

# STUDY AND EVALUATION SCHEME FOR ELECTRICAL ENGINEERING (2010)

## FIRST SEMESTER

Code No.	Subject	Study Scheme Period/ Week			Evaluation Scheme						Total Marks
		L	T	P	Internal Assessment		External Assessment Exam				
					Theory	Practical	Written Paper		Practical		
					Max Marks	Max. Marks	Max. Marks	Hrs.	Max. Marks	Hrs.	
*BS-214	Applied Chemistry	4	-	2	50	25	100	3	50	3	225
*CM-102	Communication Techniques-I	3	-	-	50	-	100	3	-	-	150
*BS-112	Applied Mathematics-I	3	1	-	50	-	100	3	-	-	150
*ES-121	Engineering Drawing-I	1	-	6	-	50	100	3	-	-	150
#CE-131	Elements of Civil Engineering	3	-	2	25	25	100	3	50	3	200
*ES-120	Applied Mechanics	3	2	2	25	25	100	3	50	3	200
*ME-130	Workshop Practice-I	-	-	8	-	50	-	-	100	3	150
**	Student Centered Activities	-	-	-	-	-	-	-	-	-	-
TOTAL		17	3	20	200	175	600		250		1225

\* Subjects common with Civil, Electrical, Production Engineering, Mechanical and Automobile Engineering

# Course common with Automobile and Mechanical Engineering.

\*\* Student centered activities will include: extension lectures, field visits, seminars, debates, hobby clubs, library Studies, awareness regarding ecology and environment, conservation of energy (Petroleum products, electricity etc), social service camps and other co-curricular activities including games. Advanced planning for each semester has got to be made



**BS - 214 APPLIED CHEMISTRY**

Pds/week

L	T	P
4	-	2

**RATIONALE**

Applied Chemistry has been considered as one of the core subject for diploma holders in engineering and technology to develop in them scientific temper, appreciation of chemical properties of materials and to develop learning to learn skills in the students. This course will deal with metallurgy, corrosion, and fuels. This will equip them to perform various activities effectively. Hence the course.

**NOTE:** Weightage of each topic for external examination is given in the brackets

**DETAILED CONTENTS**

1. **Structure of Atom** (10%)  
 ✓ Rutherford model of the structure of atom, Boher's theory of H atom and equation deduced. Quantum numbers and their significance, De-Broglie equation and uncertainty principle. Electronic configuration of 1 to 30 elements.
2. **Periodic Properties of Elements** (10%)  
 ✓ Periodic law, periodic table, periodicity in properties like atomic radii and volume, ionic radii, ionization energy and electron affinity. Division of elements into s.p.d. and f block.
3. **Chemical Bonds** (10%)  
 ✓ Electrovalent, covalent and coordinate bond and their properties. Metallic bonding (electron cloud model) and properties (like texture, conductance, lusture, ductility and malleability). Orbital concept of covalence, hybridization (simple treatment).
4. **Fuel and their Classification** (10%)  
 ✓ Definition, characteristics, Classification, into solid, liquid and gaseous fuel, Petroleum and brief idea of its refining into various fraction and their characteristics and uses.
5. **Water** (10%)  
 ✓ Impurities in water, method of their removal, hardness of water, its types, causes and removal, Disadvantage of Hard water in boilers pH value and its determination by calorimetric method.
6. **Chemical equilibrium** Law of mass action, equilibrium constant expression, relation between  $K_p$  &  $K_c$ . Calculation of Equilibrium concentration and constant for dissociation of  $NH_3$ ,  $PCl_3$  and  $HI$ , characteristics of equilibrium. (10%)  
 ✓



- (10%)
7. **Metals**  
Cast iron and its properties, effect of sulphur, silicon and phosphorous as impurities in cast iron. Elementary knowledge of heat treatment of steels-hardening, tempering, annealing, normalizing and case hardening.
- (10%)
8. **Alloys**  
Definition, classification and necessity for making alloys. Composition, properties and use of following alloys: Brass, Bronze, Gun-metal and Duralumin. Effect of carbon, nickel, chromium, manganese on steel.
- (10%)
9. **Corrosion**  
Its meaning, theory of corrosion, prevention of corrosion by various methods using metallic and non-metallic coatings.
- (10%)
10. **Plastics and Polymers**  
Plastics-thermo-plastic and thermo setting. Introduction of Polythene, P.V.C., Nylon, synthetic rubber and phenol-formaldehyde resin. Their application in industry.

### LIST OF PRACTICALS

1. To find the strength in grams per litre of the given solution of sodium hydroxide with the help of standard oxalic acid solution.
  2. Find the strength in grams per litre of given sodium hydroxide solution with the help of standard sodium-carbonate solution and intermediate solution of an acid.
  3. Determine the total alkalinity in ppm in the given sample of water using standard sulphuric acid.
  4. To find the amount of chloride ions present in water using silver nitrate solution (potassium chromate as indicator)
  5. Determine the type of alkalinity in ppm present in a given sample of  $H_2O$  using standard sulphuric acid.
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**\*CM-102 COMMUNICATION TECHNIQUES – I**

	L	T	P
Pds/week	3	-	-

**RATIONALE**

This course aims at developing reading, writing and communications skills in the students so as to develop confidence in them in written and oral techniques of communication in English language. This course will also help the students in their continuing education needs.

**NOTE:** Weightage of each topic for external examination is given in the brackets

**DETAILED CONTENTS**

1. The Prose Textbook entitled "A Book of English for Polytechnic Students", prepared by National Institute of Technical Teachers' Training and Research (NITTTR), Chandigarh and published by Macmillan India Limited. (30%)

Questions to test the comprehension and critical appraisal of the lesson are to be given. Three questions out of five are to be attempted. Word limit for answer is to be approximately 150 words each.

2. Vocabulary (10%)

Antonyms, synonyms, homonyms and one-word substitution.

3. Grammar (20%)

A brief review of easy forms of tenses (present indefinite, present continuous, present perfect, present perfect continuous, past indefinite, past continuous, past perfect, past perfect continuous and future indefinite). Conversions of direct into indirect narration and vice versa (only simple sentence) Punctuation articles, prepositions, voice, auxiliary (be, have, do and models).

4. Comprehension: (20%)

A passage of 100 – 150 words may be given to test the comprehension skill of the students. Simple question to test the understanding of the contents and vocabulary may be given.

5. Essay (20%)

Choice of attempting one out of three topics may be given. The essay will be of 300 – 350 words. Descriptive, narrative and reflective topics from areas such as science, technology, environment, current problems, socio-economic issues may be given.



**\*BS-112 APPLIED MATHEMATICS - I**

L T P  
3 1 1

**RATIONALE**

The course aims at developing analytical abilities in basics of applied mathematics such as: vector algebra, matrices, elementary numerical analysis, coordinate geometry, differential and integral calculus and solution of first order differential equations. Besides application of above the elements in engineering, the course of study will also provide continuing education base to them.

**NOTE:** Weightage of each topic for external examination is given in the brackets

**DETAILED CONTENTS**

**1. ALGEBRA**

15%

- (i) Arithmetic Progression (A.P.) – its  $n^{\text{th}}$  term, sum to  $n$  terms. Geometric Progression (G.P.) - its  $n^{\text{th}}$  term, sum to  $n$  terms. And infinite Geometric series.
- (ii) Partial Fractions.
- (iii) Binomial theorem for positive integral index (without proof), Binomial theorem for any index, Expansions.

**2. TRIGONOMETRY.**

15%

- (i) Sum and difference formulas for trigonometric ratios of angles and their application (without proof). Formula from product to sum, difference and vice-versa. Ratio multiple angles, sub multiple angles (like  $2A$ ,  $3A$ ,  $A/2$ ).
- (ii) In a triangle sine formulas, cosine formulas, Napier's analogy. Solution of triangle.
- (iii) Simple problems on height and distance.
- (iv) Plotting of curves  $y = f(x)$ ,  $f(x)$  being algebraic function (maximum upto third degree) or trigonometric functions (Sine, Cosine, Tangent).

**3. COORDINATE GEOMETRY.**

40%

- (i) Equation of straight line in various standard forms. Intersection of two straight lines and angle between them. Concurrent lines, perpendicular distance formula.
- (ii) General equation of a circle and its characteristics. Equation of a circle given center and radius, three point form and diametrical form.
- (iii) Definition of a conic section, standard equation of a parabola equation of parabola given its focus and Directrix. Given the equation of parabola finding its focus, vertex, Directrix and latus section.
- (iv) Ellipse and hyperbola (standard equation, without derivation) determining equation of ellipse and hyperbola given the Directrix, focus and eccentricity. Given the equation of the ellipse and hyperbola finding the foci, Directrices, axes, latus rectum, vertex and eccentricity.



4. **VECTOR ALGEBRA.** 10%
- (i) Concept of a vector, Position vector of a point. Addition and subtraction of vectors.
  - (ii) Multiplication of a vector by a scalar product and vector product of two vectors. Application to problems on work done and moment (torque)

5. **DETERMINANT AND MATRIX.** 20%
- (i) Definitions Evaluation of a determinant of order two and three. Minor and cofactors. Properties of determinants. Solving simultaneous equations by Cramer's rule.
  - (ii) Concept of a matrix, definitions, Transpose of a matrix, Symmetric and Skew Symmetric matrix, Diagonal matrix, Unit matrix, Addition and Multiplication of matrices, Adjoint and Inverse of a matrix, solving simultaneous equations by matrix methods.
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## +CE - 131 ELEMENTS OF CIVIL ENGINEERING

L	T	P
3	-	2

### RATIONALE

This is an appreciation course and is useful to understand regarding various types of engineering materials, their characteristics and usage; elements of building construction and surveying. This knowledge will be quite helpful to diploma engineers in their professional career.

**Note:** Weightage of each topic for external examination is given in the brackets.

### DETAILED CONTENTS

1. **Civil Engineering Materials.** (40%)  
 Properties and uses of bricks, stones, stones aggregate, cement, cement concrete, bitumen and asphalt.  
**Timber**  
 Different types of timber, identification, properties and uses of different types of timbers  
**Special Materials:**  
 Properties and uses of fire resistant and sound proofing materials.
2. **Elementary Surveying** (15%)  
 Brief idea of chain surveying, compass surveying and leveling; use of theodolite in alignments.
3. **Building Construction.** (45%)
  - (i) Selection of site for construction of a building, Setting out of a building, various components of a building to be used in residential building, workshops, factories and power houses. Water supply and sanitation of buildings.
  - (ii) Foundations:  
 Elementary idea of foundations. Special foundations and foundations used for factories, powerhouses. Machine foundations. Minimization of vibrations.
  - (iii) General principles of bricks masonry. English bonds floors and types of flooring with particular reference to industrial floorings.
  - (iv) Sloping, trussed and RCC roofs for factories.

### LIST OF PRACTICALS

1. To determine initial and final setting time of cement.
2. To perform slump test.
3. Laying of bricks in different layer using English bond.
4. Ranging and chaining of a survey line.
5. Study of prismatic compass and taking readings.
6. Study and use of a level, simple leveling.
7. Study of Theodolite and its uses.
8. Identification of timbers.



**\*ES-120 APPLIED MECHANICS**

L T P  
3 2 2

**RATIONALE**

The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required to the students for further understanding of other applied subjects. Hence this course.

**NOTE:** Weightage of each topic for external examination is given in the brackets

**DETAILED CONTENTS**

**1. Introduction**

(5%)

Concept of mechanics and applied mechanics – Explanation of mechanics and applied Mechanics, its importance and necessity, giving suitable examples on bodies at rest and motion, explanation of branches of this subject.

**2. Laws of Forces**

(15%)

Force and its effects. Units and measurement of force. Characteristics of force vector representation. Bow's notation.

Types of forces, action and reaction, tension & thrust. Force systems: Coplanar and space force systems. Coplanar, concurrent and non-concurrent forces. Free body diagrams.

Resultant and components of forces, concept of equilibrium; parallelogram law of force Equilibrium of two forces, super-position and transmissibility of forces, Newton's third law triangle law of forces, different cases of concurrent coplanar, two forces systems, extension parallelogram law and triangle law to many forces acting at one point-polygon law of force method of resolution into orthogonal components for finding the resultant, graphical method special case of three concurrent, coplanar forces, Lami's theorem.

**3. Moments**

(15%)

Concept of moment, Varignon's theorem – statement only. Principle of moments – application of moments to simple mechanism. Parallel forces, like and unlike parallel forces, calculation of their resultant, concept of couple, moving a force parallel to its line of action, general case of coplanar force system, general conditions of equilibrium of bodies under coplanar parallel forces.

**4. Friction**

(10%)

Concept of friction, laws of friction, limiting friction and coefficient of friction, sliding friction and rolling friction, inclined plane.



**5. Centre of Gravity and Centroid**

(15%)

Concept of gravity, gravitational force, centroid and centre of gravity. Centroid for regular lamina and center of gravity for regular solids. Position of centre of gravity of compound bodies and centroid of composite area. CG of bodies and areas with portions removed.

**6. Moment of Inertia of Plane Areas**

(15%)

Concept of Moment of Inertia and second moment of area and Radius of gyration, theorems of parallel and perpendicular axes, second moment of area of common geometrical sections: rectangle, triangle, circle (without derivations). Second moment of area for L, T and I sections. Section modulus without derivation.

**7. Laws of Motion**

(15%)

Concept of momentum, Newton's laws of motion, their application, derivation of force equation from second law of motion, numerical problems on second law of motion, piles, lifts, bodies tied with string, Newton's third law of motion numerical problems, conservation of momentum, impulse and impulsive force (definition only).

**8. Simple Lifting Machines**

(10%)

Concept of machine, mechanical advantage, velocity ratio and efficiency of a machine, their relationship, law of machine, simple machines (lever, wheel and axle, pulleys, jacks winch crabs only).

**LIST OF PRACTICALS**

1. Verification of the laws of polygon of forces.
  2. To verify the forces in the different members of a jib crane.
  3. To verify the reaction at the supports of a simply supported beam.
  4. To find the mechanical advantage, velocity ratio and efficiency in the case of inclined planes
  5. To find the mechanical advantage, velocity ratio and efficiency in the case of Screw Jack
  6. To find the mechanical advantage, velocity ratio and efficiency in the case of worm and worm wheel
  7. To find the mechanical advantage, velocity ratio and efficiency in the case of winch Crab- Single-Graphical representation.
  8. To find out centre of gravity of regular and irregular laminas.
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**\*ES-121 ENGINEERING DRAWING-1**

	L	T	P
Pds/week	1	-	6

**RATIONALE**

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation.. The emphasis, while imparting instructions, should be to develop conceptual skills in the students.

- NOTE:**
- 1) Weightage of each topic for external examination is given in the brackets
  - 2) First Angle Projection to be followed
  - 3) Minimum of 12 sheets to be prepared by each student covering all topics/units.
  - 4) BIS SP 46-1988 should be followed

**DETAILED CONTENTS**

- 1) The introductory lecture should cover "Handling, use & care of drawing instruments and materials, drawing sheets". The sheet #1 & 2 should cover—" Different types of lines, methods of dimensioning, free hand sketching of lines, geometrical figures, free hand single stroke lettering- alphabet- uppercase, lower case, numerals – single stroke lettering of 2.5, 3.5, 5, 7, 10, 14, 20 mm high (ratio 7:4)"- vertical and inclined at  $75^{\circ}$ . (15%)
- 2) Lecture on First & Third angle projection, projection of points in various quadrants. Sheet # 3 Examples on projection of points. (10%)
- 3) Lecture on projection of lines and sheet # 4,5, 6 on projection of lines. (5%)
- 4) Lecture on Projection of planes and sheet # 7,8 on projection of planes. (10%)
- 5) Lecture on projection of solids- Sheet # 9, 10. (10%)
- 6) Lecture on Sections of solids - Standard Conventions Sheet # 11, 12
- 7) Lecture on Intersection of solids - sheet # 13, 14. (20%)
- 8) Lecture on Development of Surfaces # Sheet 15, 16. (20%)
- 9) Lecture on Isometric view of solids Use sketch book (free hand sketch) to have the three orthographic views of 6 solid blocks. 6 examples of isometric view of another set of 6 objects. (5%)  
(5%)
- 10) Lectures on Scales and Monograms Sheet # 17.



## ME-130 WORKSHOP PRACTICE-I

L T P  
- - 8

### RATIONALE

This course aims at developing generic manual and machining skills in the student. Besides about the development of dignity of labour, precision, safety at work places, team working and development of right attitudes are other objectives.

### DETAILED CONTENTS

#### 1. Fitting Shop

Introduction to tools, workbench and work holding devices and measuring instruments. Their safekeeping, safety precautions. Practical exercises involving sawing, filing, marking, square ness, chipping.

#### 2. Welding Shop

##### (i) Arc Welding

Introduction to tools and equipment, safety precautions, use of welding transformer/welding machine, method of selecting current, choice of electrode.

##### (ii) Gas Welding

Introduction to gas welding equipment, safety precautions, selection of gas pressure, welding torch, types of flame, flux, welding rod and welding technique.

Exercises involving job preparation and making single joints. Brazing practice brazing by gas.

#### 3. Carpentry Shop

Identification of wood, introduction to tools, safety precautions.

Practical exercises involving practice of sawing, planing, chiseling, making various joints. To make some utility jobs such as brackets, office tray.

#### 4. Painting and Polishing

Introduction to paints and allied materials exercises on surface preparation, varnishing, spirits polishing, painting-using brush and spray, casual painting.

**Note:** - Making a record of exercise / job completed by the student is a part of the work for internal evaluation.