous Assessment (Maximum Marks-50)

50% - Laboratory practical and record
40% - Test
10% - Regularity in the class
EN 14 105: ENGINEERING MECHANICS  
(Common for all branches)

Teaching scheme
2 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To acquaint with general approach of solving engineering problems.
- To illustrate the application of the theory learned in Mechanics in practical engineering problems.
- To lay clear fundamentals to core Engineering Subjects

Units: System International

Module I (20 hours)
Introduction to engineering mechanics - units - dimensions - vector and scalar quantities - laws of mechanics - elements of vector algebra - important vector quantities - equivalent force systems - translation of a force to a parallel position - resultant of a force system - simplest resultant of special force systems - distributed force systems - equations of equilibrium - free body diagrams - free bodies involving interior sections - general equations of equilibrium - problems of equilibrium - static indeterminacy. (Both vector and scalar formulations are to be introduced to solve problems.)

Module II (20 hours)

Moment of inertia of a rigid body and lamina (derivation of MI for cylinder, rod and sphere).

Module III (18 hours)
Kinematics of particles - rectilinear motion - curvilinear motion – motion of a projectile - tangential and normal acceleration
Work, power and energy – work-energy equation – transformation and conservation of energy – impulse and momentum.

Module IV (20 hours)
Kinematics rigid bodies - rotation of a rigid body about a fixed axis - plane motion of a rigid body - instantaneous center Kinetics of rigid bodies - equations of motion of a rigid body rotating about a fixed axis – rotation under the action of a constant moment - D’Alembert’s principle – equations of motion for general plane motion - principle of work and energy.
Application of Graphical Methods in Mechanics – Force Poligons – Applications in truss analysis, centroid and moment of inertia

Text Books
4. V. Jayakumar, M Kumar, Engineering Mechanics, Prentice Hall Of India
Reference Books

Internal Continuous Assessment (*Maximum Marks-50*)
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

University Examination Pattern

**PART A:** Analytical/problem solving SHORT questions

8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE questions

4 x 15 marks=60 marks

Two questions from each module with choice to answer one question.

Maximum Total Marks: 100
EN 14 106: BASICS OF CIVIL AND MECHANICAL ENGG.  
(Common for all branches)

Teaching scheme
2 hours lecture

Credits: 4

SECTION 1: BASICS OF CIVIL ENGINEERING

1 hour lecture per week

Objective
• To give a basic knowledge of the topics in Civil Engineering.  
(In - depth treatment is not required)

Module I (13 hours)
Scope of Civil Engineering- Role of Civil Engineers in nation building.
Brief description of Engineering properties and applications of the following construction

Timber, Iron & steel. (Study on laboratory tests not expected, detailed manufacturing processes of materials not expected).

Stone and brick masonry construction- bonds used in general constructions- Cement mortar and Cement Concrete - Properties and applications- Reinforced Cement Concrete Fundamentals - points to be observed during masonry construction and concreting (Only brief description is expected).

Module II (13 hours)
Introduction to Surveying - brief description of the following instruments (i) chain and accessories (ii) Dumpy level (iii) Theodolite. Use of levelling instrument for determining reduced levels of various stations- Simple problems on levelling - use of theodolite for measuring horizontal angles – Simple problems on horizontal distance and plane area. (Only brief description is expected).

Building drawing- plan, section and elevation of a single room building with RCC roof (sketching in the paper/note book only is expected).

Type and functions of the following structural components of buildings (i) Foundation (ii) Wall (iii) Column (iv) Beam (v) Slab (vi) Arch & Lintels (vii) Plane Trusses. (viii) Cross Sectional elements of Roads and Dams.

Text Books
2. Pumia, B.C —Basic Civil Engineering, Laxmi Publications
3. PC Varghese —Building materials, Prentice Hall, India
4. PC Varghese —Building Construction, Prentice Hall, India

Reference Books
1. Mimi Das saikia, Bhargab Mohan Das, Madan Mohan Das—Elements of Civil Engineering—Prentice Hall, India
4. Pumia. B.C - Building Constructio, Laxmi Publications
5. Rajput. R.K.- Engineering Materials, S. Chand and Company
7. Satheesh Gopi - Basic Civil Engineering, Pearson

University of Calicut B.Tech Syllabus - Combined First & Second Semesters - 2014
**Internal Continuous Assessment (Maximum Marks-25)**

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Attendance and Regularity in the class

**University Examination Pattern for Section 1**

*PART A: Analytical/problem solving SHORT questions*  
4x 5 marks=20 marks

Candidates have to answer FOUR questions out of FIVE. There shall be minimum of TWO and maximum of THREE questions from each module with total FIVE questions.

*PART B: Analytical/Problem solving DESCRIPTIVE questions*  
2 x 15 marks=30 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 50*

Note: Section 1 and Section 2 are to be answered in separate answer books Maximum 50 marks each for Section 1 and Section 2
SECTION 2: BASICS OF MECHANICAL ENGINEERING

Teaching scheme
1 hour lecture per week

Objectives
- Gives an introduction as well as an overview on the concepts and applications of Mechanical Engineering

Module I (13 hrs)
Power Plants: Introduction – Layout and working of Diesel, Nuclear and Hydel power plants
Manufacturing process – Introduction – Elementary ideas of rolling and extrusion
Machining operations – Turning, shaping, milling and drilling
Power transmission – introduction – belt, rope, chain and gear drives, terminology, classification; advantages, disadvantages and applications

Module II (13 hrs)
Thermodynamic processes – isobaric, isochoric, isothermal, adiabatic and polytropic – work done, P-V diagrams.
Otto cycle, Diesel cycle (derivation not required) – IC Engines – SI and CI engines, 4S and 2S engines, comparison; MPFI & CRDI Engines
Refrigeration: Introduction – working of vapour compression refrigeration system, Ton of refrigeration, COP
Hydraulic turbines – Pelton, Francis and Kaplan turbines (applications only).
Pumps – Introduction, classification – reciprocating and centrifugal – (brief description and working only).

Text Books
1. P.Balachandran – Basic Mechanical Engineering – Owl Books - Thiruvananthapuram
2. J.Benjamin – Basic Mechanical Engineering – Pentx
3. Pravin kumar – Basic Mechanical Engineering – Pearson
6. V. Prabhuraja – Basic Mechanical Engineering – Scitech Publishers
**Internal Continuous Assessment (Maximum Marks-25)**

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

**University Examination Pattern for Section 2**

*PART A: Analytical/problem solving SHORT questions*  
4x 5 marks=20 marks

Candidates have to answer FOUR questions out of FIVE. There shall be minimum of TWO and maximum of THREE questions from each module with total FIVE questions.

*PART B: Analytical/Problem solving DESCRIPTIVE questions*  
2 x 15 marks=30 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 50*

**Note: Section 1 and Section 2 are to be answered in separate answer books**  
Maximum 50 marks each for Section 1 and Section 2
EN14 107: BASICS OF ELECTRICAL, ELECTRONICS & COMMUNICATION ENGINEERING  
(Common for all branches)

Teaching scheme
2 hours lecture per week

Credits: 4

SECTION 1 - BASIC ELECTRICAL ENGINEERING

Objective

- This course provides a quick overview of the concepts and results in Basic analysis that may be useful in engineering. Also it gives an introduction to Very basic concept and theory of Electrical Engineering.

Module I: Basic Laws in Electrical Engineering (13 Hours)

What is electrical Engineering? Kirchhoff’s Laws, Solution of series and parallel circuits with DC excitation. Voltage and current division rule. (2Hrs)

Magnetic circuits – MMF, Flux, Reluctance. Comparison of electric and magnetic circuits. (2 Hrs)

Faradays laws, Lenz’s Law, Thump rules. Statically and dynamically induced EMF, Self and Mutual Inductance, Coefficient of Coupling. (2 Hrs)

AC circuits: - Single phase AC circuits – generation of sinusoidal EMF, cycle, frequency, time, period. Average, RMS value and Maximum value, Form factor, peak factor of sine wave only. Analysis of simple R, L, C, RL, RC, LC, and RLC circuits (Equations and waveforms in AC only). Reactance and Impedance, active, reactive and apparent power (Phasor diagram), Power factor. (4Hrs)

Three phase circuits – generation of 3 phase wave form, star and delta connection, voltage and current relationship in star and delta (Balanced case only), star to delta and delta to star conversion. (3Hrs)

Module II: Basic Concepts of Transformers and Machines (13 Hours)

Single Phase Transformer – Construction (Core & Shell), principle of operation, EMF equation, Transformation Ratio, Ideal Transformer. (3Hrs)

DC Generators and Motors: - Constructional details, Types and Configurations, EMF equation. Application of DC Motors. (3Hrs)

3 Phase Induction Motors – Parts of Induction machine ( squirrel cage and Wound rotor type), Concept of Rotating magnetic field, principle of operation, slip, synchronous frequency. Application. (3Hrs)

Synchronous generator – construction, salient pole, cylindrical rotor type, principle of operation. (3Hrs)

Basic structure of power system (block diagram only). (1Hr)

Text Books:
1. Edward Hugs – Electrical & Electronic Technology, Pearson Education
2. Vincent Del Toro, Electrical Engineering Fundamentals, Pearson Education
3. SK Bhattacharyya, Basic Electrical & Electronics Engineering, Pearson
Reference:
1. Kothari and Nagrath, Theory & problems of Basic Electrical engineering. Tata
   McGraw Hill
2. JB Gupta, A course in electrical engg. SK. Kataria & Sons
3. BL Theraja, Electrical Technology Vol. 1,
4. K Uma Rao, Basic Electrical Engineering, Pearson

Internal Continuous Assessment (Maximum Marks-25)

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz,
   literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class

University Examination Pattern for Section 1

PART A: Analytical/problem solving SHORT questions  
4x 5 marks=20 marks
Candidates have to answer FOUR questions out of FIVE. There shall be
minimum of TWO and maximum of THREE questions from each
module with total FIVE questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions  
2 x 15 marks=30 marks
Two questions from each module with choice to answer one question.

Maximum Total Marks: 50

University Examination Pattern – for Section 1

Note: Section 1 and Section 2 are to be answered in separate answer books Maximum 50
marks each for Section 1 and Section 2
SECTION 2: BASICS OF ELECTRONICS AND COMMUNICATION ENGINEERING

Objectives

- To impart knowledge about basic electronic and digital systems
- To give basic ideas about various communication systems (Only system level block diagram approach, no analysis required)

Module I (13 hours)
Amplifiers: Principle of electronic amplifiers – Block diagram representation – Classification – Significance of input impedance, output impedance, output power, power gain, voltage gain and frequency response – noise in amplifiers – cascaded amplifiers – concept of differential amplifiers and operational amplifiers – concept of oscillators. (6 Hours)

Digital Systems: Logic gates – logic states – Boolean algebra – algebraic logic minimisation – generating logic diagram from Boolean expression – introduction to TTL and CMOS logic – programmable logic devices. (4 Hours)

Measurements and Data Acquisition Systems: Working and block diagram of CRO – sensors – actuators – principle of digital voltmeter – principle of ADC and DAC. (3 Hours)

Module II (13 hours)


Text Books
2. Santhiram Kal, _Basic Electronics-Devices, Circuits & IT fundamentals_, PHI, New Delhi.
5. David A. Bell, _Electronic Instrumentation & Measurements_, PHI, New Delhi.
Internal Continuous Assessment *(Maximum Marks-25)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

University Examination Pattern for Section 1

*PART A: Analytical/problem solving SHORT questions*  
4x 5 marks=20 marks  
Candidates have to answer FOUR questions out of FIVE. There shall be minimum of TWO and maximum of THREE questions from each module with total FIVE questions.

*PART B: Analytical/Problem solving DESCRIPTIVE questions*  
2 x 15 marks=30 marks  
Two questions from each module with choice to answer one question.

*Maximum Total Marks: 50*

**Note:** Section 1 and Section 2 are to be answered in separate answer books  
Maximum 50 marks each for Section 1 and Section 2
EN14 108: ENGINEERING GRAPHICS
(Common for all branches)

Teaching scheme
1 hour lecture and 3 hours practical/drawing per week

Credits: 6

Objectives
By going through the contents student will be able to:
• Understand systems of drawing.
• Produce orthographic drawing of points, lines and solids.
• Produce isometric views of any object.
• Develop skill to produce perspective views of any object.
• Develop skill to convert the pictorial views of simple engineering objects into orthographic views.

Module – I (8 Hours; 2 Drawing Exercises)
Drawing instruments and their use - Different types of lines - Lettering and dimensioning – Scales - Familiarization with current Indian Standard Code of practice for general engineering drawing - Construction of Conic sections - Construction of Cycloid, Involute and Helix (For internal work assessment only, not for University Examination)

Module-II (27 Hours; 5 Drawing exercises)
a) Introduction to projections - Systems of projections - Vertical, Horizontal and Profile planes - Principles of first and third angle projections - Projections of points in different quadrants - Orthographic projections of straight lines parallel to both reference planes - Perpendicular to one of the reference planes - Inclined to one and parallel to other reference plane - Inclined to both the reference planes and occupied in one quadrant - Traces of lines - True length and inclination of a line with reference planes - Line occupied in more than one quadrant - Line inclined to the two reference planes but parallel to the profile plane.
b) Projections of plane lamina of geometrical shapes - Plane lamina parallel to one of the reference planes - Inclined to one and perpendicular to the other reference plane - Inclined to both the reference planes - Inclined to the two reference planes but perpendicular to the profile plane.

Module- III (24 Hours; 5 Drawing exercises)
a) Projections of Polyhedra, Solids of revolution and Frustums - Projections of solids with axis parallel to one and inclined to the other reference plane - Axis inclined to both the reference planes - Projections of solids on auxiliary planes (Solids to be drawn: Cube, Prisms, Pyramids, Tetrahedron, Cone and Cylinder)
b) Sections of solids - Sections by cutting planes parallel to the reference planes - Cutting plane inclined to one and perpendicular to other reference plane - True shape of the section by projecting on auxiliary plane (Solids to be drawn: Cube, Prisms, Pyramids, Tetrahedron, Cone and Cylinder)

Module- IV (18 Hours; 4 Drawing exercises)
a) Development of surfaces of solids - Method of parallel line and radial line developments - Development of Polyhedra, Cylinder, Cone and sectioned solids - Development of solids having hole or cut
b) Introduction to isometric projection - Isometric scale - Isometric views - Isometric projections of Prisms, Pyramids, Cylinder, Cone, Spheres, sectioned solids and combination of them.
Module- V (19 Hours; 4 Drawing exercises) 

a) Introduction to perspective projections - Classification of perspective views - Visual ray and vanishing point method of drawing perspective projection - Perspective views of plane figures such as polygons and circles - Perspective views of solids like Prisms, Pyramids and Cube.

b) Introduction to multiview projection of objects - The principle of the six orthographic views - Conversion of pictorial views of simple engineering objects into orthographic views.

c) Conventional representation of threaded fasteners - Drawing of nuts, bolts, washers and screws - Locking arrangements of nuts - Bolted and screwed joints - Foundation bolts.

Module- VI (8 Hours; 2 Drawing exercises) 

a) Introduction to Computer Aided Drafting (CAD) - Preparation of engineering drawings by using any software capable of drafting and modelling - Creation of simple figures like polygon and general multiline figures - Drawing of front view and top view of solid like Prism, Pyramid and Cylinder and dimensioning - Drawing of front view and top view of objects from pictorial view. (For internal work assessment only, not for University Examination)

NOTE: All drawing exercises mentioned above are for class work. Additional exercises where ever necessary may be given as home assignments

Text Books

Reference Books.

Internal Continuous Assessment (Maximum Marks-50)
60% - Drawing exercises (Best 15 sheets)
40% - Tests (minimum 2)

University Examination Pattern
No question from modules I and VI

PART A
Q I Two questions (a) and (b) of 20 marks each from module II, one from module II (a) and one from module II(b), with choice to answer any one.
Q II Two questions (a) and (b) of 20 marks each from module III, one from module III(a) and one from module III(b), with choice to answer any one.
Q III Two questions (a) and (b) of 20 marks each from module IV, one from module IV(a) and one from module IV(b), with choice to answer any one.

PART B
Q IV 3 Questions (a), (b) and (c) of 20 marks each from module V, one from module V(a), one from module V(b) and one from module V(c), with choice to answer any two.
EN14 109: HUMANITIES AND COMMUNICATION SKILLS
(Common to all branches)

Teaching scheme
2 hour lecture and 1 hour tutorial per week

Credits: 2

A minimum of 12 Tutorial hours can be utilized for Language lab/extra mural lectures on communication and other topics of social and technical importance.

Objectives
- To identify the most critical issues that confronted particular periods and locations in history;
- To identify stages in the development of science and technology;
- To understand the purpose and process of communication;
- To produce documents reflecting different types of communication such as technical descriptions, proposals, and reports;
- To develop a positive attitude and self-confidence in the workplace; and
- To develop appropriate social and business ethics.

Module I (16 hours)

Module II (23 hours)
Concept of communication: The speaker/writer and the listener/reader, medium of communication, barriers to communication, accuracy, brevity, clarity and appropriateness Reading comprehension: Reading at various speeds, different kinds of text for different purposes, reading between lines. Listening comprehension: Comprehending material delivered at fast speed and spoken material, intelligent listening in interviews
Speaking: Achieving desired clarity and fluency, manipulating paralinguistic features of speaking, task oriented, interpersonal, informal and semi formal speaking, making a short classroom presentation.
Group discussion: Use of persuasive strategies, being polite and firm, handling questions and taking in criticisms on self, turn-taking strategies and effective intervention, use of body language.

Module III (23 hours)
Written Communication: Note making and taking, summarizing, notes and memos, developing notes into text, organization of ideas, cohesion and coherence, paragraph writing, ordering information in space and time, description and argument, comparison and contrast, narrating events chronologically. Writing a rough draft, editing, proof reading, final draft and styling text.
Project report: Reference work, General objective, specific objective, introduction, body, illustrations using graphs, tables, charts, diagrams and flow charts. Conclusion and references Preparation of leaflets, brochure and C.V.
Module IV (16 hours)

Human relations and Professional ethics: Art of dealing with people, empathy and sympathy, hearing and listening. Tension and stress, Methods to handle stress

Responsibilities and rights of engineers- collegiality and loyalty – Respect for authority – Confidentiality – conflicts of interest – Professional rights, Rights of information, Social responsibility

Senses of ethics – variety of moral issues – Moral dilemma – Moral autonomy – Attributes of an ethical personality – right action – self interest

Reference Books

3. Subrayappa, *History of Science in India*, National Academy of Science, India
11. Encyclopaedia Britannica, *History of Science, History of Technology*

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Attendance and Regularity in the class

University Examination Pattern

*PART A: Analytical/problem solving SHORT questions* 8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

*PART B: Analytical/Problem solving DESCRIPTIVE questions* 4 x 15 marks=60 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 100*
EN 14 110 (P): MECHANICAL WORKSHOPS
(Common for all branches)

Teaching scheme
2 hours practical per week

Credits: 2

Objectives
• To inculcate engineering aptitude, confidence and experience towards technical skills
• To train the students mentally and physically for industries
• To impart knowledge and technical skills on basic manufacturing methods

A. Carpentry: study of tools and joints – planing, chiselling, marking and sawing practice, different joints, use of power tools

B. Fitting: study of tools, chipping, filing, cutting, drilling, tapping, male and female joints, stepped joints

C. Smithy: study of tools, forging of square prism, hexagonal bolt

D. Foundry: study of tools, sand preparation, moulding practice

E. Sheet Metal work: study of tools, selection of different gauge sheets, types of joints, trays and containers

F. Welding: study of tools, different types of joints, practice

At least 3 models should be completed by the student in each section.

Internal Continuous Assessment (Maximum Marks-100)
50% - Laboratory practical and record
40% - Test
10% - Regularity in the class
EN 14 111(P) ELECTRICAL AND CIVIL WORK SHOPS
(Common for all branches)

Teaching scheme
2 hours of practical per week

Credits: 2

SECTION 1: ELECTRICAL ENGINEERING WORK SHOP

Objective
• To impart a basic knowledge of electrical circuits, machines and power systems.

List of experiments

1. Familiarization of various types of Service mains – Wiring installations – Accessories and house hold electrical appliances.
2. Methods of earthing- Measurement of earth resistance- Testing of electrical installations- Precautions against and cure from electric shock
3. Practice of making different joints ( Britannia, Married and T- Joints) on copper/ aluminium ba
4. Wiring practice of a circuit to control two lamps by two SPST switches.
5. Wiring practice of a circuit to control one lamp by two SPDT switches.
6. Wiring practice of a circuit to control one fluorescent lamp and one three pin plug socket.
7. Wiring practice of a main switch board consisting of ICDP switch, DB, MCB’s and ELCB’s.
8. Familiarization of various parts of electrical motors and wiring of three phase and single phase motor with starter.
9. Familiarization of energy meter and measurement of energy consumption by a single phase load.
10. Familiarization of various electrical and electronic components such as transformers, resistors, AF and RF chokes, capacitors, transistors, diodes, IC’s and PCB.
11. Assembling and soldering practice of single phase full wave bridge rectifier circuit with i) capacitor circuit ii) regulator IC

Internal Continuous Assessment (Maximum Marks-50)
50% - Laboratory practical and record
40% - Test
10% - Regularity in the class
SECTION 2: CIVIL ENGINEERING WORK SHOP

Objectives

- To provide experience on plotting, measuring/determining horizontal distances, level differences between stations and horizontal angles
- To provide experience on setting out for small buildings, masonry construction, plumbing work and model making.

1. Chain Surveying - Study of chain and accessories, Plotting one side of a building/Five or six points in the field using chain and cross-staff
2. Compass surveying (Study of compass, Plotting one side of a building/Five or six points in the field using compass
3. Levelling - Study of levelling instruments, Determination of reduced levels of five or six points in the field.
4. Theodolite - Study of Theodolite, Measuring horizontal angles
5. Setting out practice
6. Brick Masonry
7. Plumbing - Demonstration of plumbing fixtures-Exercise in joints
8. Model making of simple solids

Internal Continuous Assessment (Maximum Marks-50)
50% - Laboratory practical and record
40% - Test
10% - Regularity in the class