SCHEME OF STUDIES

FIRST YEAR				
Code	**Subject Name**	**T**	**P**	**C**
Gen 111	Islamiat & Pakistan Studies	1	0	1
Eng 112	English	2	0	2
Math 113	Applied Mathematics-I	3	0	3
Ch 112	Applied Chemistry	1	3	2
Phy 122	Applied Physics	1	3	2
Civil 114	Basic Surveying	2	6	4
Civil 123	Engineering Materials & Construction	2	3	3
Civil 133	Basic Engineering Drawing	1	6	3
Shop 112	Workshop Practice	1	3	2
Comp 111	Computer Applications	0	3	1
	T o t a l	**14**	**27**	**23**

SECOND YEAR				
Code	**Subject Name**	**T**	**P**	**C**
Gen 211	Islamiat/Pakistan Studies	1	0	1
Math 212	Applied Mathematics-II	2	0	2
Gen 222	Communication Skills & Report Writing	1	2	2
Civil 213	Public Health Technology	2	3	3
Civil 224	Advanced Surveying	2	6	4
Civil 233	Building Construction	2	3	3
Civil 243	Civil Engineering Drawing & Auto CAD	1	6	3
Civil 253	Mechanics of Structures	2	3	3
Civil 262	Quantity Surveying	1	3	2
	T o t a l	**14**	26	**23**

THIRD YEAR				
Code	**Subject Name**	**T**	**P**	**C**
Gen 311	Islamiat & Pakistan Studies	1	0	1
Civil 312	Project Management	2	0	2
Civil 323	Advanced Quantity Surveying	1	6	3
Civil 332	Environment Health and Safety	2	0	2
Civil 344	Hydraulics & Irrigation	3	3	4
Civil 353	Transportation Engineering	2	3	3
Civil 363	Concrete Technology and RCC Design	2	3	3
Civil 373	Soil Mechanics & Bridge Engineering	2	3	3
Civil 382	Civil Engineering Project Civil	0	6	2
	T o t a l	**15**	**24**	**23**

DAE CIVIL TECHNOLOGY

YEAR 1

اسلامیات/مطالعہ پاکستان

		ڈی	پی	سی
حصہ اول اسلامیات	GEN III			
حصہ دوم مطالعہ پاکستان		1	0	1
موضوعات حصہ اول اسلامیات	سال اول	کل وقت: 20 گھنٹے		

کتاب و سنت

(i) قرآن مجید

-1 تعارف قرآن مجید 2- نزول قرآن 3- مکی و مدنی سورتوں کی خصوصیات 4- وحی کی اقسام 5- پندرہ منتخب آیات مع ترجمہ

1.1 تنالوا البر حتی تنفقوا مما تحبون

1.2 واعتصموا بحبل اللّٰہ جمیعا" ولا تفرقو

1.3 ولا یجر منکم شنان قوم علی ان لا تعدلوا

حصہ اول

حصہ اسلامیات

تدریسی مقاصد

۱- قرآن مجید

عمومی مقصد: طالب علم یہ سمجھنے کے قابل ہو کہ اسلام کی تعلیمات کا اصل سرچشمہ قرآن مجید ہے

خصوصی مقاصد: طالب علم اس قابل ہو جائے گا کہ

☆ قرآن مجید کی تعریف کر سکے گا

☆ قرآن مجید کے نزول کی صورت بیان کر سکے

☆ قرآن مجید کی مکی و مدنی سورتوں کی پہچان کر سکے

☆ منتخب آیات کا ترجمہ و تشریح کر سکے

عمومی مقصد: یہ سمجھنے کے قابل ہو جائے گا کہ منتخب قرآنی آیات کے ذریعے اسلامی تعلیمات کا مفہوم کیا ہے

☆ قرآنی آیات کا ترجمہ تشریح کر سکے

☆ قرآنی تعلیمات کی روشنی میں اپنی اور معاشرتی اصلاح کر سکے

2- سنت

عمومی مقصد: طالب علم سنت نبوی کی اہمیت اور ضرورت کو اچھی طرح سمجھنے کے قابل ہو جائے گا

خصوصی مقاصد:

☆ سنت کی تعریف بیان کر سکے

☆ سنت کی اہمیت و ضرورت کی وضاحت کر سکے

☆ سنت کی روشنی میں اسوہ حسنہ پر عمل کر سکے

-3 منتخب احادیث نبویہ

عمومی مقصد: احادیث کی روشنی میں اخلاقی اقدار سے آگاہی حاصل کر سکے

خصوصی مقاصد: احادیث کا ترجمہ و تشریح کر سکے

رسول اللہ ﷺ کے اسوۂ حسنہ کی پیروی کا جذبہ پیدا ہو سکے

دین اسلام

عمومی مقاصد: دین اسلام کے بنیادی مقاصد اور عبادات کے بارے میں جان سکے اور بیان کر سکے

خصوصی مقاصد

لفظ دین اسلام کے لغوی اور اصطلاحی معنی بیان کر سکے

اسلام کے بنیادی مقاصد کی اہمیت بیان کر سکے

اسلام کے بنیادی مقاصد سے انسان کی انفرادی و اجتماعی زندگی پر پڑنے والے اثرات بیان کر سکے

عبادت کے لغظی و اصطلاحی معنی بیان کر سکے

عقیدے اور عبادت کا فرق بیان کر سکے

عبادات (نماز، روزہ، حج، زکواۃ) کے فوری احکامات اور انسانی زندگی پر ان کی اثرات بیان کر سکے

اسلامی مقاصد و عبادات کے مطابق اپنی زندگی ڈھال کر ایک اچھا مسلمان بن سکے

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات سال اول

GEN III

حصہ دوم مطالعہ پاکستان

ٹی	پی	سی
1	0	1

کل وقت- 20 گھنٹے

موضوعات

اخلاقیات کی تعریف اور اہمیت

اخلاقیات کا معیار (قانون، عقل، الہامی کتب)

مندرجہ ذیل اخلاق کی وضاحت

- ☆ دیانت داری
- ☆ وفاداری
- ☆ نظم و ضبط
- ☆ راست گوئی
- ☆ صبر و استقلال
- ☆ حوصلہ مندی
- ☆ وقت کی پابندی
- ☆ صفائی
- ☆ ایثار
- ☆ باہمی احترام
- ☆ مصلحت

نصاب اخلاقیات (سال اول)

تدریسی مقاصد

عمومی مقاصد: اعلیٰ اخلاق کی وجہ سے ملکی ترقی میں مکمل قدر فعالہ کر سکے

خصوصی مقاصد: طالب اس علم سے اس قابل ہو گا کہ

- ☆ موضوعات کا مطلب بیان کر سکے
- ☆ عملی زندگی سے مثالوں کی نشاندہی کر سکے
- ☆ اپنی شخصیت اور معاشرے پر موضوعات کے مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے
- ☆ دیانت داری کی اہمیت بیان کر سکے
- ☆ وفاداری کی اہمیت بیان کر سکے
- ☆ نظم و ضبط کی افادیت بیان کر سکے
- ☆ صدق بیان کی ضرورت بیان کر سکے
- ☆ حوصلہ مندی کے فوائد بیان کر سکے
- ☆ وقت کی پابندی کے فوائد بیان کر سکے
- ☆ صفائی اور باہمی اختیار سے حسن کارکردگی کو بیان کر سکے
- ☆ مصلحت کے فوائد بیان کر سکے

نصاب (سال اول) Class III

حصہ دوئم | مطالعہ پاکستان | کل وقت 12 گھنٹے

موضوعات

☆ حریت فکر: مسلمان قوم میں آزادی فکر کی تاریخ، مسلمانوں میں سیاسی آزادی کی اہمیت اور ضرورت - ذہنی و جسمانی غلامی کے نقصانات

☆ نظریہ پاکستان

مطالعہ پاکستان (حصہ دوئم) اور حصہ

تدریسی مقاصد

حریت فکر:

عمومی مقصد

طالب علم یہ جان لے کہ اسلام میں اور مسلمان قوم میں آزادی فکر کی کیا اہمیت ہے

خصوصی مقاصد

☆ حریت فکر کا معنی و مفہوم بیان کر سکے

☆ آزادی فکر کی اہمیت بیان کر سکے

☆ خصوصاً اسلام میں آزادی اظہار رائے کی اہمیت بیان کر سکے

☆ ذہنی غلامی کے قومی سطح پر نقصانات کے بیان کر سکے

☆ جسمانی غلامی قومی سطح پر نقصانات بیان کر سکے

نظریہ پاکستان

عمومی مقصد:

نظریہ پاکستان (دین اسلام) سے پوری طرح واقفیت ہو جائے

خصوصی مقاصد:

☆ نظریہ کی تعریف بیان کر سکے اور اس کی وضاحت کر سکے

☆ نظریہ پاکستان کی تعریف کر سکے اور اس کا مفہوم بیان کر سکے

☆ علامہ اقبال اور قائداعظم کے فرمودات کی روشنی میں نظریہ پاکستان بیان کر سکے

نظریہ پاکستان کا تاریخی پہلو

عمومی مقصد

☆ نظریہ پاکستان کے تاریخی پس منظر سے واقفیت حاصل کر سکے

خصوصی مقاصد:

☆ محمد بن قاسم کے بارے میں بیان کر سکے

- ☆ محمد بن قاسم کے ہندوستان پر حملہ کی وجہ بیان کر سکے
- ☆ محمد بن قاسم کے ہندوستان پر حملہ کے اثرات بیان کر سکے
- ☆ بیان کر سکے کہ ہندوستان میں ہندو مسلم دو قومی نظریہ کا نکتہ آغاز کیا ہے
- ☆ مجدد الف ثانیؒ کی علمی خدمات بیان کر سکے
- ☆ شاہ ولی اللہ کی علمی خدمات بیان کر سکے
- ☆ مجدد الف ثانیؒ اور شاہ ولی اللہ نے جو تبلیغ دین اور مسلمانوں میں سیاسی شعور پیدا کیا اسے بیان کر سکے

علمی تحریکیں

عمومی مقصد

- ☆ برصغیر کی علمی تحریکوں سے آگاہی حاصل ہو سکے

خصوصی مقاصد:

- ☆ علی گڑھ - دیوبند - ندوۃ العلماء مدرسۃ السلام ، اسلامیہ کالج۔ انجمن حمایت اسلام نے تعلیم کے ذریعہ سیاسی شعور مسلمانوں میں پیدا کیا اسے بیان کر سکے
- ☆ آزادی ہند کے سلسلہ میں تحریک مجاہدین کی خدمات بیان کر سکے

DAE CIVIL TECHNOLOGY
YEAR 1

Eng-112 **English**

Total Contact Hours:		T	P	C
Theory:	64	2	0	2
Practical:	0			

Aims: At the end of the course, the students will be equipped with cognitive skill have the capability of presenting facts in a systematic and logical manner to meet the demands of English language in the dynamic fields commerce and industry. The course is designed to inculcate skills of reading, writing and comprehending the facts from the written material. This will also help the students in developing speaking skill.

COURSE CONTENTS

1. PROSE/TEXT 13 Hours
- 1.1 First eight essays of Intermediate English Book-II.

2. GROUP DISCUSSION/SPEAKING (Sessional Evaluation) 13 Hours

3. GRAMMAR 19 Hours
- 3.1 Sentence structure
- 3.2 Tenses (correct use of verb/tense)
- 3.3 Parts of speech
- 3.4 Change of direct speech into indirect form
- 3.5 Words often confused.

4. COMPOSITION 13 Hours
- 4.1 Business letters
- 4.2 Applications for job, character certificate and grant of scholarship
- 4.3 Essay writing (topics specified in Instructional objectives).

5. TRANSLATION 6 Hours
- 5.1 Translation from Urdu into English for Foreign Students: A paragraph or a dialogue.

ENG-112: ENGLISH

Instructional Objectives:

1. Demonstrate Better Reading, Comprehension and Vocabulary.

1.1 Describe and narrate in simple English.

1.2 Identify the author and the essay.

1.3 Write summaries of the textual essays.

1.4 Identify facts and ideas.

2. Listen and Speak English Clearly (Sessional Evaluation).

2.1 Converse fluently.

2.2 Express ideas clearly.

3. **Apply the Grammatical Rules to Writing a Speaking.**

3.1 Describe sentence structure.

3.1.1 Identify kinds of sentences.

3.2 Use correct verb/tense in sentences.

3.2.1 Identify the tense of a sentence.

3.3 Narrate the direct speech in indirect form.

3.4 Distinguish between confusing words.

4. **Apply the Concepts of Composition Writing to Practical Situations.**

4.1 Write letters to communicate messages in the business world (inquiry, placing orders, complaints etc.).

4.1.1 Identify parts of a business letter.

4.1.2 Describe the qualities of a good business letter.

4.2 Write applications for job opportunities, grant of character certificate and grant of scholarship.

4.2.1 Describe the structure of application.

4.2.2 Design and compose Curriculum Vitae (C.V.), Bio-data or Resume separately.

4.3 Write essays pertaining to Technical Education, Science and our life, Computer, Environmental Pollution, Duties of a student and Life of a Technician.

4.3.1 Identify major kinds of essay.

5. **Apply Rules of Translation.**

5.1 Convert sentences from Urdu to English.

5.2 Translate a passage of Urdu into English making appropriate substitution of words.

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MATHS-113: Applied Mathematics-I

	T	P	C
Total Contact Hrs:	3	0	3

Theory: 96 Hrs.

Practical: 0

Aims & Objectives:

After completing the course the students will be able to:

(i) Solve problems of Algebra, Trigonometry, Vectors, Phasors and mensuration etc.

(ii) Develop skill, mathematical attitudes and logical perception.

Course Contents:

1. SET AND NUMBERS. 3 Hrs.
   - 1.1 Set and subsets.
   - 1.2 Product of sets.
   - 1.3 Intervals.
   - 1.4 Real and Complex numbers.
2. QUADRATIC EQUATIONS. 8 Hrs.
   - 2.1 Standard form.
   - 2.2 Methods of solving quadratic equations.
   - 2.3 Nature of roots of a quadratic equation.
   - 2.4 Relation between roots and coefficients.
   - 2.5 Formation of quadratic equations.
   - 2.6 Problems.
3. MATRICES AND DETERMINANTS. 10 Hrs.
   - 3.1 Definition of Matrix.
   - 3.2 Some important matrices.
   - 3.3 Algebra of Matrices.
   - 3.4 Determinants and their properties.
   - 3.5 Singular and non-singular matrices.
   - 3.6 Ad-joint and inverse of a matrix.
   - 3.7 Solution of linear equations.
   - 3.8 Problems.

4. SEQUENCES AND SERIES. 12 Hrs.
   - 4.1 Arithmetic sequence.
   - 4.2 Arithmetic means.
   - 4.3 Arithmetic series and its sum.
   - 4.4 Geometric sequence.
   - 4.5 Geometric means.
   - 4.6 Geometric series and its sum.
   - 4.7 Infinite Geometric series and its sum.
   - 4.8 Problems.

5. BINOMIAL THEOREM. 6 Hrs.
   - 5.1 Factorials.
   - 5.2 Statement of Binomial Theorem.
   - 5.3 General term.
   - 5.4 Binomial series.
   - 5.5 Problems.

6. TRIGONOMETRIC FUNCTIONS. 9 Hrs.
   - 6.1 Angles.
   - 6.2 Measurements of angles in different quadrants.
   - 6.3 Degree and radian measurements.
   - 6.4 Trigonometric functions.
   - 6.5 Signs of trigonometric functions.
   - 6.6 Graphical representation of trigonometric functions (Sin, Cos, tan)
   - 6.7 Fundamental identities.
   - 6.8 Problems.

7. TRIGONOMETRIC IDENTITIES. 6 Hrs.
   - 7.1 Fundamental Law and Deductions.
   - 7.2 Sum and Difference Formulae.
   - 7.3 Double angle identities.
   - 7.4 Half angle identities.
   - 7.5 Conversion of Sum or Difference to products.
   - 7.6 Problems.

8. SOLUTION OF TRIANGLES. 6 Hrs.
   - 8.1 Solution of oblique triangles.
   - 8.2 The law of Sines.
   - 8.3 The law of Cosines.
   - 8.4 Solution of right triangles.
   - 8.5 Measurement of heights and distances.
   - 8.6 Problems.

9. VECTORS. 6 Hrs.
   - 9.1 Scalars & Vectors.
   - 9.2 Addition and Subtraction.
   - 9.3 The unit vectors i, j, k.
   - 9.4 Direction Cosines.
   - 9.5 Scalar product of two vectors.
   - 9.6 Vector product of two vectors.

10. MENSURATION OF PRISMS AND CYLINDERS. 12 Hrs.
   - 10.1 Introduction and Review of Formulae of plane figures.
   - 10.2 Definitions.
   - 10.3 Types of Prisms and Cylinders.

10.4 Formulae for surfaces and volumes.
10.5 Problems.

11. MENSURATION OF PYRAMIDS AND CONES AND THEIR FRUSTA. 12 Hrs.
11.1 Definitions.
11.2 Types of Pyramids, Cones and Frusta.
11.3 Formulae for surfaces and volumes.
11.4 Problems.

12. MENSURATION OF SPHERES. 6 Hrs.
12.1 Definitions.
12.2 Surface area of sphere.
12.3 Volume of a sphere.
12.4 Problems.

Ch-112 APPLIED CHEMISTRY

T	P	C
1	3	2

Total Contact Hours

Theory	32
Practical	64

Pre-requisite: The student must have studied the subject of elective chemistry at secondary school level.

AIMS After studying this course a student will be able to:

1. Understand the significance and role of chemistry in the development of modern technology.
2. Become acquainted with the basic principles of chemistry as applied in the study of relevant Technology.
3. Know the scientific methods for production, properties and use of materials of industrial & technological significance.
4. Gains skill for the efficient conduct of practicals in a Chemistry lab.

COURSE CONTENTS

1. INTRODUCTION AND FUNDAMENTAL CONCEPTS. 3 Hours

1.1 Orientation with reference to this technology.

1.2 Terms used & units of measurements in the study of chemistry.

1.3 Chemical Reactions & their types.

2. ATOMIC STRUCTURE. 3 Hours

2.1 Sub-atomic particles.

2.2 Architecture of atoms of elements, Atomic No. & Atomic Weight.

2.3 The periodic classification of elements periodic law

2.4 General characteristics of a period and group.

3. CHEMICAL BOND. 3 Hours

3.1 Nature of chemical Bond.

3.2 Electrovalent bond with examples.

3.3 Covalent Bond(Polar and Non-polar, sigma & Pi Bonds with examples.

3.4 Co-ordinate Bond with examples.

4. WATER. 3 Hours

4.1 Chemical nature and properties.

4.2 Impurities.

4.3 Hardness of water (types, causes & removal)

4.4 Scales of measuring hardness (Degrees Clark French, PPM, Mg- per liter).

4.5 Boiler feed water, scales and treatment.

4.6 Sea-water desalination, sewage treatment.

5. ACIDS, BASES AND SALTS. 3 Hours

5.1 Definitions with examples.

5.2 Properties, their strength, basicity & Acidity.

5.3 Salts and their classification with examples.

5.4 pH-value and scale.

6. OXIDATION & REDUCTION. 3 Hours

6.1 The process, definition & examples.

6.2 Oxidizing and reducing agents.

6.3 Oxides and their classifications.

7. NUCLEAR CHEMISTRY. 2 Hours

7.1 Introduction.

7.2 Radioactivity (alpha, beta and gamma rays).

7.3 Half life process.

7.4 Nuclear reaction & transformation of elements.

8. PLASTICS AND POLYMERS. 2 Hours

8.1 Introduction and importance.

8.2 Classification.

8.3 Manufacture.

8.4 Properties and uses.

9. CORROSION. 2 Hours

9.1 Introduction with causes.

9.2 Types of corrosion.

9.3 Rusting of iron.

9.4 Protective measures against-corrosion.

10. REFRACTORY MATERIALS AND ABRASIVE. 2 Hours

10.1 Introduction to Refractories.

10.2 Classification of Refractories.

10.3 Properties and Uses.

10.4 Introduction to Abrasives.

10.5 Artificial and Natural Abrasives and their uses.

11. ALLOYS. 2 Hours

11.1 Introduction with need

11.2 Preparation and Properties.

11.3 Some Important alloys and their composition.

11.4 Uses.

12. FUELS AND COMBUSTION. 2 Hours

12.1 Introduction of fuels.

12.2 Classification of fuels.

12.3 Combustion.

12.4 Numerical Problems of Combustion.

13. LUBRICANTS. 1 Hour

13.1 Introduction.

13.2 Classification.

13.3 Properties of lubricants.

13.4 Selection of lubricants.

14. POLLUTION. 1 Hour

14.1 The problem and its dangers.

14.2 Causes of pollution.

14.3 Remedies to combat the hazards of pollution.

BOOKS RECOMMENDED

1. Text Book of Intermediate Chemistry (I & II)

2. Ilmi Applied Science by Sh. Atta Muhammad.

3. Polytechnic Chemistry by J.N. Reedy Tata Mc Graw Hill (New Delhi).

4. Chemistry for Engineers by P.C. Jain (New Delhi, India).

Ch-112 APPLIED CHEMISTRY

INSTRUCTIONAL OBJECTIVES

1. UNDERSTAND THE SCOPE, SIGNIFICANCE AND FUNDAMENTAL ROLE OF THE SUBJECT.

1.1 Define chemistry and its important terms.

1.2 State the units of measurements in the study of chemistry.

1.3 Write chemical formula of common compounds.

1.4 Describe types of chemical reactions with examples.

2. UNDERSTAND THE STRUCTURE OF ATOMS AND ARRANGEMENT OF SUB ATOMIC PARTICLES IN THE ARCHITECTURE OF ATOMS.

2.1 Define atom.

2.2 State the periodic law of elements.

2.3 Describe the fundamental sub atomic particles.

2.4 Distinguish between atomic no. and mass no.; isotopes and isobars.

2.5 Explain the arrangements of electrons in different shells and sub energy levels.

2.6 Explain the grouping and placing of elements in the periodic table.

3. UNDERSTAND THE NATURE OF CHEMICAL BOUND.

3.1 Define chemical bond.

3.2 Describe the nature of chemical bond.

3.3 Differentiate between electrovalent and covalent bonding.

3.4 Explain the formation of polar and non polar, sigma and pi-bond with examples.

3.5 Describe the nature of coordinate bond with examples.

4. UNDERSTAND THE CHEMICAL NATURE OF WATER.

4.1 Describe the chemical nature of water with its formula.

4.2 Describe the general impurities present in water.

4.3 Explain the causes and methods to removing hardness of water.

4.4 Express hardness in different units like mg/liter., p.p.m, degrees Clark and degrees French.

4.5 Describe the formation and nature of scales in boiler feed water.

4.6 Explain the method for the treatment of scales.

4.7 Explain the sewage treatment and desalination of seawater.

5. UNDERSTAND THE NATURE OF ACIDS, BASES AND SALTS.

5.1 Define acids, bases and salts with examples.

5.2 State general properties of acids and bases.

5.3 Differentiate between acidity and basicity and use the related terms.

5.4 Define salts, state their classification with examples.

5.5 Explain p-H value of solution and pH scale.

6. UNDERSTAND THE PROCESS OF OXIDATION AND REDUCTION.

6.1 Define oxidation.

6.2 Explain the oxidation process with examples.

6.3 Define reduction.

6.4 Explain reduction process with examples.

6.5 Define oxidizing and reducing agents and give at least six examples of each.

6.6 Define oxides.

6.7 Classify the oxides and give examples.

7. UNDERSTAND THE FUNDAMENTALS OF NUCLEAR CHEMISTRY.

7.1 Define nuclear chemistry and radioactivity.

7.2 Differentiate between alpha, Beta and Gamma particles.

7.3 Explain half-life process.

7.4 Explain at least six nuclear reactions resulting in the transformation of some elements.

7.5 State important uses of isotopes.

8. UNDERSTAND THE NATURE AND IMPORTANCE OF PLASTICS AND POLYMERS.

8.1 Define plastics and polymers.

8.2 Explain the mechanism of polymerization.

8.3 Describe the preparation and uses of some plastics/polymers.

9. UNDERSTAND THE PROCESS OF CORROSION WITH ITS CAUSES AND TYPES.

9.1 Define corrosion.

9.2 Describe different types of corrosion.

9.3 State the causes of corrosion.

9.4 Explain the process of rusting of iron.

9.5 Describe methods to prevent/control corrosion.

10. UNDERSTAND THE NATURE OF REFRACTORY MATERIALS AND ABRASIVE.

10.1 Define refractory materials.

10.2 Classify refractory materials.

10.3 Describe properties and uses of refractories.

10.4 Define Abrasive.

10.5 Classify natural and artificial abrasives.

10.6 Describe uses of abrasives.

11. UNDERSTAND THE NATURE AND IMPORTANCE OF ALLOYS.

11.1 Define alloy.

11.2 Describe different methods for the preparation of alloys.

11.3 Describe important properties of alloys.

11.4 Enlist some important alloys with their composition, properties and uses.

12. UNDERSTAND THE NATURE OF FUELS AND THEIR COMBUSTION.

12.1 Define fuels.

12.2 Classify fuels and make distinction of solid, liquid & gaseous fuels.

12.3 Describe important fuels.

12.4 Explain combustion.

12.5 Calculate air quantities in combustion gases.

13. UNDERSTAND THE NATURE OF LUBRICANTS.

13.1 Define a lubricant.

13.2 Explain the uses of lubricants.

13.3 Classify lubricants and cite examples.

13.4 State important properties of oils, greases and solid lubricants.

13.4 State the criteria for the selection of lubricant for particular purpose/job.

14. UNDERSTAND THE NATURE OF POLLUTION.

14.1 Define Pollution (air, water, food).

14.2 Describe the causes of environmental pollution.

14.3 Enlist some common pollutants.

14.4 Explain methods to prevent pollution.

LIST OF PRACTICALS.

1. To introduce the common apparatus, glassware and chemical reagents used in the chemistry lab.
2. To purify a chemical substance by crystallization.
3. To separate a mixture of sand and salt.
4. To find the melting point of substance.

5. To find the pH of a solution with pH paper.
6. To separate a mixture of inks by chromatography.
7. To determine the co-efficient of viscosity of benzene with the help of Ostwald vasometer.
.
8. To find the surface tension of a liquid with a stalagometer.
9. To perform electrolysis of water to produce Hydrogen and Oxygen. .
10. . To determine the chemical equivalent of copper by electrolysis of Cu So4.
11. To get introduction with the scheme of analysis of salts for basic radicals.
12. To analyse 1st group radicals (Ag + - Pb ++ - Hg +)
13. To make practice for detection 1st group radicals.
14. To get introduction with the scheme of II group radicals.
15. To detect and confirm II-A radicals (Hg ++ ,Pb ++++ ,Cu+, Cd++, Bi +++) To detect and confirm II-B radicals(Sn +++ , Sb +++, As +++)
16. To get introduction with the scheme of m group radicals (Fe +++ - AI +++, Cr+++)
17. To detect and confirm Fe +++ , AI +++ and Cr +++
18. To get introduction with the scheme of IV group radicals.
19. To detect and confirm An ++ and Mn ++ radicals of N Group.
20. To detect and confirm Co++ & Ni++ radicals of IV group.
21. To get introduction with the Acid Radical Scheme.
22. To detect dilute acid group.
23. To detect and confirm C03" and HC03 radicals.
24. To get introduction with the methods/ apparatus of conducting volumetric estimations.
25. To prepare standard solution of a substance.
26. To find the strength of a given alkali solution.
27. To estimate HCO'3 contents in water.
28. To find out the %age composition of mixture solution of KN03 and KOH volumetrically.
29. To find the amount of chloride ions (Cl') in water volumetrically.

APPLIED PHYSICS

Total Hours	**128**	**T**	**P**	**C**
Theory	**32**	**1**	**3**	**2**
Practical	**96**			

AIMS: The students will be able to understand the fundamental principles and concept of physics, use these to solve problems in practical situations/technological courses and understand concepts to learn advance physics/technical courses.

Course Contents

1 **Measurements.** **2 Hours**

- 1.1 Fundamental units and derived units
- 1.2 Systems of measurement and S.I. units
- 1.3 Concept of dimensions, dimensional formula
- 1.4 Conversion from one system to another
- 1.5 Significant figures

2 **Scalars and Vectors.** **4 Hours**

- 2.1 Revision of head to tail rule
- 2.2 Laws of parallelogram, triangle and polygon of forces
- 2.3 Resolution of a vector
- 2.4 Addition of vectors by rectangular components
- 2.5 Multiplication of two vectors, dot product and cross product

3 **Motion** **4 Hours**

- 3.1 Review of laws and equations of motion
- 3.2 Law of conservation of momentum
- 3.3 Angular motion
- 3.4 Relation between linear and angular motion
- 3.5 Centripetal acceleration and force
- 3.6 Equations of angular motion

4 **Torque, Equilibrium and Rotational Inertia.** **6 Hours**

- 4.1 Torque
- 4.2 Centre of gravity and centre of mass
- 4.3 Equilibrium and its conditions
- 4.4 Torque and angular acceleration
- 4.5 Rotational inertia

5 **Wave Motion.** **5 Hours**

- 5.1 Review Hooke's law of elasticity
- 5.2 Motion under an elastic restoring force
- 5.3 Characteristics of simple harmonic motion

5.4 S.H.M. and circular motion
5.5 Simple pendulum
5.6 Wave form of S.H.M.
5.7 Resonance
5.8 Transverse vibration of a stretched string

6 **Sound.** **5 Hours**

6.1 Longitudinal waves
6.2 Intensity, loudness, pitch and quality of sound
6.3 Units of Intensity of level and frequency response of ear
6.4 Interference of sound waves silence zones, beats
6.5 Acoustics
6.6 Doppler effect.

7 **Light.** **5 Hours**

7.1 Review laws of reflection and refraction
7.2 Image formation by mirrors and lenses
7.3 Optical instruments
7.4 Wave theory of light
7.5 Interference, diffraction, polarization of light waves
7.6 Applications of polarization in sunglasses, optical activity and stress analysis

8 **Optical Fiber.** **2 Hours**

8.1 Optical communication and problems
8.2 Review total internal reflection and critical angle
8.3 Structure of optical fiber
8.4 Fiber material and manufacture
8.5 Optical fiber - uses.

9 **Lasers.** **3 Hours**

9.1 Corpuscular theory of light
9.2 Emission and absorption of light
9.3 Stimulated absorption and emission of light
9.4 Laser principle
9.5 Structure and working of lasers
9.6 Types of lasers with brief description.
9.7 Applications (basic concepts)
9.8 Material processing
9.9 Laser welding
9.10 Laser assisted machining
9.11 Micro machining
9.12 Drilling, scribing and marking
9.13 Printing
9.14 Lasers in medicine

RECOMMENDED BOOKS

1 Tahir Hussain, Fundamentals of Physics Vol-I and II
2 Farid Khawaja, Fundamentals of Physics Vol-I and II
3 Wells and Slusher, Schaum's Series Physics .
4 Nelkon and Oyborn, Advanced Level Practical Physics
5 Mehboob Ilahi Malik and Inam-ul-Haq, Practical Physics
6 Wilson, Lasers - Principles and Applications
7 M. Aslam Khan and M. Akram Sandhu, Experimental Physics Note Book

Phy-122 APPLIED PHYSICS

Instructional Objectives

1 **Use Concepts of Measurement to Practical Situations and Technological Problems**.
- 1.1 Write dimensional formulae for physical quantities
- 1.2 Derive units using dimensional equations
- 1.3 Convert a measurement from one system to another
- 1.4 Use concepts of measurement and Significant figures in problem solving.

2 **Use Concepts of Scalars and Vectors in Solving Problems Involving these Concepts.**
- 2.1 Explain laws of parallelogram, triangle and polygon of forces
- 2.2 Describe method of resolution of a vector into components
- 2.3 Describe method of addition of vectors by rectangular components
- 2.4 Differentiate between dot product and cross product of vectors
- 2.5 Use the concepts in solving problems involving addition resolution and multiplication of vectors.

3 **Use the Law of Conservation of Momentum and Concepts of Angular Motion to Practical Situations.**
- 3.1 Use law of conservation of momentum to practical/technological problems.
- 3.2 Explain relation between linear and angular motion
- 3.3 Use concepts and equations of angular motion to solve relevant technological problems.

4 **Use Concepts of Torque, Equilibrium and Rotational Inertia to Practical Situation/Problems.**
- 4.1 Explain Torque
- 4.2 Distinguish between Centre of gravity and centre of mass
- 4.3 Explain rotational Equilibrium and its conditions
- 4.4 Explain Rotational Inertia giving examples
- 4.5 Use the above concepts in solving technological problems.

5 **Use Concepts of Wave Motion in Solving Relevant Problems.**

5.1 Explain Hooke's Law of Elasticity
5.2 Derive formula for Motion under an elastic restoring force
5.3 Derive formulae for simple harmonic motion and simple pendulum
5.4 Explain wave form with reference to S.H.M. and circular motion
5.5 Explain Resonance
5.6 Explain Transverse vibration of a stretched string
5.7 Use the above concepts and formulae of S.H.M. to solve relevant problems.

6 **Understand Concepts Of Sound.**
6.1 Describe longitudinal wave and its propagation
6.2 Explain the concepts: Intensity, loudness, pitch and quality of sound
6.3 Explain units of Intensity of level and frequency response of ear
6.4 Explain phenomena of silence zones, beats
6.5 Explain Acoustics of buildings
6.6 Explain Doppler effect giving mathematical expressions.

7 **Use the Concepts of Geometrical Optics to Mirrors and Lenses.**
7.1 Explain laws of reflection and refraction
7.2 Use mirror formula to solve problems
7.3 Use the concepts of image formation by mirrors and lenses to describe working of optical instruments, e.g. microscopes, telescopes, camera and sextant.

8 **Understand Wave Theory of Light**
8.1 Explain wave theory of light
8.2 Explain phenomena of interference, diffraction, polarization of light waves
8.3 Describe uses of polarization given in the course contents.

9 **Understand the Structure, Working and Uses of Optical Fiber.**
9.1 Explain the structure of the Optical Fiber
9.2 Explain its principle of working
9.3 Describe use of optical fiber in industry and medicine.

Phy-122 APPLIED PHYSICS

List of Practicals.

1 Draw graphs representing the functions:
a. y=mx for m=0, 0.5, 1, 2
b. $y=x^2$
c. y=1/x
2 Find the volume of a given solid cylinder using venire calipers.
3 Find the area of cross-section of the given wire using micrometer screw gauge.
4 Prove that force is directly proportional to (a) mass, (b) acceleration, using fletchers' trolley.
5 Verify law of parallelogram of forces using Grave-sands apparatus.
6 Verify law of triangle of forces and Lami's theorem
7 Determine the weight of a given body using
a. Law of parallelogram of forces

b. Law of triangle of forces
c. Lami's theorem

8 Verify law of polygon of forces using Grave-sands apparatus.
9 Locate the position and magnitude of resultant of like parallel forces.
10 Determine the resultant of two unlike parallel forces.
11 Find the weight of a given body using principle of moments.
12 Locate the centre of gravity of regular and irregular shaped bodies.
13 Find Young's Modules of Elasticity of a metallic wire.
14 Verify Hooke's Law using helical spring.
15 Study of frequency of stretched string with length.
16 Study of variation of frequency of stretched string with tension.
17 Study resonance of air column in resonance tube and find velocity of sound.
18 Find the frequency of the given tuning fork using resonance tube.
19 Find velocity of sound in rod by Kundt's tube.
20 Verify rectilinear propagation of light and study shadow formation.
21 Study effect of rotation of plane mirror on reflection.
22 Compare the refractive indices of given glass slabs.
23 Find focal length of concave mirror by locating centre of curvature.
24 Find focal length of concave mirror by object and image method
25 Find focal length of concave mirror with converging lens.
26 Find refractive index of glass by apparent depth.
27 Find refractive index of glass by spectrometer.
28 Find focal length of converging lens by plane mirror.
29 Find focal length of converging lens by displacement method.
30 Find focal length of diverging lens using converging lens.
31 Find focal length of diverging lens using concave mirror.
32 Find angular magnification of an astronomical telescope.
33 Find angular magnification of a simple microscope (magnifying glass)
34 Find angular magnification of a compound microscope.
35 Study working and structure of camera.
36 Study working and structure of sextant.
37 Compare the different scales of temperature and verify the conversion formula.
38 Determine the specific heat of lead shots.
39 Find the coefficient of linear expansion of a metallic rod.
40 Find the heat of fusion of ice.
41 Find the heat of vaporization.
42 Determine relative humidity using hygrometer

DAE CIVIL TECHNOLOGY
YEAR 1

CIVIL-114 BASIC SURVEYING

TOTAL CONTACT HOURS:	**256**	**T**	**P**	**C**
Theory:	64	**2**	**6**	**4**
Practical:	192			

AIM: To determine the relative positions of distinctive features on the surface and near the surface of the earth by means of measurements of distances, directions and elevations

COURSE CONTENTS

1. Introduction — 4 Hours

1.1 Definition of surveying
1.2 Main divisions of surveying including Chain & Compass Surveying, Topographic Surveying, Engineering Surveys, Cadastral Surveys and Geographical Information Systems(GIS)
1.3 Linear and angular measurement
1.4 Fundamental principles of surveying including reliability of a survey
1.5 Introduction of chain survey.e.g principles of chain surveying , types of ranging, off-setting its types and methods

2. Compass Traversing — 4 Hours

2.1 Introduction to compass survey and their determination
2.2 Concept of meridian and its types
2.3 Introduction of whole circle bearing and reduced bearing
2.4 Determination of whole circle bearing from reduced bearing and vice versa
2.5 Determination of Dip and Declination
2.6 Local attractions
2.7 Determination of errors in traversing

3 Plane Table Surveying — 6 Hours

3.1 Introduction to equipment used.
3.2 Setting of plane table - centering, leveling & orientation
3.3 Methods of plane tabling -radiation, intersection, traversing and resection.
3.4 Merits and demerits of plane table survey

4 Leveling — 24 Hours

4.1 Introduction.
4.2 Definitions of terms-level line, level surface, datum line, reduced level, line of collimation, horizontal plane, vertical plane, station point, axis of telescope, axis of bubble tube etc.
4.3 Bench mark and its types.
4.4 Types of leveling instruments, component parts
4.5 Types of leveling staves

4.6 Temporary adjustment of level
4.7 Finding reduced levels.
4.8 Booking - height of instrument and rise & fall method, finding missing data in a level book page.
4.9 Classification of leveling and detailed description.
4.10 Errors in leveling
4.11 Introduction and use of Laser Level.

5 Contouring. 8 Hours

5.1 Definition, contour interval, horizontal equivalent
5.2 Purpose and use of contouring
5.3 Characteristics of contour lines
5.4 Methods of contouring
5.5 Marking of alignment & grade of road, railway and canal. Computing earthwork, capacity of reservoir using trapezoidal and prismoidal rule

6 Tacheometry. 6 Hours

6.1 Definition, types and principles.
6.2 Finding horizontal distances & elevations of different objects by tacheometry.

7 Hydrographic / Bathymetric Survey. 6 Hours

7.1 Introduction and purpose.
7.2 Soundings - sounding boat, sounding rod, still water recess, current meter, fathometer, velocity rod.
7.3 Long section & cross section of a small distributor, determination of velocity and area.
7.4 Discharge of different sections

8. **Computations of Areas and Volumes** 6 Hours

8.1 Regular and irregular geometrical figures
8.2 Area enclosed between surveying lines(railway line, highways, etc) and irregular boundary lines by:
8.2.1 Mid Ordinate Rule
8.2.2 Average Ordinate Rule

RECOMMENDED / REFERENCE BOOKS:

1. Surveying & Leveling: **T.P.Kanetar and S.V. Kulkarni**, [2000], A.V.G Publications
2. Text Book of Surveying : **S.K. Hassan**
3. Surveying : **Hakim Ali**
4. Professional Practice in surveying and viva voce: **P.B. Shahani**
5. Rasul Manual (volume I & II) on surveying

6. Plane and Geodetic Surveying : **David Clark**
7. Surveying (theory & practice): **E. Davis**
8. Practical field surveying and computation: **A.L. Allan**
9. Guide to site surveying: **Ralph Hewitt**
10. Surveying: **A. Bannister, S. Raymond and R. Baker**, [2009], Pearson Education
11. Surveying and Levelling: **R.Agor**, [2007], Khanna Publishers
12. Surveying with Construction Applications: **Barry F. Kavanagh**, [2004], Pearson Prentice-Hall
13. Surveying, Principles and Applications: **Barry F. Kavanagh**, [2006], Pearson Prentice-Hall
14. Surveying and Levelling: **N.N. Basak**, [1994], Tata McGraw-Hill, New Delhi
15. Fundamentals of Surveying**: S.K. Roy,** [2007], Prentice-Hall of India, New Delhi

INSTRUCTIONAL OBJECTIVES

1. Know Basic Facts About Surveying

1.1 Define Surveying.
1.2 State the purpose of surveying
1.3 State the classification of surveying including Chain & Compass Surveying, Topographic Surveying, Engineering Surveys, Cadastral Surveys and Geographical Information Systems(GIS)
1.4 State the fundamental principles of surveying
1.5 Define chain surveying
1.6 State principals of chain surveying
1.7 Explain method of chain surveying
1.8 Describe types of chain, offsets and its types

2. Compass Traversing

2.1 State the purpose and principals of compass traversing
2.2 Define the traverse
2.3 State the types of traverse and explain methods of traversing
2.4 Define meridian and state its types
2.5 Solve problems relating to bearings
2.6 Define dip and declination
2.7 Compute problems relating to declination

3. Understand the Principle of Plane Table Surveying and Perform Field Work

3.1 State the purpose and principles of plane table surveying
3.2 Identify the functions of accessories used in plane table surveying
3.3 Explain the operations involved in setting-up plane table.
3.4 Explain the methods of Orientation
(a) By back sighting
(b) By Trough compass

3.5 Explain the methods of plane tabling.
3.6 List steps involved in carrying out plane table surveying
3.7 Describe three point problem
3.8 Explain solution of three point problem by
(a) By mechanical method
(b) By graphical method
3.9 State the merits and demerits of plane table surveying
3.10 List the errors in plane table surveying and precaution to be taken

4. Understand the Principles of Leveling for Different Engineering Purposes

4.1 Define leveling
4.2 Describe the purpose of leveling
4.3 Define technical terms, level line, level surface, datum, datum line, horizontal plane, vertical plane, Horizontal line, vertical line, level line, line of collimation, Axis of telescope, bubble tube axes, back sight, foresight, Intermediate sight, change point, station point
4.4 Describe bench mark and its types
4.5 Identify the parts and function of various types of tilting level and Auto set level
4.6 Explain with sketches leveling staves and their uses
4.7 List the steps involved in performing temporary adjustment of a level
4.8 Compute the reduced levels by rise & fall method and height of instrument method and recording the same on level book
4.9 Determine the missing data of a level book page
4.10 Define fly leveling, Longitudinal sectioning, cross-sectioning, reciprocal leveling, precise leveling, Barometric leveling
4.11 State precautions in leveling operation
4.12 Describe the procedures for taking, L-section x-section, and for reciprocal leveling precise leveling etc
4.13 Plot X-section and L-section
4.14 Solve numerical problem on reciprocal leveling
4.15 Describe errors in leveling
4.16 Compute correction due to curvature and refraction
4.17 Describe parts and functions of Laser Level
4.18 Explain the procedure of leveling by use of Laser Level.

5. **Understand Methods of Contouring and Computation of Volumes**

5.1 Define the terms relating to contouring
5.2 Explain characteristics and the purpose of contouring
5.3 Explain the uses of contouring
5.4 Explain the methods of performing contour survey
5.5 Interpolate contours on a plan
5.6 Explain the procedure to lay down alignment of road, railway and channel on contour map
5.7 Describe procedure for measuring gradient
5.8 Compute the capacity of reservoirs and volume of earth from the contour map

6. **Understand the Principles of Tacheometry to find the Elevations and Distances of Stations**

6.1 Explain the principles of tacheometry
6.2 Enlist the method of tacheometry
6.3 Describe the instruments used in stadia survey
6.4 State tacheometric constants
6.5 Lists the steps involved in taking stadia observations in field to find elevations and distances of stations
6.6 Compute the elevation and horizontal distances.
6.7 Solve examples for finding horizontal and vertical distances by tacheometry

7. **Understand the Principles of Hydrographic Survey**

7.1 Define Hydrographic survey
7.2 State the purposes of Hydrographic survey
7.3 Describe sounding, sounding rod/pole, sounding boat, still water recess, fathometer, velocity rod and current meter
7.4 Explain the methods of taking soundings
7.5 Explain procedure of determining velocity with velocity rod and current meter for determination of discharge of channel

8. **Understand the Computation of Areas and Volume**

8.1 Describe Regular and irregular geometrical figures
8.2 Calculate Area enclosed between surveying lines(railway line, highways, etc) and irregular boundary lines by:-
i. Mid Ordinate Rule
ii. Average Ordinate Rule

LIST OF PRACTICALS

		HOURS
1.	Ranging and chaining of various survey lines and taking off-set	6
2.	Setting up the compass and observation of bearings.	9
3.	Compass survey of an area and its plotting	12
4.	Plane table survey of an area.	12
5.	Solution of two and Three point problem by Graphical method	9
6.	Reading different types of staves.	3
7.	Temporary adjustment of level and taking readings.	9
8.	Taking reduced levels of various points and recording in the field book.	12
9.	Fly leveling and finding R.Ls by height of collimation and rise fall method.	12
10.	Route leveling (by auto set level).	9
11.	Reciprocal leveling and its booking.	12
12.	Finding and setting gradient using a level and staff.	12

13.	Taking longitudinal section and cross section of a 1/2 mile long route and their plotting, marking alignment and gradient calculation of earth work.	15
14.	Leveling by Laser Level (Fly Leveling, Route Leveling).	15
15.	Contouring of small area by radial and square method and preparing of a contour map	12
16.	Determination of horizontal distance and elevation by stadia tachometry.	9
17.	Measuring distance by Hydrographic survey of a small channel	12
18.	Determination of area: enclosed between surveying line (Railway lines/Highways and irregular boundary lines in the field)	6
19.	Shifting of Bench Mark by precise leveling	6

DAE CIVIL TECHNOLOGY
YEAR 1

CIVIL-123 ENGINEERING MATERIALS & CONSTRUCTION

TOTAL CONTACT HOURS:	160	T	P	C
Theory:	64	2	3	3
Practical:	96			

AIM:

The student will be able to:

1. Understand about the manufacture, properties and uses of building materials in order to produce the required finished facility and to use it to the best advantage

2. Understand the fundamentals of building construction and gain skills through practical work.

COURSE CONTENTS

1. Bricks and Tiles — 2 Hours

1.1 Merits as a building material
1.2 Classification of bricks
1.3 Testing of bricks.
1.4 Tiles and their classification.

2 Mortars — 2 Hours

2.1 Introduction and Classification of mortars.
2.2 Batching Mixing.
2.3 Application

3 Stones — 2 Hours

3.1 Quarrying
3.2 Characteristics
3.3 Types
3.4 Uses
3.5 Dressing of stones

4 Lime — 3 Hours

4.1 Sources of lime
4.2 Calcination, slaking and hydraulicity
4.3 Classifications, quick lime and hydraulic lime
4.4 Uses and storage

5 Cement — 2 Hours

5.1 Introduction and manufacturing

5.2 Composition & manufacture
5.3 Types of cement and their uses.
5.4 Storage

6 Sand 2 Hours

6.1 Sources and classification
6.2 Grading
6.3 Bulking
6.4 Uses

7 Concrete and Concreting Operations 6 Hours

7.1 Composition and proportioning
7.2 Batching of materials by volume and weight
7.3 Mixing of concrete
7.4 Transportation of concrete
7.5 Compaction of concrete
7.6 Finishing of concrete surface, types
7.7 Curing of concrete
7.8 Joints in concrete
7.9 Classification of concrete

8 Ferrous Metals and Non Ferrous Metals 3 Hours

8.1 Types of ferrous metals
8.2 Structural steel sections and their use in building construction.
8.3 Steel used in Reinforced cement concrete-Plain & deformed steel bars.
8.4 Special steels-High carbon steel, high tensile steel, properties and uses.
8.5 Types of non ferrous metals and their uses in construction.

9 Paints and Varnishes 1 Hours

9.1 Introduction
9.2 Constituents.
9.3 Preparation, Types and uses of paints & Varnishes

10 Timber 1 Hours

10.1 Classification and uses.
10.2 Defects and decay of timber.
10.3 Qualities-characteristics, section of timber
10.4 Wood products-plywood, veneer

11 Advanced Construction Materials. 4 Hours

11.1 Introduction
11.2 Glass its types and uses, glass blocks and glass doors.
11.3 Bitumen, Asphalt and tar grades and uses.

11.4 Tiles and their types including Tuff tiles-uses and construction
11.5 Fiber reinforced concrete
11.6 Fiber reinforced polymers.
11.7 Bonding materials in Construction work

12 Surface Finishing 4 Hours

12.1 Plastering objectives, types and procedures.
12.2 White washing, distempering and their specifications.
12.3 Painting old and new surfaces - wooden, metal and wall surfaces.
12.4 Defects in painting.
12.5 Pointing objectives and types.
12.6 Graffito & Rockwall finishing
12.7 Tiles Finishing
12.8 Panel Finishing

13 Classification of Buildings. 2 Hours

13.1 Definition of building classification based on materials and occupancy.
13.2 Different parts of building and their functions.

14 Foundations

4 Hours

14.1 Introduction
14.2 Concepts of foundation, types of soils and bearing capacity.
14.3 Shallow foundation definition, types and suitability.
14.4 Design of thickness, width and depth of foundation for concrete block wall.
14.5 Deep foundation - necessity uses and types.
14.6 Construction of foundation-layout, for excavation.
14.7 De-watering.

15 Masonry 4 Hours

15.1 Brick bonds and their types.
15.2 Methods of bedding bricks.
15.3 Construction of brick walls.
15.4 Classification of Stone Masonry.
15.5 Specifications of Stone Masonry.

16 Damp Proof Course. 2 Hours

16.1 Causes and effects of dampness
16.2 Necessity, Types and materials used.
16.3 Method of laying damp proof course

17 Walls 3 Hours

17.1 Purpose of walls.
17.2 Classification of walls according to functions and material used.

18 Scaffolding, Shoring and Underpinning, Formwork. 3 Hours

18.1 Types of scaffolding.
18.2 Introduction to shoring and underpinning
18.3 Purpose of formwork
18.4 Types of formwork

19 Arches and Lintels. 2 Hours

19.1 Arches-definition, terminologies, parts, and functions
19.2 Classification-according to material used, function and shapes.
19.3 Methods of arch construction including stone arches.
19.4 Lintels-types and construction.
19.5 Plinth beams and grade beams

20 Doors, windows and ventilators 2 Hours

20.1 Introduction
20.2 Doors, windows and ventilators
20.3 Standard sizes of doors, windows and ventilators
20.4 Types of doors
20.5 Windows and its types

21 Roofs 4 Hours

21.1 Definition, functions
21.2 Classification of roofs
21.3 Pitched roofs-types and roof covering materials
21.4 Types of trusses for pitched roofs
21.5 Introduction and materials used in construction of False Ceiling

22 Floors 3 Hours
22.1 Parts of floors
22.2 Types and Construction of Floors

23 Stair and Staircase 3 Hours
23.1 Important Technical Terms
23.2 Types of stairs and staircases with brief specifications and parts
23.3 Lifts and escalators

RECOMMENDED / REFERENCE BOOKS:

1. Engineering Material: **Surrender Singh.**
2. Building Materials: Choudhry**.**
3. Building Construction : **Kulkarne**
4. Building Construction : **Arora & Gupta**
5. Building Construction: **Mitchell.**
6. Building Construction: **Mckay.**
7. Engineering Materials: **Handoo.**
8. Building Construction: **P. C. Varghese** [2009], PHI Learning, New Delhi

9. Building Construction: **N.L.Arora and B.R.Gupta**, [2001], Prakashar,New Delhi
10. Construction Technology: **Eric Fleming**, [2004], Blackwell Publishing
11. Steel Designer's Manual: **Buick Davison and Graham Owens**, [2005], Blackwells Publishing
12. Fundamentals of Building Construction : **Edward Allen**, [1985], Wiley & Sons
13. Rehabilitation and Re-use of Old Buildings**: D. High field**,[1987], E & F. N Spon
14. Building Materials and Construction: **Theodore Marotta, [**2005], Pearson Apprentice-Hall

INSTRUCTIONAL OBJECTIVES

1. Understand the Selection of Suitable Bricks for Construction Work

1.1 State the classification of bricks according to specifications
1.2 Describe the characteristics of a good brick
1.3 Explain standard tests for bricks
1.4 Describe the common types of tiles and their uses
1.5 Describe merits and classification of fair faced bricks, i.e. burnt clay tiles, glazed tiles, marble tiles.

2. Understand the Principles of Preparation of Mortars for Building Work

2.1 State the classification of mortars
2.2 State the different proportions of mortars for various works
2.3 State the function of mortar
2.4 Explain the methods of preparation of mortars

3. Understand Selection of Stones and their Acceptability for Construction Work.

3.1 Define the quarrying
3.2 Explain the methods of quarrying
3.3 State the classification of stone and their uses in different items of construction
3.4 Explain the methods of dressing stone.

4. Understand the Types and Uses of Lime for Construction Work

4.1 State the sources of lime
4.2 Explain terms, calcination, slaking and hydraulicity
4.3 State classification and uses of lime
4.4 Describe the method of storage of lime

5. Understand the Manufacturing Process and Uses of Cement for Construction Work

5.1 Explain the types of cement and their uses

5.2 Explain the ***Composition of cement & its manufacture processes.***
5.3 Explain the methods of storage of cement under various situations

6. Understand the Characteristics of Sand

6.1 State the classification of sand and uses
6.2 Describe the grading of sand
6.3 Explain the bulking of sand

7. Understand the Principles of Preparation of Concrete

7.1 Define the concrete, types of concrete
7.2 State the ingredients of plain and reinforced concrete
7.3 State the proportions of plain and reinforced concrete for different types of work
7.4 Describe methods of batching by weight and by volume
7.5 Explain the procedure of hand and machine mixing
7.6 State the types of concrete mixers
7.7 Explain the various methods of transportation of fresh concrete
7.8 Explain various methods of compacting concrete t hand, vibrators
7.9 Explain methods of concrete finishing
7.10 Describe objects of curing and methods of curing
7.11 Explain the needs of joints in curing.

8. Know the Properties and Uses of Ferrous Metals in Construction Work

8.1 State the properties of cast iron, mild steel and wrought iron with their uses
8.2 List the common structural steel sections used in construction work
8.3 Distinguish between plain steel, deformed steel and cold twisted steel bars
8.4 State the properties and uses of special steels i.e. High carbon steel, high tensile steel
8.5 State the properties of Aluminum, lead and zinc
8.6 State the uses of Aluminum lead and zinc in construction work

9. Know the Selection of Suitable Paints and Varnishes for Construction Work

9.1 Describe the characteristics, ***constituents and preparation*** of a good paint.
9.2 State the types of paints and their uses in construction works
9.3 State the types and uses of varnishes

10. Understand the Selection of Wood for Construction Work

10.1 List the common varieties of timber used in civil engineering works
10.2 Describe the structure of tree
10.3 Describe the felling procedure of trees and conversion
10.4 State the importance of seasoning
10.5 Explain the methods of seasoning i.e. air seasoning, kiln seasoning, water seasoning and steam seasoning
10.6 State the defects and decay of timber and method of preservations of timber
10.7 Describe the characteristics of good timber
10.8 Explain the construction and uses of wood products in construction works

11. Understand the Properties and Uses of Advance Materials i.e. Glass, Asphalt,

Tuff Tiles and Fiber Reinforced Concrete

11.1 State the uses of different types of glass in construction work
11.2 Describe the differences between asphalt, tar and bituminous materials
11.3 Describe the grades and uses of bituminous materials
11.4 Explain the uses and construction of tuff tile
11.5 Describe composition and uses of fiber reinforced concrete
11.6 State use of glass tiles and glass doors.
11.7 Describe modern materials and construction bonding materials.
11.8 Explain use of fiber reinforced polymers.

12. Understand the Finishes Provided Over Masonry Wood Work and Metal Work

12.1 Describe purpose and types of plastering
12.2 Explain the methods of cement plastering
12.3 Explain the specifications and procedures of white washing/ colour washing and distempering on old and new surfaces
12.4 State the purpose of pointing
12.5 Explain the types and methods of pointing with sketches
12.6 Explain the purpose and method of painting new and old wall surfaces
12.7 Explain the method of painting wood work and steel work
12.8 State the defects in painting
12.9 Explain use of Graffito and Rockwall finishing, Tile finishing & Panel finishing

13. Know the Classification of Building as Per Building Code

13.1 State the classification of buildings with examples
13.2 State the components of a building and their functions

14. Understand the Suitability and Design of Common Types of Foundations

14.1 Define foundation
14.2 Explain the properties of various soil deposits
14.3 Explain the terms bearing capacity, safe and ultimate bearing capacity
14.4 Explain the types of investigations required for foundation
14.5 Describe with sketches various types of shallow and deep foundations and their suitability
14.6 Explain rules for minimum depth, width of foundation and thickness of concrete block
14.7 Explain the layout of a building
14.8 Explain the procedure of constructing spread footings
14.9 Describe the methods of timbering foundation

15. Understand Masonry Work

15.1 Define the technical terms related to masonry work.
15.2 Explain with sketches bond and their types i.e. English bond, Flemish bond, herring bone bond, zigzag bond, and garden wall bond.
15.3 State the general principles to be observed in brick masonry construction.
15.4 Explain the different types of stone masonry i.e. ashlar masonry, random rubble.
15.5 Explain specification for carrying out stone masonry work.

16. Understand the Function of Damp Proof Course in Building

16.1 State the causes and effects of dampness in building
16.2 Explain the functions and method of laying damp proof courses

17. Understand the Types and Suitability of Various Types of Wall

17.1 Describe the purpose of wall
17.2 Explain the classification of walls according to functions and materials
17.3 Select suitable type of wall for given situation

18. Understand the Methods of Providing Supports to Walls and Foundation During Construction

18.1 Define the terms, scaffolding, shoring and underpinning.
18.2 Explain the constructional details and suitability of each type of scaffolding including tubular scaffolding.
18.3 Explain the methods of shoring.
18.4 Explain methods of underpinning.
18.5 Explain formwork and its types

19. Understand the Constructions and Suitability of Various Types of Arches and Lintels in Construction Work

19.1 Explain the functions of arch and lintels and their suitability in construction work.
19.2 Label the parts of common arch.
19.3 Explain with sketches common types of arches and lintels and their respective suitability in construction work.
19.4 Explain the general procedure of construction of arches and lintels.

20. Understand the Construction and Methods of Fixation of Common Types of Doors and Windows and ventilators.

20.1 Explain with sketches common and special types of doors and windows.
20.2 Describe the method of fixing door frame and window in a wall.
20.3 Enlist the fittings and fastenings used for door and windows.

21. Understand the Methods of Construction of Roofs

21.1 State the functions of roofs.
21.2 State the classifications of roofs.
21.3 Explain with sketches the different types of pitched roof.
21.4 Explain with sketches the different types of wooden and steel trusses.
21.5 Explain with sketches common types of flat roofs.
21.6 Explain the construction of common types of flat roofs
21.7 Describe construction of False Ceiling.

LIST OF PRACTICALS		HOURS
1.	***Practice of laying small dry brick walls and piller 9" and 13 - ½" thick by English and Flemish bond***	6
2.	Preparation of dry mix, wet mortar and use on some construction work	6
3.	Visit of cement factory. Sketch a flow diagram, showing manufacturing process of cement.	4
4.	Visit to precast unit factory, demonstration of casting and submission of visit report.	4
5.	Preparation of hand/machine mix concrete placing, finishing, etc of concrete at site for suitable useful work.	6
6.	Sketches showing timber structure, defects and methods of conversion.	
7.	White washing and distempering on plastered surface.	3
8.	Plastering of small wall with cement mortar.	6
9.	Painting of plastered surface/steel surface, wooden surface.	6
10.	Preparation of layout plan for a building and layout on the ground.	6
11.	Sketching of various types of foundations.	6
12.	Sketches of various bonds and practice making dry brick bond.	9
13.	Construction of small masonry wall.	9
14.	Demonstration of dressing of natural stone.	3
15.	Visit to nearby quarry/crusher and submission of visit report.	4
16.	Demonstration and practice of fixing of door/windows.	3
17.	Demonstration and practice on setting out of an arch.	3
18.	Demonstration and practice in knotting, lashing and erection of common scaffolding	3
19.	Demonstration of preparation of putty and fixation of glass panes in door/windows.	3
20.	Practical Demonstration of false ceilings.	3

DAE CIVIL TECHNOLOGY
YEAR 1

CIVIL133 BASIC ENGINEERING DRAWING

TOTAL CONTACT HOURS:	224	T	P	C
Theory:	32	1	6	3
Practical:	192			

The student will be able to:

AIM:

1. Understand proper use of drawing instruments for preparation of geometric and multi-view pictorial drawings.

2. Understand the construction of various geometric figures as applicable in civil technology.

3. Apply the techniques of free hand sketching for preparation of finished sketches of given objects.

COURSE CONTENTS

1. Introduction. 2 Hours

1.1 Meanings of drafting and its scope.
1.2 Free hand sketching of plane figures and solid figures.

2. Engineering Drawing Instruments. 3 Hours

2.1 Basic and advance drawing tools and their uses.
2.2 Scales.
2.3 Line; type and selection of line thickness.
2.4 Selection of pencil.
2.5 Title strip/block-types and sizes.

3. Lettering/Printing. 2 Hours

3.1 Importance and types.
3.2 Size and style.
3.3 Lettering stencils.

4. Geometrical Constructions. 3 Hours

4.1 Construction of angles.
4.2 Construction of Triangles, quadrilaterals, and polygons.
4.3 Meaning of inscribed and circumscribed figures.
4.4 Terms used in a circle.
4.5 ***Conic Sections***, ellipse, parabola, hyperbola and their applications in civil engineering.

5. Orthographic Projections. 2 Hours

5.1 Planes including principal plane.
5.2 Projections and projection lines.
5.3 Dihedral and trihedral angles.
5.4 Types of orthographic projections.
5.5 Principal views in 1st & 3rd angle ***Projections.***

6. Sectioning 2 Hours

6.1 Definition & purpose of sectional views.
6.2 Location of cutting plane- purpose of cutting plane line.
6.3 Direction of arrowheads of CPL in 1st & 3rd angle projections.
6.4 Position of cutting plane lines in case of full & half section.

7. Dimensioning. 2 Hours

7.1 Definition
7.2 Elements in dimensioning.
7.3 System of dimensioning.

8. Pictorial Drawing 3 Hours

8.1 Definition & uses.
8.2 Brief description of different types of pictorial drawing.
8.3 Isometric axis, angles and scales.
8.4 Isometric arc, ***and circles***,
8.5 Oblique drawing & their uses.
8.6 Angle of receding axis.
8.7 Similarity between front and oblique view.
8.8 Lettering in oblique cavalier and cabinet views.
8.9 Perspective drawings; definition and purpose, vanishing point, parallel & angular (diametric and trimetric) perspective, principles of making perspective views.

9. Auxiliary Views 1 Hours

9.1 Necessity, auxiliary plane
9.2 Cases of auxiliary views.

10. Building Drawing ***10*** Hours

10.1 Conventions and terms used for buildings.
10.2 Symbols used for ***civil works, materials, HAVC***, public health & electrical installations.
10.3 Plan; site plan, line plan, detailed plan and layout plan.
10.4 Instructions for drawing plan, elevation and cross-section of single and double storey building.
10.5 Instruction on baths and kitchen arrangement.
10.6 ***Local*** Building bye-laws
10.7 Categories of Government servants residences

11. House Planning 2 Hours

11.1 Significance of house planning.
11.2 Selection of site and its governing factors.
11.3 Introduction to factors affecting the planning of a house, orientation, selection of material, ventilation and position of openings.

RECOMMENDED / REFERENCE BOOKS:

1. Engineering Drawing: **Parkinson.**
2. Engineering Drawing: **N.D. Bhat.**
3. Building Drawing: **Gurcharn Singh.**
4. First Year Drawing : **Gupta**
5. Civil Engineering Practice (Urdu) : **Niaz Ahmed Mirza**
6. Engineering Drawing: **N.D. Bhatt and V. M. Panchal**, [2006], Prabhat Publishers. Delhi

INSTRUCTIONAL OBJECTIVES

1. Understand the Need of Drafting, Civil Drafting and use of Free Hand Sketching.

1.1 State the importance of civil drafting as an engineering communication medium.
1.2 Understand necessity of civil drafting in different engineering fields.
1.3 Indicate the link between drafting and other subjects of study in diploma course.
1.4 State plane and solid figures.
1.5 State the difference between plane and sold figure.
1.6 Draw free hand sketches of different plane and solid figures.

2. Understand Different Engineering Drawing Instruments and Accessories.

2.1 State the different engineering drawing instruments and drawing papers.
2.2 State the types of scales and meaning of R.F.
2.3 State the uses of hard and soft grades of pencils.
2.4 State the types of lines.

3. Know the Need and Types of Lettering & Printing.

3.1 State importance of lettering.
3.2 State different types of lettering.
3.3 Select and use lettering stencils for a given applications.
3.4 State the principles of lettering.

4. Understand the Construction of Geometrical Figures.

4.1 State the construction of angles.
4.2 State different triangles quadrilaterals and polygons.
4.3 State difference between inscribed and circumscribed figures.
4.4 State the terms used in a circle.
4.5 Sketch and label different lines and arcs in a circle.
4.6 State cone, conical sections, (circle, parabola, ellipse and hyperbola).
4.7 Relate the conical sections in civil engineering drawings.
4.8 Define ellipse and parabola

5. Understand Types & Techniques of Orthographic Projections.

5.1 Define plane, principal plane.
5.2 Explain the principle of orthographic projection with simple sketches.
5.3 State the definition of projector and projection lines and their use.
5.4 State and differentiate between dihedral and trihedral angles.
5.5 State the types of orthographic projection.
5.6 Sketch the orthographic views of a simple engineering part of given pictorial drawing.
5.7 Identify the object from a number of orthographic views of the object.
5.8 Select the minimum number of views needed to fully represent a given object.

6. Understand the Basics of Sectioning.

6.1 State the definition of section and sectioning.
6.2 Explain purpose of sectional views.
6.3 State cutting plane and cutting plane line.
6.4 State the purpose of cutting plane line.
6.5 State conventional representation of engineering materials.
6.6 Know rule of putting arrowhead on cutting plane line.
6.7 State types of sectional views.
6.8 Select the position of cutting plane line to give maximum details of object.
6.9 Explain the principles of hatching.

7. Understand Techniques of Dimensioning.

7.1 Define dimensioning.
7.2 State the need of dimensioning drawings according to accepted standards
7.3 State the dimension and extension line.
7.4 State the length of arrowhead.
7.5 Identify the system of placement of dimensions of a given dimensioned drawing.
7.6 Dimension a given drawing using standard notations and desired system of dimensioning.

8. Understand the Techniques of Pictorial Drawings.

8.1 Define pictorial drawing.
8.2 State the types of pictorial drawings and their general uses.
8.3 Sketch isometric axis, angles, scales, arcs and circles.
8.4 Differentiate between the isometric and non-isometric lines.
8.5 Sketch isometric drawing and isometric projection.
8.6 Sketch the isometric projection from the given orthographic drawings.
8.7 Explain the angle of receding axis.
8.8 State the oblique drawing and its uses.

8.9 Sketch and letter the oblique cavalier and cabinet views.
8.10 Define perspective drawing.
8.11 Explain the purpose of perspective drawing.
8.12 State the vanishing point.
8.13 State the principles of making perspective views.
8.14 State the parallel and angular (diametric and trimetric) perspective.

9. Know the Types and Uses of Auxiliary Views.

9.1 State auxiliary views and auxiliary planes.
9.2 State necessity of auxiliary views.
9.3 State the types of auxiliary views i.e. primary and secondary auxiliary views.
9.4 State the types of auxiliary views due to their location with reference line i.e. symmetrical, unilateral and bilateral auxiliary views.
9.5 State the classes of primary views i.e. front top and profile auxiliary planes and oblique surfaces.
9.6 State the cases of secondary auxiliary views.

10. Understand the Types and Procedures of Building Drawing.

10.1 Define conventional symbols and give its importance.
10.2 Sketch the x-section of wall with flooring and roofing
10.3 Label the parts of given plan.
10.4 State the sizes of rooms for different classes of houses.
10.5 Follow measurements from a given plan.
10.6 Define site plan, detailed plan, layout plan, index plan, elevations & sections.
10.7 Sketch plans elevations and sections of buildings from given line diagrams.
10.8 Explain the procedure for preparing plans, elevations and sections for single storey and double storey buildings.
10.9 State the different fixtures required for bath, kitchen, dining and courtyards.
10.10 Sketch the different fixtures in kitchen and bathrooms at their proper places.

11. Know the Importance and Factors of House Planning.

11.1 Define House planning
11.2 State the necessity of house planning
11.3 State the factors, which govern the selection of site for building
11.4 Define orientation
11.5 State the factors affecting the planning of a house
11.6 State the minimum area of the building services
11.7 State principles of providing building services
11.8 State the inter-relationship of different rooms
11.9 Select materials for building structures
11.10 State the portion of different openings in building at their appropriate places
11.11 Draw sketches of different sizes of plots along with location of commercial area
11.12 State building by laws of different agencies i.e., CDA,LDA
11.13 State the classes of residential buildings

LIST OF PRACTICALS	**HOURS**
1. Printing/Lettering on graph paper	5

i.Block printing in ratio 4:5 & 4:7
ii.Single stroke printing in ratio 4:5 & 4:7
iii.Italic printing; free hand, gothic letters, figures in capital and lower case letters.

2.	Space distribution of drawing sheet and drawing of title strips and drawing different types of lines.	5
3.	Freehand proportionate sketching & sketching to scale of lines, triangle, quadrilaterals, polygon and circle.	9
4.	Construction of scales useful for civil engineering.	6
5.	Drawing triangles with inscribed and circumscribed circles, hexagons inside and outside circle, cones, and conic sections (ellipse, parabola, and hyperbola).	9
6.	Sketching three views of V-block and different wooden blocks.	9
7.	Completion of missing views when two views are given.	9
8.	Drawing of full sectional front view and outside top view of the hollow concrete block.	3
9.	Drawing of full sectional front view, side view and top view of the prisms, pyramids of different types.	9
10.	Drawing isometric views of a cube having circular hole in its focus and R.C.C. stairs (First three steps).	9
11.	Create an oblique drawing of different prisms and pyramids from its given principal views.	9
12.	Perspective drawing of slotted block and different wooden blocks from there given principal views.	9
13.	Draw partial, symmetrical and auxiliary view when top and front views are given, front and side views are given.	9
14.	Draw development of a right and oblique truncated hexagonal prism, cylinder and pyramid.	9
15.	Pattern drawing of a funnel from given data.	8
16.	Draw the following features; Symbols used in building work including public health and electrical installation. X-section of wall with foundation, floor and roof details. (9",13-1/2",20cm,30cm Thick) Line plan of a single room, two roomed quarter and C-Type (2500 sft) residence.	15
17.	Detailed plan, elevation and section of; a) Single room with verandah. b) C-class residence c) Double storey building.	15
18.	Foundation/layout plan of ; a) C-type residence. b) A-class residence.(3500 sft)	15
19.	Detailed plan of; a) A & C class bathroom showing internal arrangement. b) Kitchen with internal fittings.	15
20.	Drawing plan of C type residence showing public health and water supply connections.	9
21.	Draw layout plan for electrification and circuit diagram for C type residence	6

DAE CIVIL TECHNOLOGY
YEAR 1
WORKSHOP PRACTICE
(WOOD WORKING AND WIRING)

SHOP-112

TOTAL CONTACT HOURS:	**128**	**T**	**P**	**C**
Theory:	**32**	**1**	**3**	**2**
Practical:	96			

AIM: The student will develop skills to prepare basic woodwork and wiring tasks in building construction and be able to select proper tools and ensure their maintenance.

COURSE CONTENTS

A- WOOD WORK

1. **Work Shop Polish Safety Precautions and Importance of Wood** 1 Hours

1.1 ***Wood*** Work shop orientation
1.2 Safety precaution
1.3 Importance wood for industry

2. **Wood, Constriction, Types and Uses** 3 Hours

2.1 Define wood
2.2 Explain Construction of wood with sketch
2.3 Explain wood types
2.4 Uses of ***various wooden products***
2.5 Wood defects

3. **Wood Seasoning** 1 Hours

3.1 Wood seasoning
3.2 Method
3.3 Safety precaution during seasoning

4. **Wood working tools** 2 Hours

4.1 Wood tool
4.2 Measuring tool
4.3 Marking tools
4.4 Holding tool
4.5 Cutting tool
4.6 Planning tool

5. **Wood Working Machines** 3 Hours

5.1Introduction and safety
5.2Circular SAW
5.3W.W, Planer
5.4Wood Turning lathe, **Spindle, Boring, Sander**

6. **Wood Sawing** 1 Hours

6.1 Sawing of log and timber
6.2 Method of sawing

7. **Wood Joints and Their Uses** 1 Hours

7.1 ***Types*** of wood joints
7.2 Uses of wood joints

8. **Wood Finishing and Polishing** 2 Hours

8.1 Glue
8.2 Fastener
8.3 Sprit polish
8.4 Lacquering and paints

9. ***Measurement*** **of Wood** 2 Hours

9.1 Measuring of wood
9.2 Measuring of Log

B- ELECTRICAL WIRING

10. **Basic Terms/Units & Laws** 4 Hours

10.1 Conductor, Insulator, Semi Conductor current, Ampere voltage, Resistance and ohm
10.2 Define ohms law specific resistance laws up Resistance make calculation using
10.3laws of resistance in series and parallels

11. **Cable And Protection Device** 4 Hours

11.1 Wire and cable, parts of cable, types of insulating materials.
11.2 Types of cable w.r.t insulation and core
11.3 fuse and types (Rewire able, HRC and Cartridge fuse)
11.4 Earthing, necessity of earthling and parts of earthling
11.5 Cable Jointing (Skinning, Scraping Soldering and tapping)
11.6 Wiring types & Test

12. **Domestic Wiring** 4 Hours

12.1 Wiring testing equipment (Millimeter, Mager)
12.2 Testing of wiring (Polarity test, short circuit test)
12.3 Service line, main cable sub main cable, Branch circuit and final sub circuit
12.4 Distribution fuse boards and types (Single phase D.F.B and three phase D.F.B)
12.5Define Magnetic Contactor thermal relay

13. **Electricity Rules & Safety** 4 Hours

13.1 Pakistan electricity rules 1973, (25,28,***29***,32,40,46,49,51,57,58)
13.2 Fire, causes of fire, types of fire (Class A,B,C, D, E) firefighting equipment precautions during fire fighting, principle of fire fighting
13.3 General safety precaution
13.4 Electric shock, Causes and treatment

RECOMMENDED / REFERENCE BOOKS:

1. Workshop Technology: **John Chapman**

2. A TEXT BOOK OF WORKSHOP TECHNOLOGY: **R.S. KHURMI & J. K. GUPTA** [2008], S. CHAND & CO., NEW DELHI

INSTRUCTIONAL OBJECTIVES

1. **Understand Work Shop Policy, Safety Precautions, Importance Of Wood In Industries**

1.1 Define work shop orientation
1.2 Enlist safety precautions
1.3 Explain Importance of wood in industry

2. **Understand Wood, Construction Of Wood, Types Of Wood Uses Of Wood And Wood Defects**

2.1 Define wood
2.2 Explain construction of wood with sketch
2.3 Explain types of wood
2.4 Use a wood of in industry
2.5 Enlist wood defects
2.6 Explain wood defects

3. **Understand Seasoning, Method Of Seasoning, Safety Precautions**

3.1 Define wood seasoning
3.2 Enlist method of seasoning
3.3 Explain each method of seasoning
3.4 Enlist safety precaution in seasoning

4. **Understand Impact Tools, Measuring Tools, Marking Bolding, Cutting And Planning Tools**

4.1 Enlist wood working tool
4.2 Describe measuring tools
4.3 Describe marking tools
4.4 Holding tools
4.5 Cutting tools (Saw, chisel, file)
4.6 Describe planning tools (Jack plane and other planes)

5. **Understand Wood Working Machines, Band Saw, Circular Saw Planer, And Wood Turning Lathe.**

5.1 Enlist wood working machines
5.2 Explain band saw
5.3 Explain circular saw
5.4 explain planer
Explain wood turning lathe, **Spindle, Boring, Sander**

6. **Understand wood sawing, method of sawing,**

6.1 Define sawing of log and timber
6.2 Enlist method of sawing explain seasoning
6.3 Explain seasoning method

7. **Wood Joints and Their Uses**

7.1 Classify wood working joints
7.2 Explain each joint
7.3 Uses of joint in industry

8. **Wood Finishing And Polishing**

8.1 Define glue
8.2 Describe fanners
8.3 Explain sprit polish
8.4 Explain lacquering and paint

9. **Calculation Of Wood, Squire, Board And Log**

9.1 Define measuring of wood
9.2 Explain measuring of log
9.3 Explain measuring of board
9.4 Explain measuring squire.

10. **Basic Terms/Units & Laws**

10.1 Conductor, Insulator, Semi Conductor current, Ampere voltage, Resistance and ohm
10.2 Define ohms law specific resistance laws up Resistance make calculation using
10.3 Define these laws resistance in series and parallels solve series and parallel circuits

11. **Cable And Protection Device**

11.1 Define wire and cable, parts of cable, types of insulating materials. Define Types of cable w.r.t insulation and core
11.2 Define fuse and types (Rewire able, HRC and Cartridge fuse)
11.3 Define Earthling, necessity of earthling and parts of earthling
11.4 Define different steps up cable Jointing (Skinning, Scraping Soldering and tapping)
11.5 Wiring types & Test
11.6 Define types of domestic wiring (cleat wiring) latten wiring, casing and capping wire and conduit
11.7 Define wiring testing equipment (Millimeter, Mager)
11.8 Define Testing of wiring (Polarity test, short circuit test)
11.9 State the service line, main cable sub main cable, Branch circuit and final sub circuit
11.10 Distribution fuse boards and types (Single phase D.F.B and three phase D.F.B)
11.11 Define Magnetic Contactor thermal relay

12. **Electricity Rules & Safety**

12.1 State Pakistan electricity rules 1973, (25,28,***29***,32,40,46,49,51,57,58)

12.2 Define fire, causes of fire, types of fire (Class A,B,C, D, E) firefighting equipment precautions during fire fighting, principle of fire fighting
12.3 State General safety precaution
12.4 Define Electric shock, Causes and treatment

List Of Practicals

1.	Study the wiring accessories and tools used in different types of wirings including latest/modern accessories with specifications.	***3***
2.	Treatment against electric shock	***3***
3.	Control of one lamp with a single way switch control of Two lamps in series with a single way switch	***3***
4.	Control of one lamp with Two, Two way switches	***3***
5.	Construct a test board	***3***
6.	Construct a bell indicator circuit	***3***
7.	Construct of one ball with two push but tow with their indicators	***3***
8.	Construct up two lamps with two one way switch in batten wiring	***3***
9.	Construct one lamp with single way witch with conduit wiring	***3***
10.	Construct one lamp with two, two way switches with conduit wiring	***3***
11.	Construct three lamps in parallel with Individual single way switches with conduit wiring	***3***
12.	Construct tunnel light circuit	***3***
13.	Study and connect fluorescent lamp circuit	***3***
14.	Perform the wiring lay out up of a three phase pump	***3***
15.	Demonstrate earthling for residential building and machinery along with circuit diagrams	***3***
16.	Measuring of voltage current and resistance using modern electronic measuring equipment.	***3***
17.	Introduction to work shop, safety precaution	***3***
18.	Introduction different wood working tools such as lag out, measuring, Holding, cutting and planning	***3***
19.	Sawing Practice (Tobs1)	***3***
20.	Planning and squaring to dimensions (Tob2)	***3***
21.	Sharpening plane iron and wood chisel	***3***
22.	Making dado Joint (Job3)	***3***
23.	Making cross Lap Joint (Job4)	***3***
24.	Making Mortise and Tennon Joint (Job5)	***3***
25.	Nailing and wood screwing process (Job6)	***3***
26.	Boring Process, making holes (Job 7)	***3***
27.	Polishing (Prepare wood surface for polishing staining and lacquering)	***3***
28.	***Project wood working***	***3***
29.	***Project Electrical Wiring (one room wiring)***	***96***

DAE CIVIL TECHNOLOGY
YEAR 1

COMP-111	**COMPUTER APPLICATIONS**			
TOTAL CONTACT HOURS:	**96**	**T**	**P**	**C**
Theory:	0	**0**	**3**	**1**
Practical:	96			

AIM: This subject will enable the student to be familiar with the operation of a computer and its applications. Basic skills on Windows, Word processing, MS Excel, will be practiced for its applications in civil engineering

RECOMMENDED / REFERENCE BOOKS:

1. Computer Applications for Beginners.
2. Word Processor Latest Release
3. MS Excel for Learners

LIST OF PRACTICALS — HOURS

1. Introduction to Computer — 6 Hours

1.1 Demonstrate & practice identification/application of Input/ Output devices
1.2 Demonstrate & practice identification/application of Hardwares/ Softwares & their types
1.3 Demonstrate & practice identification/application of Computer Resources

2. Windows Operating System & Internet — 12 Hours

2.1 Practice start, restart, shut down, log on/off
2.2 Demonstration & Practice Windows interface
2.3 Demonstration & Practice Windows Help
2.4 Practice File / folder Manipulation
2.5 Demonstration & Practice window search
2.6 Practice Windows Advance setting options.
2.7 Demonstration & Practice Partitioning & installation of windows
2.8 Demonstration Introduction to internet
2.9 Demonstration & Practice setting up internet connection using internet browser
2.10 Practice Make/Maintain E-Mail address
2.11 Practice send/Receive E-Mail
2.12 Practice Downloading data
2.13 Practice search teaching & learning Resources (TLRs)

3. Word Processing — 24 Hours

3.1 Demonstration & Practice installation of MS-office package
3.2 Demonstration Introduction to word processor
3.3 Introduction to MS-Word
3.4 Demonstration Main Interface window
3.5 Practice open/Close MS-Word
3.6 Practice Create/save/Rename/Close files
3.7 Practice Editing data in MS-Word
3.8 Demonstration and Practice use of clip board
3.9 Practice Insert Symbols
3.10 Demonstration & Practice find/replace data
3.11 Practice Formatting character
3.12 Practice Formatting Paragraph
3.13 Practice paragraph indentation
3.14 Practice Bullets & Numbering
3.15 Demonstration & Practice Inserting columns
3.16 Practice page setup
3.17 Practice spelling & grammar
3.18 Practice Synonyms & Thesaurus
3.19 Demonstration & Practice Drawing toll bar
3.20 Practice word Art
3.21 Practice Manipulating Tables
3.22 Demonstration & Practice Printing Documents
3.23 Demonstration & Practice Mail Merge
3.24 Practice using formulas in MS-Word

4. MS-Excel 27 Hours

4.1 Introduction to spread sheet program
4.2 Introduction to MS-Excel
4.3 Practice open/close MS-Excel
4.4 Introduction to data types, work sheets/work books
4.5 Introduction Row, Column, Cell
4.6 Practice Editing Data
4.7 Practice data manipulation
4.8 Practice Formatting cells
4.9 Practice printing documents
4.10 Practice using Formula
4.11 Practice insert function/wizard
4.12 Formula application for surveying data calculation
4.13 Formula application for geometry calculation
4.14 Formula application for trigonometry calculation
4.15 Practice prepare charts
4.16 Practice protection of files
4.17 Practice data sorting
4.18 Practice filtering data
4.19 Practice table Manipulation

4.20 Practice creating macro
4.21 Practice find/replace data
4.22 Practice merge/split cells

5. **AutoCAD** 27 Hours

5.1 Installation of Auto CAD Software
5.2 Introduction to AutoCAD and demonstration of its use
5.3 Demonstration & Practice of AutoCAD Menus
5.4 Demonstration & Practice of AutoCAD Graphic window
5.5 Demonstration & Practice of coordinate system (Types of coordinates).
5.6 Practice setting of model and its layout.
5.7 Practice of Draw commands
5.8 Practice of File commands
5.9 Practice of Edit commands
5.10 Practice of dimensions.
5.11 Practice of display command.
5.12 Modify Commands
5.13 Insert object
5.14 Formatting Commands
5.15 Practice to use existing templates and also create relevant templates.
5.16 Practice of drawing of plane and solid geometrical figures
5.17 Practice for incorporation of data from WORD and Excel.
5.18 Practice of drawing of two roomed house (detailed plan, elevation and sections) and steel reinforcement for slabs and setting layouts for plotting.
5.19 Plotting of two roomed house.
5.20 Practice Integration of AutoCAD & MS Excel.

DAE CIVIL TECHNOLOGY

YEAR 2

اسلامیات / مطالعہ پاکستان

مضمون (سال دوئم)	GEN 211	ت	ع	ک
حصہ اول اسلامیات		1	0	1
حصہ دوم مطالعہ پاکستان		کل وقت: 20 گھنٹے		

موضوعات

1- سورۃ المومنون ایک تا گیارہ آیات کا مع ترجمہ

2- دس منتخب احادیث مع ترجمہ و تشریح

☆ خیرکم من تعلم القرآن و علمہ

☆ لا ایمان لمن لا امانۃ لہ ولا دین لمن لا عہد لہ

☆ وایاکم والظن ان الظن اکذب الحدیث

☆ من احدث فی امرنا ہذا ما لیس منہ فہو رد

☆ من حمل علینا السلاح فلیس منا

☆ انا وکافل الیتیم فی الجنۃ

☆ لا ضرر ولا ضرار فی الاسلام

☆ کلکم راع وکلکم مسئول عن رعیتہ

3- سیرۃ طیبہ

☆ مکی زندگی۔ ولادت۔ بعثت۔ ہجرت

☆ مدنی زندگی۔ مواخات۔ میثاق مدینہ۔ فتح مکہ (اسباب و نتائج)

4- حضور [illegible] بحیثیت

☆ خطبہ حجۃ الوداع

معلم کامل، سربراہ خاندان

5- اسلامی معاشرہ

نظام تعلیم اور اس کے مقاصد۔ عدل و انصاف۔ امر بالمعروف۔ نہی عن المنکر

جہاد۔ کسب حلال۔ مسجد (اہمیت و فضیلت)

6- اسلامی ریاست کی تعریف۔ اسلامی ریاست کی خصوصیات۔ اسلامی حکومت کے فرائض۔ اسلامی طرز حکومت

تدریس مقاصد

عمومی مقاصد بطالبعلم یہ جان سکے کہ آیات قرآنی کی روشنی میں مومن کے اوصاف کیا ہیں

قرآن مجید — منتخب آیات قرآنی

خصوصی مقاصد:

☆ قرآنی آیات کا ترجمہ بیان کر سکے
☆ قرآنی آیات کی تشریح کر سکے
☆ قرآنی آیات کی روشنی میں ایک مومن کے اوصاف بیان کر سکے
☆ قرآنی آیات میں بیان کردہ مومن کے اوصاف اپنے اندر پیدا کر سکے

احادیث نبویہ

☆ عمومی مقصد احادیث کی روشنی میں اسلامی اخلاقی اقدار (انفرادی و اجتماعی) سے آگاہ ہو سکے

خصوصی مقاصد:

☆ احادیث کا ترجمہ بیان کر سکے
☆ احادیث کی تشریح کر سکے
☆ احادیث کی روشنی میں اسلام کی اخلاقی اقدار کی وضاحت کر سکے
☆ ان احادیث کی دی گئی تعلیمات کے مطابق اپنی زندگی گزار سکے

سیرت طیبہ

☆ عمومی مقصد: حضور ﷺ کی سیرت طیبہ کے بارے میں جان سکے

خصوصی مقاصد:

☆ حضور ﷺ کی ابتدائی زندگی اختصار کے ساتھ بیان کر سکے
☆ حضور ﷺ کی ہجرت کا واقع بیان کر سکے
☆ حضور ﷺ کی مدنی زندگی اختصار سے بیان کر سکے
☆ حضور ﷺ کی بطور معلم خصوصیات بیان کر سکے

☆ حضور ﷺ کی بطور سربراہ خاندان بیان کر سکے

اسلامی معاشرہ

عمومی مقصد: اسلامی معاشرہ کی خصوصیات سے آگاہی حاصل کر سکے

خصوصی مقاصد:

☆ اسلامی معاشرہ کا معنی و مفہوم بیان کر سکے

☆ اسلامی معاشرہ کی امتیازی خصوصیات بیان کر سکے

☆ اسلامی معاشرہ میں عدل و احسان کی اہمیت بیان کر سکے

☆ تبلیغ کے لغوی معنی بیان کر سکے

☆ تبلیغ کی اہمیت و ضرورت بیان کر سکے

☆ جہاد کے لفظی و اصطلاحی معنی بیان کر سکے

☆ جہاد کی اہمیت بیان کر سکے

☆ جہاد اور قتال میں فرق بیان کر سکے

☆ جہاد کی مختلف اقسام بیان کر سکے

☆ لفظ مسجد کی تعریف کر سکے

مسجد کی سابقہ حیثیت کو بحال کرنے کے بارہ میں اقدامات کو بیان سکے

اسلامی ریاست

عمومی مقاصد: اسلامی ریاست کی خصوصیت بیان کر سکے

خصوصی مقاصد:

☆ ریاست کی تعریف بیان کر سکے

☆ اسلامی ریاست میں طرز حکومت سے آگاہی حاصل کر سکے

☆ اسلامی ریاست کی خصوصیات بیان کر سکے

☆ اسلامی ریاست کے اغراض و مقاصد بیان کر سکے

☆ اسلامی ریاست کے قیام کیلئے جدوجہد کر سکے

نصاب مطالعہ پاکستان

سی	پی	ٹی
1	0	1

کل وقت: 12 گھنٹے

سال دوم

حصہ دوم

موضوعات

☆ دو قومی نظریہ

☆ تحریک پاکستان

☆ انڈین کانگریس

☆ مسلم لیگ

☆ تقسیم بنگال

☆ میثاق لکھنؤ

☆ تحریک خلافت

☆ سندھ تحریک

☆ تجاویز رضی

☆ نہرو رپورٹ

☆ قائداعظم کے چودہ نکات

☆ خطبہ الہ آباد

☆ انتخابات 1936 اور انتخابی منشور

☆ قرارداد پاکستان

حصہ دوم

مطالعہ پاکستان

تدریس مقاصد

تحریک پاکستان

عمومی مقصد: قیام پاکستان کے اسباب و محرکات کو بیان کر سکے

خصوصی مقاصد:

- ☆ قومیت کے مفہوم کو بیان کر سکے
- ☆ دو قومی نظریہ کی تعریف و توضیح کر سکے
- ☆ دو قومی نظریہ اہمیت بیان کر سکے
- ☆ ہندوستانی مسلمانوں کی محرومیوں کو بیان کر سکے
- ☆ قومی تشخص کو بحال رکھنے کے لئے مسلمانان ہند کی مساعی بیان کر سکے
- ☆ آزادی ہند اور قیام پاکستان علامہ اقبال اور قائداعظم کی مساعی بیان کر سکے
- ☆ قیام پاکستان سے مستقبل اسلامی مملکت کے قیام کے لئے مسلم عوام کی کوششوں کو بیان کر سکے
- ☆ مسلم لیگ کے قیام پاکستان کے لئے جدوجہد بیان کر سکے

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات

سال دوم

ی	پی	ی
I	D	I

کل وقت: 20 گھنٹے

موضوعات

معاشرتی اقدار، لحاظ، ہمسایہ، قوم، قومی سطح، شہری سطح، صنعتی ادارہ کی سطح، ضروریات، ورثہ

- ☆ حقوق و فرائض
- ☆ قوت برداشت
- ☆ قوت ارادی
- ☆ لگن و جذبہ
- ☆ وسیع النظری
- ☆ بے غرضی
- ☆ مسلمانی دوستی
- ☆ حفاظتی شعور
- ☆ پاس آزادی
- ☆ کامل اتحاد
- ☆ تغیرات کو قبول کرنا
- ☆ خود شناسی

نصاب اخلاقیات

سال دوم

تدریسی مقاصد

عمومی مقاصد :

طالب علم: اخلاقیات کی اہمیت و ضرورت سے آگاہ ہو سکے اور بیان کر سکے

خصوصی مقاصد: طالب علم اس قابل ہو کہ

☆ موضوعات کا مطلب بیان کر سکے

☆ عملی زندگی سے مثالوں کی نشاندہی کر سکے

☆ اپنی شخصیت اور معاشرے پر موضوعات کے مطابق مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے

☆ اعلیٰ اخلاقی اقدار میں سے

قوت برداشت۔ قوت ارادی۔ لگن جذبہ۔ وسیع النظری۔ بے غرضی۔ انسانی دوستی حق گوئی۔ شعور۔ پس انداز۔

کامل آگاہی اور خود شناسی کی اہمیت بیان کر سکے

☆ اخلاقیات سے متصف ہو کر قومی خدمت بہتر طور پر انجام دے سکے

DAE CIVIL TECHNOLOGY
YEAR 2

Math 212 APPLIED MATHEMATICS

Total Contact Hours	T	P	C
Theory 64 Hours	2	0	2

Pre-requisite: Must have completed Mathematics I.

AIMS The students will be able to:

1. Solve problems of Calculus and Analytic Geometry.
2. Develop mathematical skill, attitudes and logical perception in the use of mathematical instruments.
3. Apply principles of Differential Calculus to work out rate measures, velocity, acceleration, maxima & minima values
4. Use Principles of Integral Calculus to compute areas & volumes.
5. Acquire proficiency in solving technological problems with mathematical clarity and insight.

COURSE CONTENTS

1. FUNCTIONS & LIMITS. 4 Hours

- 1.1 Constant & Variable Quantities
- 1.2 Functions & their classification
- 1.3 The concept of Limit
- 1.4 Limit of a Function
- 1.5 Fundamental Theorems on Limit
- 1.6 Some important Limits
- 1.7 Problems

2. DIFFERENTIATION 4 Hours

- 2.1 Increments
- 2.2 Differential Coefficient or Derivative
- 2.3 Differentiation ab-initio or by first Principle
- 2.4 Geometrical Interpretation of Differential Coefficient
- 2.5 Differential Coefficient of X^n, $(ax + b)^n$
- 2.6 Three important rules
- 2.7 Problems

3. DIFFERENTIATION OF ALGEBRAIC FUNCTIONS 4 Hours

- 3.1 Explicit Functions
- 3.2 Implicit Functions
- 3.3 Parametric forms
- 3.4 Problems

4. DIFFERENTIATION OF TRIGONOMETRIC FUNCTIONS 6 Hours

- 4.1 Differential Coefficient of Sin x, Cos x, Tan x from first principle.
- 4.2 Differential Coefficient of Cosec x, Sec x, Cot x
- 4.3 Differentiation of inverse Trigonometric functions.
- 4.4 Problems.

5. DIFFERENTIATIONS OF LOGARITHMIC & EXPONENTIAL FUNCTIONS 4 Hours

5.2 Differentiation of Log a^x
5.3 Differentiation of a^x
5.4 Differentiation of e^x
5.5 Problems

6. RATE OF CHANGE OF VARIABLES. 4 Hours
6.1 Increasing and decreasing functions
6.2 Maxima and Minima values
6.3 Criteria for maximum & minimum values
6.4 Methods of finding maxima & minima
6.5 Problems

7. INTEGRATION 8 Hours
7.1 Concept
7.2 Fundamental Formulas
7.3 Important Rules
7.4 Problems

8. METHODS OF INTEGRATION 6 Hours
8.1 Integration by substitution
8.2 Integration by parts
8.3 Problems

9. DEFINITE INTEGRALS 6 Hours
9.1 Properties
9.2 Application to area
9.3 Problems

10. PLANE ANALYTIC GEOMETRY & STRAIGHT LINE 6 Hours
10.1 Coordinate System
10.2 Distance Formula
10.3 The Ratio Formula
10.4 Inclination and slope of a line
10.5 The slope Formula
10.6 Problems

11. EQUATIONS OF STRAIGHT LINE 6 Hours
11.1 Some important Forms
11.2 General Form
11.3 Angle Formula
11.4 Parallelism & Perpendicularity
11.5 Problems

12. THE EQUATIONS OF CIRCLE 6 Hours
12.1 Standard form of Equation
12.2 Central form of Equation
12.3 General form of Equation
12.4 Radius & Coordinates of the centre
12.5 Problems

REFERENCE BOOKS

1. Thomas Finny- Calculus and Analytic Geometry
2. Ghulam Yasin Minhas - Technical Mathematics Vol - II, Ilmi Kitab Khana, Lahore.
3. Prof. Riaz Ali Khan- Polytechnic Mathematic Series Vol I & II, Majeed Sons, Faisalabad
4. Prof. Sana Ullah Bhatti - Calculus and Analytic Geometry, Punjab Text Book Board, Lahore.

Math-212 APPLIED MATHEMATICS

INSTRUCTIONAL OBJECTIVES

1. USE THE CONCEPT OF FUNCTIONS AND THEIR LIMITS IN SOLVING SIMPLE PROBLEMS.

1.1 Define a function.
1.2 List all type of functions.
1.3 Explain the concept of limit and limit of a function.
1.4 Explain fundamental theorems on limits.
1.5 Derive some important limits.
1.6 Solve problems on limits.

2. UNDERSTAND THE CONCEPT OF DIFFERENTIAL COEFFICIENT

2.1 Derive mathematical expression for a differential coefficient.
2.2 Explain geometrical interpretation of differential coefficient.
2.3 Differentiate a constant, a constant associated with a variable and the sum of finite number of functions.
2.4 Solve related problems.

3. USE RULES OF DIFFERENTIATION TO SOLVE PROBLEMS OF ALGEBRAIC FUNCTIONS.

3.1 Differentiate ab-initio x^n and $(ax+b)^n$.
3.2 Derive product, quotient and chain rules.
3.3 Find derivatives of implicit functions and explicit functions.
3.4 Differentiate parametric forms, functions w.r.t another function and by rationalization.
3.5 Solve problems using these formulas.

4. USE RULES OF DIFFERENTIATION TO SOLVE PROBLEMS INVOLVING TRIGONOMETRIC FUNCTIONS.

4.1 Differentiate from first principle sin x,Cos x,tan x.
4.2 Derive formula Derivatives of Sec x, Cosec x, Cot x.
4.3 Find differential coefficients of inverse trigonometric functions
.

5. USE RULES OF DIFFERENTIATION TO LOGARITHMIC AND EXPONENTIAL FUNCTIONS.

5.1 Derive formulas for differential coefficient of Logarithmic and exponential functions.
5.2 Solve problems using these formulas.

6. UNDERSTAND RATE OF CHANGE OF ONE VARIABLE WITH RESPECT TO ANOTHER.

6.1 Derive formula for velocity, acceleration and slope of a line.
6.2 Define an increasing and a decreasing function, maxima and minima values, point of inflexion.
6.3 Explain criteria for maxima and minima values of a function.

6.4 Solve problems involving rate of change of variables.

7. APPLY CONCEPT OF INTEGRATION IN SOLVING RELEVANT PROBLEMS.

7.1 Explain the concept of integration.
7.2 State basic theorems of integration.
7.3 List some important rules of integration.
7.4 Derive fundamental formulas of integration.
7.5 Solve problems of integration based on these rules/formulas.

8. UNDERSTAND DIFFERENT METHODS OF INTEGRATION

8.1 List standard formulas of Integration.
8.2 Integrate a function by substitution method.
8.3 Find integrals by the method of integration by parts.
8.4 Solve problems using these methods.

9. UNDERSTAND METHODS OF SOLVING DEFINITE INTEGRALS.

9.1 Define definite integral.
9.2 List properties of definite integrals.
9.3 Find areas under the curves using definite integrals.
9.4 Solve problems of definite integrals.

10. UNDERSTAND THE CONCEPT OF PLANE ANALYTIC GEOMETRY.

10.1 Explain the rectangular coordinate system.
10.2 Locate points in different quadrants.
10.3 Derive distance formula.
10.4 Prove section formulas.
10.5 Derive Slope Formula
10.6 Solve problem using these formulas.

11. USE EQUATIONS OF STRAIGHT LINE IN SOLVING PROBLEMS.

11.1 Define a straight line.
11.2 Write general form of equation of a straight line.
11.3 Derive slope intercept and intercept forms of equations of a straight line.
11.4 Derive expression for angle between two straight lines.
11.5 Derive conditions of perpendicularity and parallelism of two straight lines.
11.6 Solve problems involving these equations/formulas.

12. SOLVE TECHNOLOGICAL PROBLEMS USING EQUATIONS OF CIRCLE.

12.1 Define a circle.
12.2 Describe standard, central and general forms of the equation of a circle.
12.3 Convert general form to the central form of equation of a circle.
12.4 Derive formula for the radius and the coordinates of the center of a circle from the general form.
12.5 Derive equation of the circle passing through three given points.
12.6 Solve problems involving these equations.

DAE CIVIL TECHNOLOGY
YEAR 2
GEN 221 COMMUNICATION SKILLS AND REPORT WRITING

TOTAL CONTACT HOURS:	**32**	**T**	**P**	**C**
Theory:	32	**1**	**2**	**2**
Practical:	64			

AIM: The course has been design to enable the students:

a) To communicate their technical skills properly at work place.

b) To present reports/findings by using modern presentation techniques.

COURSE CONTENTS

1. LISTENING SKILLS **4 Hours**

1.1 Listening process

1.1.1. Listening words and Phrases

2. READING SKILLS **2 Hours**

2.1. Active reading techniques

2.2. General & careful reading

3. WRITTEN COMMUNICATION SKILLS IN ENGINEERING SETTINGS. **8 Hours**

3.1 Written work

3.1.1 Note taking

3.1.1.1 Lists

3.1.1.2 Mind mapping/flow diagrams

3.2 Writing style

3.2.1 Business letter

3.2.2 Memo writing

3.2.3 Report style and format

3.2.4 Email, fax

3.3 Proofreading and amending text

3.4 Use of diary/logbook for planning and prioritizing work schedules

3.5 Graphical presentation techniques

4. VERBAL COMMUNICATION SKILLS IN ENGINEERING SETTINGS. **8 Hours**

4.1 Speaking with peers, supervisors and public

4.2 Use of appropriate technical language

4.3 Tone and manner

4.4 Impact and use of body language in verbal communications

4.5 Meeting & interviewing

4.5.1 Participating in meeting

4.5.1.1 Questioning answering & note taking

4.5.2 Preparing for interview

5. USE ENGINEERING INFORMATION **10 Hours**

5.1 Information sources
- 5.1.1 Non-computer-based sources
- 5.1.2 Computer-based sources

5.2 Use of information
- 5.2.1 For the solution of engineering problems
- 5.2.2 For product/service/topic research
- 5.2.3 Gathering data or material to support own work
- 5.2.4 Checking validity of own work/findings

5.3 Present information
- 5.3.1 Presentation skills
- 5.3.2 Report
- 5.3.3 Visual presentation
  - 5.3.3.1 Overhead transparencies
  - 5.3.3.2 Charts, Histograms and Graphs
  - 5.3.3.3 Computer-based presentations(on power point)

REFERENCE BOOKS:

1. Communications Skills: **Mathew McKay[2009],** New Harbinger Publications
2. A course in English Communication: **M. Apte**, [2009], PHI Learning, New Delhi.
3. Communication Skills Handbook: **Jane Summers and Brett Smith** [2005],

LIST OF PRACTICCALS (ORAL) 64 Hours

1. Practice of listening vowels, words and phrases through audio. 03 Hours
2. Practice of listening simple sentences & complex sentences through movies. 03 Hours
3. Practice of listening social expressions & colloquial expressions through movie. 03 Hours
4. Practice of listening message takings & noting details through audios. 03 Hours
5. Performance of the situational speaking activity like self introduction & group introduction 03 Hours
6. Performance of the social interaction activity like talking to friends, classroom interaction & student teacher interaction. 03 Hours
7. Performance for the job interview activity (mock interview). 03 Hours
8. Practice of speaking activity on given topics. 02 Hours
9. Practice of speaking activity on social issues. 02 Hours
10. Practice of group activities like “group discussion on different topics”. 02Hours
11. Practice of group activities on discussing current affairs. 02 Hours
12. Interpret drawings, specifications and other administrative documents. 2 Hours
13. Use different methods of communication to liaise with the building team. **Methods:** oral, written 2 Hours

14. Receive customer requirements and promptly deal with them. **Receipt:** orally (face to face), written, telephone 2 Hours
15. Fill out a daily/weekly diary or log of work activities. 2 Hours
16. Access and use technical information from different sources. **Sources:** trade/suppliers catalogues, libraries 3 Hours
17. Use language in written and oral forms to communicate needs clearly. Oral: telephone, work instructions, group, one to one Written: technical/commercial letters (eg internal memos, technical reports, job applications, curriculum vitae/résumé), summarise (documents/reports) Systems: word processor, fax 6 Hours
18. Interpret, use and draw diagrams in a routine work environment. Interpret: graphical to written, written to graphical, graphical (bar charts, histograms, graphs) 3 Hours
19. Collect and select information on the use of international standards. 3 Hours
20. Collect and select technical information from different sources. Information: eg technical drawings, schedules, data sheets/charts, manufacturers information sheets/brochures, microfilm, micro fiche, libraries, library systems (index, classification), video tape, CD ROM, computer systems (eg Internet) 12 Hours

DAE CIVIL TECHNOLOGY
YEAR 2

Civil-213 PUBLIC HEALTH TECHNOLOGY

TOTAL CONTACT HOURS	**160**	**T**	**P**	**C**
Theory:	64	**2**	**3**	**3**
Practical:	96			

AIM: To have a comprehensive understanding of the technology of municipal water processing, water distribution, waste water collection & treatment and sludge & effluent disposal

INTRODUCTION OF PH ENGG

1. **Pipes Used In Plumbing Water And Gas Supply:** 2 Hours

   1.1 Types.
   1.2 Description of pipes with reference to material e.g. G.I, PVC, PPR CI & A/C PIPES
   1.3 Specification of pipes.

2. **Plumbing Fixtures and *Tools*:** 4 Hours

   2.1 Flushing cistern, water closets, urinals.
   2.2 Traps-functions, wash hand basin and bath tub
   2.3 Introduction of plumbing tools

3. **Faucets, Valves & Specials:** 3 Hours

   3.1 Taps and their types.
   3.2 Valves and their types.
   3.3 Mixer of different types.

4. **Introduction to Water Supply** 2 Hours

   4.1 General importance of water supply.
   4.2 Need for protected water supply.
   4.3 Development of water supply.

5. **Sources Of Water:** 3 Hours

   5.1 Surface source, lakes, streams, rivers, rainfall, intensity of rainfall, run off, catchments area, and yield from surface sources.
   5.2 Underground sources, springs, wells-its kinds (i.e. tube well), infiltration galleries
   5.3 Yield from wells-Quantity of underground water, water table, aquifier, cone of depression.

6. **Intakes:** 3 Hours

6.1 Intakes and its types-Reservoir intakes, river intakes, lake intake, canal intake, factor governing the selection of site for an intake.

7. Quantity Of Water: 4 Hours

7.1 Total quantity of water for a town, per capita demand, factors affecting demand
7.2 Water requirement for domestic, industrial, fire fighting & commercial purposes.
7.3 Variation in demand

8. **Quality of Water.** 3 Hours

8.1 Meaning of pure water.
8.2 Impurities in water
8.3 Turbidity
8.4 Colour
8.5 Temperature
8.6 Taste and Odour
8.7 Suspended Solids
8.8 Total Dissolved Solids (TDS)
8.9 Alkalinity
8.10 Hardness
8.11 Fluorides
8.12 Biological Water Quality Parameters (Pathogens)
8.13 Tests of water (physical chemical tests and biological) and PH Value of water / use of WHO Standards and guidelines for drinking water

9. **Treatment of Water.** 8 Hours

9.1 Sedimentation-purpose of sedimentation, plain sedimentation, Types of settling tanks based on functions and shapes.
9.2 Coagulation-purpose, use of coagulants and kinds. Method of feeding and mixing.
9.3 Filtration
- Theory of filtration,
- Construction and operation of slow sand, rapid sand, pressurized filters,
- comparison between slow sand and
- rapid sand filters

9.4 Disinfection of Water.
- Necessity and methods of disinfect ion,
- Chlorination
- Forms of chlorination and
- Test for chlorine.

9.5 Water softening.
- Purposes

- Types of hardness
- Methods of softening.

9.6 Miscellaneous methods of water treatment, aeration, fluoridation, colour, odour and taste removal.

10. **Distribution System of Water.** 6 Hours

10.1 Methods of distribution, gravity, combined and direct pumping.
10.2 Methods of supply of water intermittent and continuous.
10.3 Methods of layout of pipes, dead end, grid, ring and radial system.
10.4 Storage-underground and overhead service reservoirs, necessity and accessories.
10.5 Appurtenance in distribution system. Use of sluice valves, air valves, drains valves, fire hydrants, water meter, reflux valve, scour valves.

11. **Pumps & pumping.** 3 Hours

11.1 Necessity, kinds of pumps, fundamental principle of pumping.
11.2 Selection of site for tube-well.

12. **Introduction to Sanitary Engg** 3 Hours

12.1 Terminology of sanitary Engineering. e.g. refuse, garbage, sludge, etc.
12.2 Sanitation systems, conservancy system, water carriage system and cesspool system their comparison.
12.3 Types of sewerage systems and their suitability

13. **Quantity of Sewage & design of sewer** 8 Hours

13.1 Quantity of discharge in sewer, dry weather flow, Self cleansing velocity, variation in quantity of dry weather flow.
13.2 Quantity of storm water flow-run off, its co-efficient, time of concentration impervious factor, hydraulic formula for velocity of flow.
13.3 Numerical problems

14. **House Drainage** 3 Hours

14.1 Requirements of house drainage.
14.2 Shapes & construction of different type of drains & ducts.
14.3 House drains slopes & connection with main sewer.
14.4 One & two pipe system of drainage and their comparison.

15. **Alignment & Layout of sewer Line** 3 Hours

15.1 Layout of sewer.
15.2 Location of sewer line - longitudinal & X-Section showing sewer lines.
15.3 Layout of sewer line gradient fixing, bedding, handling, laying, jointing, testing & back filling.

16. Sewer Appurtenances 6 Hours

16.1 Brief description, location, function and construction of:- Man holes, shallow MH ,Deep MH, drop-man hole, inlets, clean out, lamp hole,, grease, & oil traps, inverted syphon, trestles & piers.

RECOMMENDED / REFERENCE BOOKS:

1. Plumbing by: **Babbitt.**
2. Fundamental of water supply and sanitary engineering by: **Rangwala S.C.**
4. Water supply and sanitary engineering. By: **Kulkarni.**
5. A text book of sanitary engineering by: **Deshpande R.S**.
6. Public health engineering by: **Sharma.**

INSTRUCTIONAL OBJECTIVES

1. Understand the Types and Specifications of Pipes.

1.1 State the types of pipes.
1.2 Compare pipes with reference to materials.
1.3 Describe specifications of pipes.

2. Understand about Faucets and their use.

2.1 Explain taps and their types.
2.2 Explain valves and their types.
2.3 Explain Mixer and their types
2.4 Explain G.I and their uses and specifications.
2.5 Explain cocks their types and uses.
2.6 Identify plumbing tools and their use.

3. **Understand Plumbing Fixtures, their Functions and Installation Procedure.**

3.1 Define flushing cistern, water closets, urinals, wash hand basin, bathtub & traps.
3.2 Describe use & function of flushing cistern, water closets, urinals, wash hand basin, bathtub & traps.
3.3 Explain the procedure for installation of water closet, flushing cistern, soil pipe, and urinal

3.4 Part with flushing cistern and wash hand basin (complete).

4. **Understand The Importance, Development & Necessity Of Water Supply.**

4.1 Explain the importance of water supply.
4.2 Explain the development of water supply.
4.3 Describe the need of protected water supply

5. Understand the Surface and Underground Sources of Water and their Yields.

5.1 Enlist different sources of water & compare their merits and demerits.
5.2 Define rain fall intensity, run off, catchments area, and hydraulic gradient yield from surface sources.
5.3 Calculate yield from surface source
5.4 Describe springs, wells, kinds of well, tube well and infiltration galleries
5.5 Explain the construction and function of well, tube well
5.6 Define aquifier, static water level, Piezometeric head, pumping water, Draw Down, area of influence, well yield and cone of depression
5.7 Describe quality of underground water acceptable for human life.
5.8 Calculate yield from wells (confined & unconfined)
5.9 Explain the need for better quality of water for human life.

6. Understand Intakes and Pipe Laying and Test

6.1 Explain intakes and its types i.e. reservoir intakes, river intakes, lake intakes and canal intakes.
6.2 State the factors governing the selection of site for an intake.
6.3 Explain the pipe laying and testing procedure

7. Understand Total Quantity of Water for a Town

1.1 Explain per capita water consumption & factors affecting demand.
1.2 Describe the water requirement for domestic, industrial fire-fighting and commercial purposes.
1.3 Describe variation in demand.

8. Understand the Quality & Tests for Quality of Water

8.1 Define pure water (potable water)
8.2 Explain impurities in water
8.3 Explain the procedure for physical chemical and biological tests of water, PH of water

9. Understand the Methods and Process for Treatment of Water

9.1 Sketch the overall layout of water treatment plant indicating different stages
9.2 Explain sedimentation & plain sedimentation

9.3 State the objects of plain sedimentation
9.4 Describe types of settling tanks based on function & shapes
9.5 Define coagulation
9.6 Describe types, purpose and use of coagulants
9.7 State the method of feeding and mixing of coagulations
9.8 Explain the process of sedimentation by coagulations
9.9 State flocculation and types of Flocculator
9.10 Explain the working of baffled and mechanical Flocculator
9.11 Explain filtration and types of filters
9.12 Describe the construction and operation of slow sand and rapid sand of pressure filters
9.13 Compare slow sand and rapid sand filtration
9.14 Describe the process of filter washing
9.15 Explain disinfections & its necessity
9.16 State methods of disinfections
9.17 Explain chlorination, its forms and points of chlorination & chlorine demand
9.18 Describe the test for chlorine
9.19 State hardness & its types
9.20 Explain methods of softening
9.21 Explain aeration, fluoridation, colour, odour, and taste

10. Understand The Systems of Distribution, its Components and Layouts

10.1 Explain gravity and combined & direct pumping system of distribution
10.2 Explain intermittent and continuous methods of supply of water
10.3 Explain with sketches the different pipe layout methods including dead end system, grid iron system, radial & ring system
10.4 State the necessity of underground, overhead and service reservoirs
10.5 Draw sketches of rectangular overhead service reservoir showing all accessories
10.6 Explain with sketches the functions of various appurtenances in a distribution system

11. Understand Principle of pumping

11.1 Recognize different types of pumps
11.2 Describe about tube well

12. **Understand basic facts about Sanitary Engineering**

12.1 Define terms; sewage, sanitary sewage, domestic sewage, industrial sewage, storm or rain sewage, sewerage works, sewage treatment and sewage disposal
12.2 State types of sewer (sanitary sewer, storm sewer, combined sewer, lateral sewer, house sewer, submain sewer, main or trunk sewer, out fall sewer and relief sewer)
12.3 Compare systems of sewage disposal ***(Sanitation systems)***, conservancy system, water carriage system and cesspool drainage system
12.4 State types of sewerage system and their suitability
12.5 Compare the sewerage systems with each other

13. Understand the Discharge calculation of sewage for sewer design.

13.1 State quantity of discharge in sewer dry weathering flow.
13.2 State the factors on which dry weather flow depends.
13.3 Explain the variation in quantity of dry weather flow.
13.4 Define terms: run off co-efficient, time of concentration, rain fall intensity and impervious factor.
13.5 State the hydraulic formula for velocity of flow.
13.6 Estimate the quantity of storm water flow using empirical formula and rational formula.

14. Understand the Fundamentals and its Requirements of House Drainage

14.1 State the aims of buildings drainage and its requirement
11.1 Describe with sketches the shapes and construction of different types of drains
11.2 State House drains slopes & connection with main sewer
11.3 Compare one and two pipe system of drainage

15. Understand the Procedure for Laying Out and Alignment of Sewer

15.1 Define Alignment & Layout of sewer
15.2 State the shapes and material used for sewers
15.3 State suitability factors governing alignment of sewer
15.4 Describe the procedure of setting out alignment
15.5 Explain the steps, gradient fixing, bedding, handling, lowering, laying, jointing testing & back filling of sewer

16. Understand the Various Types of Sewer Appurtenances.

16.1 Describe the location
16.2 Construction and function of man hole, drop man hole, catch basins, inlets, clean out, lamp hole, flushing tanks, regulators, grease and oil traps, inverted syphon, trestle & pier.

LIST OF PRACTICALS — HOURS

1. Layout drawing of training institution's plumbing lab. — 3
2. Demonstration of various tools and pipe appurtenances. — 3
3. Cutting and threading of G.I. Pipes and connections of PPR pipes. — 6
4. Taking out water connection from main pipe. — 6
5. Fitting/replacement of water taps. — 3
6. Installation of water closet, flushing cistern and pipe. — 6
7. Installation of urinal with flushing cistern and waste pipe. — 6
8. Installation of wash hand basin (complete). — 3

9.	Jointing of pipes (cast iron and concrete).	6
10.	Making model of dead system grid, system, ring system and, radial System with G.I. Pipe.	6
11.	Repair of single acting reciprocating pumps and replacement of non-return valve.	6
12.	Demonstration on boring of tube-well/hand pump.	3
13.	Drawing of intakes for water supply.	3
14.	Turbidity and hardness test of water, PH (testing)	3
15.	Drawings of settling tank, slow sand filter rapid sand filter	3
16.	Flow diagram of water treatment.	3
17.	General layout of water supply and sanitary fitting in a house and calculation of all fixtures.	3
18.	Visit of water treatment plant, and water works.	6
19.	Drawing sketches of various sewer appurtenances (lamp hole, manhole ,shallow and deep man hole drop man hole inlets, regulator, grease and oil trap, inverted syphon, trestles and piers	6
20.	Demonstration for excavation of trenches of a small sewer line with proper grade.	3
21.	Visit of Sewage Treatment Plant	3
22.	Preparation of hydraulic statement of water supply scheme	3
23.	Preparation of hydraulic statement of sewerage scheme	3

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-224 **ADVANCED SURVEYING**

TOTAL CONTACT HOURS:	**256**	**T**	**P**	**C**
Theory:	64	**2**	**6**	**4**
Practical:	192			

AIM: On completion, the student will be able to:

1 Understand the fundamental principles of triangulation, traversing and curves.
2 Develop skills in carrying out traverse survey, setting out curves, and layout of structures.
3 Understand the use of Total Station and GPS and its mapping through related computer software.

COURSE CONTENTS

1. Theodolites Traversing 18 Hours

1.1 Introduction, parts and types
1.2 Definition of technical terms associated with theodolites
1.3 Temporary adjustment of theodolites
1.4 Functions of theodolites: measuring angles, prolonging a line, lining in, measuring heights & distances by stadia formula
1.5 Introduction of traverse & its types, methods of traversing
1.6 Objects and standard of accuracy of traversing
1.7 Check of open & closed traverse
1.8 Plotting & graphical adjustment of closing error
1.9 Calculation of angles from given bearings and vice versa
1.10 Computation of co-ordinates
1.11 Computation of missing data associated with theodolites traversing
1.12 Balancing the traverse by different methods

2. Triangulation 4 Hours

2.1 Methods to solve Triangles
2.2 Introduction & types of Triangulation
2.3 Sine rule and its application in triangulation
2.4 Well condition and ill condition in Triangulation
2.5 Selection of station points
2.6 Measurement of base line
2.7 Correction of base line measurement

3. Curves 16 Hours

3.1 Definition, types and necessity of curves
3.2 Designation of curves
3.3 Elements and notation of simple circular curves & their relationship
3.4 Calculation of data & methods of setting out simple circular curves
3.5 Setting out simple curve beyond obstacles
3.6 Description, types and necessity of transition curves
3.7 Characteristics, elements & notation of transition curve and their inter relationship
3.8 Introduction to super elevation and methods of calculation length of transition curve with numerical problems
3.9 Calculation of data and methods of setting out of transition curve
3.10 Calculation of data and Setting out vertical curves
3.11 Introduction to vertical curves, types of vertical curves, elements, ***terms*** and their inter relationship.

4. Setting /Lay out 4 Hours

4.1 ***(Buildings:,***
4.2 ***Bridges,***
4.3 ***Housing Schemes,***
4.4 ***Services***

5. Total Station 16 Hours

5.1 Introduction, types, main parts and accessories of Total Stations.
5.2 Functions and modes of a Total Station.
5.3 Setting of parameters.
5.4 Preparation for observations and operations
5.5 Use for taking distances, angles, bearings and co-ordinates.
5.6 Downloading data from the Total Station: knowledge of downloading software.
5.7 Putting data in the respective software and its mapping.

6. Global Positioning System (GPS) 6 Hours

6.1 Introduction to GPS.
6.2 Functions and modes of GPS.
6.3 Setting parameters.
6.4 Preparation for observations.

RECOMMENDED / REFERENCE BOOKS:

1. Surveying & Leveling : **T.P. Kanatkar**
2. Surveying Leveling : **S.K. Hussain**
3. Rasul Manual (I&II) on surveying
4. Surveying : **David Clark**

5. Manuals for Total Station and GPS
6. Surveying : **S. Ahmed**
7. Advanced Surveying : **P. S. Ghosh**
8. Surveying theory and practice : **Raymond E. Davis**
9. A text book of Advanced Surveying: **R. Agor.**
10. Surveying and leveling : **R. Agor**
11. Surveying: **A. Bannister, S. Raymond and R. Baker**, [2009], Pearson Education
12. Surveying and Levelling: **R.Agor**, [2007], Khanna Publishers
13. Surveying with Construction Applications: **Barry F. Kavanagh**, [2004], Pearson Prentice-Hall
14. Surveying, Principles and Applications: **Barry F. Kavanagh**, [2006], Pearson Prentice-Hall
15. Surveying and Levelling: **N.N. Basak**, [1994], Tata McGraw-Hill, New Delhi
16. Fundamentals of Surveying**: S.K. Roy,** [2007], Prentice-Hall of India,

INSTRUCTIONAL OBJECTIVES

1. Understand the Construction of Theodolites and its Basic Function

1.1 List the types of theodolites
1.2 Label main components of a theodolites on a given sketch
1.3 Define the terms; centering, transiting, face left, Face right, swinging the telescope, axis of level tube, horizontal & vertical axis
1.4 Explain the procedure of temporary adjustment of a theodolites
1.5 Explain the procedure of measuring vertical angle
1.6 Explain the procedure of measuring horizontal angle
1.7 Explain the procedure of setting out an angle
1.8 Explain the procedure of prolonging a line
1.9 Explain the procedure of fixing inter-mediate points between two given points

2. **Understand Techniques of Triangulation**

2.1 Define Geodetic and Trigonometrical survey
2.2 Describes the triangulation and its types
2.3 Explain the factors governing the selection of stations & base line
2.4 Enlist the steps in measurement of base line
2.5 Compute correction of base line measurement

3. **Understand the Principles of Traversing for Preparation of Plan using Theodolites**

3.1 Explain various methods of traversing
3.2 List the steps involved in traversing
3.3 State the standard of accuracy of linear and angular measurements
3.4 Compute bearing from angles & vice versa
3.5 Explain co-ordinates and its types
3.6 Compute the latitudes & departures of lines
3.7 Compute co-ordinates from given field notes

3.8 Explain the methods of plotting traverse
3.9 Explain the errors and mistakes in theodolites traversing and their rectification

4. Understand the Principles of Curves and Type of Curve used

4.1 Define curve and its type with sketch
4.2 Explain the necessity of curves in surveying
4.3 Explain the definition & notation of circular curve
4.4 Compute the inter-relation ship
4.5 Explain the designation of curve
4.6 Calculate the data for setting out simple circular curves by various methods.
4.7 List the steps for setting out of simple circular curves by various methods
4.8 Describe the procedure for ranging a curve beyond obstacles
4.9 Describe the transition curve and its type
4.10 Explain the necessity of transition curves
4.11 Explain super elevation
4.12 Derive formula for super elevation
4.13 Calculate the length of transition curve by various methods
4.14 Calculate data for setting out a combined curve
4.15 State the types of vertical curve
4.16 Explain the necessity of vertical curves
4.17 Explain the elements, notation of vertical curves and their inter-relationship
4.18 Enlist the steps for setting out vertical curves
4.19 Compute the data for setting out vertical curves
4.20 Explain the elements & notations of transition curve
4.21 Enlist the steps for the setting out combined curves

5. Understand the Total Station and its use

5.1 Identify the parts of a total station
5.2 Describe the functions and modes of total station.
5.3 Describe the parameters of total station.
5.4 Explain the methods of observations and operations of a total station.
5.5 Practice taking distances, angles, bearings and co-ordinates.
5.6 Practice for downloading data from the Total Station.
5.7 Putting data in the respective software and mapping thereof.

6. Global Positioning System (GPS).

6.1 Identify the parts of GPS
6.2 Describe the functions and modes of GPS.
6.3 Describe the parameters of GPS.
6.4 Explain the methods of observations and operations of a GPS.

	LIST OF PRACTICALS	**HOURS**
1	Practice to perform temporary adjustment of theodolite on a station. Vernier/Microptic	6

	theodolites and its parts and use	
2	Measurement of horizontal & vertical angles.	3
3	Setting out angles in the field	3
4	*Practice to prolong a survey line and lining in*	6
5	*Practice to measure the horizontal angle by repetition method the horizontal angles by reiteration method*	6
6	*Practice to measure the magnetic bearing of line*	3
7	*Practice to measure the vertical angle*	3
8	*Practice to measure the height of building or tower with theodolite.* ***(trigonometric leveling)***	3
9	*Exercise to Compute the bearing from angles & computation of* ***coordinates***	3
10	*Theodolites traversing Exercise to Balance the traverse compute the area of traverse*	12
11	*Prepare Gale's traverse table taking data of already done field, compute the coordinates and adjust closing error and plotting of traverse.*	6
12	*Setting out horizontal curves in the field by theodolites*	12
13	*Setting out vertical curves in the field*	3
14	*Setting out transition curve in the field*	3
15	*Finding out height of* ***an*** *accessible point, with a theodolite.*	6
16	*Practice to set total station on a point & prepare for measurement atmosphere correction prism correction and selection of units)*	3
17	*Measurement of slope distance, horizontal distance and vertical distance by total station.*	3
18	*Practice to enter the coordinate of occupied point, height of instrument & height of prism.*	3
19	*Practice to measure the coordinate of* ***different*** *points by using coordinate mode*	3
20	*Practice to measure horizontal angle by repetition method with total station*	3
21	*Practice to measure the vertical angle & percentage*	3
22	*Practice to stack out different point at various distances on a line.*	6
23	*Practice to measure the height of an object with total station by using REM program with and without prism height input*	6
24	*Practice to measure the* ***distance*** *between* ***different*** *station points with the help of occupied point (MLM) by using measure data* ***or*** *by using coordinate data*	6
25	*Practice to measure the area of a traverse by direct field observations.*	6
26	*Practice to calculate the area from coordinate data file etc.*	6
27	*Practice to measure the coordinates of survey points by point to line measurement program*	12
28	*Practice to set the Z coordinates of occupied point; entering the instrument height, known point* ***coordinates, data file inputting the R.L. of any known visible point***	
29	Demonstration and practice of advance functions of a total station for mapping.	6
30	Setting out horizontal curves in the field by total station	9
31	Area calculation with the help of total station	9
32	Determination of storage capacity of a reservoir	6
33	Demonstration and practice of functions and modes of GPS.	24

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DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-233 BUILDING CONSTRUCTION

		T	P	C
TOTAL CONTACT HOURS:	**160**			
Theory:	64	**2**	**3**	**3**
Practical:	96			

AIM: To understand the fundamentals of building construction and machinery used for the purpose and also be able to identify the modern methods used in construction

COURSE CONTENTS

1. Components of a building and building specifications 4 Hours

1.1 Introduction
1.2 Construction of a building: Civil Works
1.3 Building specifications
1.4 Various steps in construction of a residential building

2. Site preparation and setting out of works 6 Hours

2.1 Introduction
2.2 Site layout of Civil Project
2.3 Ground water control: permanent exclusion of water
2.4 Initial checks on drawings
2.5 Layout / Setting out of buildings
2.6 Construction procedure of a Multistory building

3. Construction of Foundation 4 Hours

3.1 Simple foundation design
3.2 Setting out for brickwork foundation of Two room
3.3 Foundations of framed buildings
3.4 Foundations for staircases
3.5 Eccentrically-loaded foundations
3.6 Bridge Foundations

4. Block masonry and Marble Work 4 Hours

4.1 Considerations for use of hollow concrete blocks

4.2 Laying of blocks
4.3 Hollow concrete blocks with concrete infilling
4.4 Special features of concrete block masonry
4.5 Compound walls in block work
4.6 Tools for stone and marble work

5. Water Proofing / Termite Proofing of Structures 4 Hours

5.1 Water proofing materials and products.
5.2 Water proofing of struck (horizontal/ vertical)
5.3 Termite proofing
5.4 Materials used in termite proofing

6. Form Work 4 Hours

7.1 Components of formwork wares
7.2 Characteristics of a good form work quality, safety, and economy
7.3 Types of formwork collapsible, progressive, slip formwork and non-removable
7.4 Preparation of formwork for placing concrete-
7.5 Loads on formwork
7.6 Form work for different components of structure

7. Steel fixing in RCC Works 4 Hours

8.1 Fixing of Reinforcement in ordinary RCC work.
8.2 Fixing of steel in precast concrete

8. Stairs, Stair Case and lifts / Elevators and Escalators 4 Hours

9.1 Planning and design of a stair-relation between going and rise, width of stair, length of flight, landing and location of stair etc.
9.2 Types of stairs according to material used & geometrical shapes
9.3 Ramps.

9. Fire Protection of Buildings 4 Hours

10.1 Causes and effects of fire

10.2 Fire resisting materials-characteristics, fire-resisting properties of construction materials

10.3 Arrangements for fire-protection of building-alarm system, protection of openings, stairs and floors, smoke detectors, fire extinguishing arrangement

10.4 Fire-resisting construction-classification of building for fire resistance, fire protection of concrete, wooden and steel structures

10.5 Means of escape in case of fire basic principles of means of escape means of escape required for flat, office building, and public building.

10. Air conditioning and ventilation of building 4 Hours

11.1 Introduction, definition, conditioned air, purity, humidity cooling, heating, ventilation.

11.2 Thermal insulation, transmission of heat, insulating material

11.3 Factors affecting ventilation of building, functional requirements of ventilation, methods of ventilation

11.4 Heating of building, methods of heating, warm air furnace steam heating, hot water heating system, panel heater, and unit heater.

11.5 Cooling of building, methods of cooling, chilling water cooling, ice cooling, spray cooling, mechanical refrigeration (air conditions)

11.6 Air conditioning plants, system of air conditioning, air circulation filters.

11. Acoustics of Buildings 4 Hours

12.1 Technical terms: sound, pitch, loudness, intensity of sound, reflection, transmission and absorption of sound, optimum time of reverberation

12.2 Factors to be considered in an acoustics of buildings.

12.3 Sound absorbing materials-characteristics

12.4 Acoustic design of an auditorium

12.5 Sound insulation-methods of sound insulation.

12.6 Physical measurement of sound

12.7 Reverberation of echoes

12.8 Sound insulation

12.9 Common acoustical defects and remedies of conference halls

12.10 Use of ray diagram and echo

12.11 Design of auditoriums

12.12 Requirements of an auditorium

12.13 Acoustical materials

12.14 Recommendations for different types of buildings for good acoustics

12. Maintenance of *Structures* 8 Hours

13.1 Introduction
13.2 Classification of building maintenance-routine/annual repair, special repairs and maintenance etc.
13.3 Repair to damage surface finishing such as plaster, pointing, white wash, distemper and painting.
13.4 Repair to damage parts of floors such as concrete floor, terrazzo floor, mosaic floor, and timber floors.
13.5 Exposure of reinforcement spalling causes and repairs.
13.6 Protection against leakage through roofs-causes and repairs
13.7 Replacement of glass panes, decayed timber, easing of door and windows.
13.8 Repair to cracks in masonry wall.
13.9 Repair to concrete structures.
13.10 Maintenance of sanitary appliances
13.11 Maintenance of electrical system
13.12 Maintenance of water supply system including taps and fixtures
13.13 Maintenance of septic tank
13.14 Maintenance of drainage system
13.15 Renovation / rehabilitation of old structures and their procedures.

13. Introduction to Seismic Proof Construction. 6 Hours

14.1 Important seismic related Definition & Terms,
14.2 Different seismic zones
14.3 Seismic Design Parameters
14.4 Seismoresistant building architecture
14.5 Ductility considerations in earthquake resistant design of buildings
14.6 Construction in different seismic zones
14.7 Methods and materials of construction

14. Municipal Requirements in planning of buildings 4 hours

15.1 Introduction
15.2 Classification of buildings
15.3 Example of building regulations

RECOMMENDED / REFERENCE BOOKS:

1 Building Construction: **Arora and Gupta.**
2 Building Construction : **M.Rangwala**

3 Construction Technology Chudly Volume I, II, III, IV
4 Building Construction Mackay Volume I, II, III, IV
5 Building Construction : **S.K. Sharma**
6 Building Construction and Foundation Engineering : **Jah**
7 Construction Planning, Equipment and Materials **: R. L. Puri**
8 Dampness in Buildings**: Oliver**.
9 Building Construction : **P.C. Varghese** (Eastern Economy Edition)
10 Geotechnical Earthquake Engineering **S. L. Kramer**, [2008], Pearson Education
11 Earthquake Resistant Design of Structures, **P. Agarwal & M. Shrikhande** [2009], PHI, New Dehli.
12 Design of Steel Structures: **P. Dayaratnam**, [2008], S. Chand & Co New Dehli
13 Building Construction: **P. C. Varghese** [2009], PHI Learning New Dehli
14 Building Construction: **N.L.Arora and B.R.Gupta**, [2001], Prakashar,New Delhi
15 Construction Technology: **Eric Fleming**, [2004], Blackwell Publishing
16 Steel Designer's Manual: **Buick Davison and Graham Owens**, [2005], Blackwells Publishing
17 Fundamentals of Building Construction : **Edward Allen**, [1985], Wiley & Sons
18 Rehabilitation and Reuse of Old Buildings**: D. High field**,[1987], E & F. N Spon
19 Building Materials and Construction: **Theodore Marotta, [**2005], Pearson Apprentice-Hall
20 Structural steel works: **A.B. Clark & S. H. Coverman**,[1987], Chapman & Hall

INSTRUCTIONAL OBJECTIVES

1. Understand components of building & building

1.1 State different components of building
1.2 Explain : - Works of a building
1.3 Discuss different building specifications
1.4 Explain various step involved in construed of a residential building

2. Understand site preparation for civil projects and setting out works.

2.1 Introduce site preparation for project.
2.2 Draw site lay out including site activities space allocation for material storage, plant position, working area, accommodation for staff.
2.3 Explain water supply for construction including ground water control, permanent exclusion of ground water, temporary exclusion (well point system, deep bored well).
2.4 Basic nature of electric supplies for equipments & matures used in construction.
2.5 Stale different checks drawings of project.

2.6 Explain setting out of buildings.
2.7 Describe construction procedure of multistory building.

3. Understand Construction precedence of foundations.

3.1 State simple foundation design.
3.2 Describe setting out for brick work of a load bearing wall.
3.3 State foundations of framed buildings.
3.4 Describe foundation of staircase.
3.5 Explain exceptionally loaded foundations.
3.6 Explain deep foundation the necessity
- Pile foundation
- Coffer Dam
- Cassion foundation

4. Understand Principles of Constructing Formwork for Reinforced Concrete Structural Components.

4.1 State use of hollow concrete blocks.
4.2 Explain laying of blocks
4.3 Explain hollow concrete blocks with concrete infilling.
4.4 Explain compound walls in block work.
4.5 Describe different tools for stone and marble work.
4.6 State the stripping of formwork.

5. Understand water proofing/Termite proofing of structure.

5.1 State water proofing materials and products
5.2 Explain water proofing of basement (Vertical & Horizontal).
5.3 Describe the procedure of termite proofing of foundation.
5.4 Stale the material use in termite proofing.

6. Understand the Principles and Technique of Air Conditioning and Ventilation of a Building.

6.1 State different ground floors with their base& bare layer. .
6.2 Explain types of suspended floors.
6.3 Describe laying of toppings
6.4 State choice of floor finishes.
6.5 Explain use of abrasives in floors.
6.6 Describe the structure of followings
- Concrete and basic floors
- Stone floors
- Ceramic tile floors

- Mosaic floors
- Wood block cork and parquet flooring

7. Understand the Principles of constructing form work for structural components.

7.1 Describe different components of form work sheathing, supporting member braces, form hard wares.
7.2 Explain characteristics of a good form work quality, safety and economy.
7.3 Describe Collapsible, progressive, slip and non removable form work.
7.4 Explain principles of form work for placing of concrete, assembly, cleaning and oiling.
7.5 Explain form work for column, colluder base walls slab beams.

8. Understand steel fixing in RCC works.

8.1 Explain procedure of cutting, bending placing & fixing of reinforcent in ordinary Rcc works.
8.2 State steel fixing in precast concrete member is beams stats etc.

9. Understand the Principles involved in pluming stair, lifts, elevators and escalators.

9.1 Define the terms used.
9.2 Describe different stain stainca and pasts.
9.3 Explain principles to be observed while planning and design of stain.
9.4 State the types of stains according.

10. Understand the Principles for Fire Protection of Buildings

10.1 Discuss the causes and effects of fire
10.2 Explain the fire resisting properties of construction materials.
10.3 Describe the arrangement for fire protection of building i.e. alarm system, fire extinguishing arrangement.
10.4 Explain principles to be observed for fire protections of concrete, wooden and steel structures.
10.5 Discuss the means of escape from a building in case of fire.

11. Understand the Principles and Technique of Air Conditioning and Ventilation of a Building.

11.1 Define terms, conditioned air, purity of air, humidity, cooling heating and ventilation.
11.2 State the importance of thermal insulation of building.
11.3 Explain principles to be observed while planning and design of stain.
11.4 State the standards for ventilation of building.
11.5 Explain the methods of ventilation i.e. natural and mechanical ventilation.
11.6 Explain the methods of heating a building.

11.7 Explain the methods of cooling building
11.8 State the systems of mechanical air conditioning of building.
11.9 State the air distribution and cleaning method
11.10 Explain the working principles of mechanical air conditioning plant/system

12. Understand the principles and Techniques of Acoustic Control of a Building.

12.1 Define terms, sound, pitch, loudness, tone intensity of sound, reflection of sound, reverberation, time of reverberation, transmission of sound and absorption of sound.
12.2 Explain the factors to be considered in acoustics of building.
12.3 Describe the characteristics of various types of sound absorbing materials.
12.4 Explain principles to be observed in the acoustic design of an auditorium.
12.5 Explain the methods of sound insulation of a building.

13. Understand the Maintenance Required for Building

13.1 Explain the annual and special repairs required for building.
13.2 Explain the methods of repair of damaged plastered surface, white wash, distemper and painting.
13.3 Explain the procedure of repair of various damaged floors such as, concrete floor, terrazzo floor, mosaic and timbre floors.
13.4 Explain causes of spelling in R.C.C members and protections against it.
13.5 Explain causes, method of repair for leakage through roofs.
13.6 Explain causes and symptoms of cracks in masonry and their repairs.
13.7 Explain repair of sanitary system electrical, water supply, septic tank and drainage system.
13.8 Explain repair of concrete structures.
13.9 Explain renovation/revalidation of striation

14. Understand the Principles of seismic proof construction

14.1 State Reid's elastic theory, theory of plate tectonics, seismic waves, earthquake size local site effects, internal structure of earth, classification of earth quartos tsunami
14.2 Describe different seismic zones.
14.3 Explain seismic design parameters.
14.4 Explain seism resistant building architecture.
14.5 State ductility consideration in earthquake resistant design of building.
14.6 Explain construction of project in different seismic zones
14.7 Describe methods and materials of construction.

15. Understand Municipal Requirement in planning

15.1 Describe general requirement municipal requirement
15.2 State classification of building
15.3 Explain building regulations of municipal administration

	LIST OF PRACTICALS	HOURS
1	Draw a job layout plan for a building project showing, material, plant and accommodations on site.	3
2	Visit for demonstration of pile boring site and draw lay out plan (showing machinery location and other details)	6
3	Draw sketches of various shapes of well foundation.	3
4	Draw plan and section of coffer dam and caissons.	3
5	Sketch basement of a building and show the water proofing treatments.	3
6	Practice in laying brick floor, conglomerate floor, mosaic floor and tiles floors.	6
7	Draw sketches of various types of stairs lifts and escalators/elevators.	3
8	Demonstration of laying-out of typical stair.	6
9	Demonstration and practice in fabrication and erection of various form work.	6
10	Demonstration and practice in removal of form work, completed during previous week.	6
11	Visit to under construction building project and presentation of visit report.	3
12	Visit to air conditioning plant	3
13	Visit to a building equipped with central air conditioning system.	3
14	Draw sketches of various methods of ventilation.	3
15	Draw the cross section of a typical acoustically treated hall.	3
16	Treatment of a damaged expansion/construction joints, repair & maintenance of old building in campus.	6
17	Demonstration and working of construction plants as given in course contents.	6
18	Visit to a precast concrete factory and preparation of its layout and report.	3
19	Demonstration of manufacturing of tough tiles.	6
20	Renovation & rehabilitation of academic/admin block, hostel & staff colony.	15

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-243 CIVIL ENGINEERING DRAWING & AUTO CAD

		T	P	C
TOTAL CONTACT HOURS:	**224**			
Theory:	32	**1**	**6**	**3**
Practical:	192			

AIM: On completion, the student will understand the techniques of drawing buildings, roads, irrigation structures and methods of inking and Ferro-printing.

Use of Auto CAD software and its applications in civil engineering drawing

COURSE CONTENTS

1 Drawing of Building Components. 4 Hours

1.1 Instruction for detailed drawing of foundations, lintels, arches, stairs, floors, roofs (flat and sloping), doors, windows, C-windows, calculations of spread footing.
1.2 Instructions on drawing plan and x-section of R.C.C. column.
1.3 Instructions on drawing plan and x-section of R.C.C. slab roof with main and secondary beams.
1.4 Introduction on drawing of steel truss and labeling its parts

2 Frame Structure Buildings. 3 Hours

2.1 Definition of frame structure.
2.2 Instruction on drawing of raft foundation with steel reinforcement.
2.3 Instruction for detailed drawing of frame structure showing all components.

3 Drawing of Road Structures. 3 Hours

3.1 Instructions for drawing of x-section of roads.
3.2 Instructions for drawings of R.C.C. road culvert 5 ft span
3.3 Instructions for detailed drawing of high level two span R.C.C. Deck Bridge with 25' span-each.
3.4 Instructions for detailed drawing of 25’ span plate girder steel bridge.

4 Drawing of Irrigation Structures. 3 Hours

4.1 Instructions for drawing typical section of an Irrigation Channel in cutting and filling.

4.2 Instruction for drawings of A.P.M. out-let, masonry flume.
4.3 Instruction for drawing of sluice (gate) of barrage

5 Inking and Printing. 2 Hours

5.1 Introduction to inking and ammonia printing.
5.2 Introduction for ink tracing including materials and apparatus used.

6 Septic Tank and Soakage Pit 2 Hours

6.1 Introduction to septic tank
6.2 Introduction to soakage pit
6.3 Sketch and label septic tank and soakage pit

7 Introduction to Auto CAD 1 Hours

7.1 What is AutoCAD and Auto desk
7.2 Interface of AutoCAD
7.3 Means of commands in CAD

8 Coordinate System 1 Hours

8.1 Cartesian and polar coordinates
8.2 Absolute coordinates
8.3 Relative coordinates
8.4 Direct distance entry system
8.5 U.C.S setting

9 Description of Menu of Auto CAD 2 Hours

9.1 File
9.2 Edit
9.3 View
9.4 Insert
9.5 Format
9.6 Tools
9.7 Draw modify
9.8 Windows help, etc

10 Tool Bars 2 Hours

10.1 Standards
10.2 Properties

10.3 Layers and their practical application

11 CAD Commands and their Aliases 2 Hours

11.1 2D commands for plane figures and their practical applications

12 Drafting Setting 1 Hours

12.1 Units, limits, grid, snap, snaps etc
12.2 Model setting and layout setting. Layers and properties etc

13 Preparation of 2D Drawings 1 Hours

13.1 Composite geometrical figures, isometric views and their orthographic projections.
13.2 Plans, elevation and sections of buildings

14 Dimensioning & Text 1 Hours

14.1 Dimensioning types, styles & application
14.2 Formatting Text styles & application

15 3D Commands 2 Hours

15.1 Solid figures
15.2 Modification of solid figures
15.3 Conversion of 2D into 3D
15.4 Shading and Rendering
15.5 View setup

16 Plotting 1 Hours

16.1 Layout setting
16.2 Print layout setup
16.3 Use of plotters

RECOMMENDED / REFERENCE BOOKS:

1. Building Drawing : **Gur Charn Singh**
2. Engineering Drawing : **French and Vierick**
3. How to plan a House : **Townsend**
4. Be your own Architect: **Z.H. Syed**.
5. Irrigation : **Iqbal**
6. Building construction: **Michel.**

7. Building construction, drafting and design : **Molnar**
8. Engineering Drawing: **N.D. Bhatt and V. M. Panchal**, [2006], Prabhat Publishers, Delhi
9. Harnishing AutoCAD
10. Mastering AutoCAD

INSTRUCTIONAL OBJECTIVES

1. Understand Techniques of Drawing Building Components.

1.1 Define and sketch the spread footing.
1.2 Define and sketch the raft foundations.
1.3 Define and sketch the grillage foundation.
1.4 Define and sketch the well and pile foundation.
1.5 Define and sketch the caisson foundations.
1.6 Label different parts of spread footing i.e. base concrete, sub grade, steps offsets, and plinth.
1.7 Calculate the depth and breadth required for spread footings.
1.8 Sketch out the x-section of lintels and arches.
1.9 State the various parts of lintels and arches.
1.10 Define stair and stair case
1.11 Define the terms and parts used in different types of stairs.
1.12 Explain the stairs according to their layout.
1.13 State the suitability of each type of stair.
1.14 Sketch the plans and sections of different types of stairs according to their layout.
1.15 Define different types of floors.
1.16 Draw the sketches of different parts of floors.
1.17 Explain the standard proportions for the different layers of floors.
1.18 State different types of roofs i.e. first class mud roofing, 2nd Class mud roofing, R.C.C and R.B roof and Pre-cast roof slabs.
1.19 State different types of sloping roof.
1.20 Draw the sketches of steel trusses up to 25' span from the given data.
1.21 Label the sketches of different parts of trusses.
1.22 State need of doors and windows.
1.23 Define clerestory windows and ventilators.
1.24 State the different types of doors and windows.
1.25 Explain the various parts of doors and windows.
1.26 State the different materials used for doors, windows and ventilators
1.27 Sketch the elevations, sectional plans and vertical sections of doors, windows and ventilators.

2. Understand Techniques of Drawing Building Frame Structure

2.1 Define frame structure buildings.

2.2 Sketch and label the raft foundation with steel reinforcement.
2.3 Distribute the space for different views evenly on drawing sheet.
2.4 Define columns.
2.5 Sketch & show steel reinforcement at appropriate place in the column sections of different shapes.
2.6 State the position of over laps and its length.
2.7 Sketch different types of hooks and bends with their standard dimensions.
2.8 Define beam & types of beam
2.9 Sketch the x-section and L-section of a singly reinforced beam & show steel reinforcement (simply supported, cantilever, over hanging, continuums beam)
2.10 Differentiate between the Primary and Secondary beam.
2.11 Sketch and label the details of Reinforcement of T-and L-Beam.
2.12 Sketch and label the details of Reinforcement of two way continuous slab over Tee-Beam.
2.13 State the purpose of stirrups and bent up bars
2.14 Types of mild steel bars (plain, deformed, cold twisted, presented)

3. Understand Techniques of Drawing Road Structures.

3.1 Sketch the X-section & L-section of Road in plain area. (urban and rural)
3.2 Sketch the Long section and X-section of Road in hilly area.
3.3 Sketch the X-section of Bituminous Road in plain and hilly area.
3.4 Sketch the X-section of concrete Road structure.
3.5 State various parts of culverts i.e. abutment, wing wall, toe wall parapet, base plate.
3.6 Sketch the Plan, Foundation Plan, Long Section and X-Section of Culvert.
3.7 Explain the various terms used in Bridge.
3.8 State the difference between culvert and Bridge.
3.9 Explain the various types of bridges.
3.10 Sketch the Plan, Foundation Plan, Long section and X-Section of two Span Bridge.
3.11 Sketch the detailed drawing of 25' span plate girder steel bridge.

4. Understand Techniques of Drawing Irrigation Structures.

4.1 State the different irrigation structures.
4.2 State the definition of irrigation channel.
4.3 Define the terms used in irrigation channel i.e. Bed Width, Side Slopes, F.S.L., H.F.L., Free Board, Gradient Spoil Bank, Service Bank, Dowel, Berm etc.
4.4 Sketch the different Sections of Irrigation channels i.e. fully in cutting, fully in banking, partially in cutting & partially in banking.
4.5 Select appropriate scale for horizontal and vertical section.
4.6 Define the A.P.M. outlets.
4.7 Sketch and label the different parts of A.P.M. outlets.
4.8 Define the Masonry Flume.
4.9 Sketch & label the parts of Masonry Flume.
4.10 Sketch to label parts of sluice (steel gate) of barrage.

5. Understand The Techniques Of Inking And Printing.

5.1 Explain the inking and Ammonia Printing.
5.2 State the material used for inking process.
5.3 State the instruments required for inking and their use.
5.4 Explain the procedure of inking.
5.5 State the material used for Ammonia Printing.
5.6 State precautionary measures adopted during printing.
5.7 Explain the structure of Dark Room and its requirements.
5.8 State different types of printing.
5.9 Explain the defects arising during the preparation of prints.
5.10 Explain the remedial measures taken to prevent defects in prints.
5.11 Prefer the method of printing from economy point of view.

6 Know the Need and Constructional Features of Septic Tank and Soakage Pit:

6.1 Define the septic tank and soakage pit.
6.2 State different parts of septic tank and soakage pit.
6.3 Sketch the plans and sections of septic tank and soakage pit.
6.4 State the constructional features of septic tank and soakage pit.
6.5 State the minimum size of chambers of septic tank.
6.6 State the importance of free board.

7 Understand Auto CAD Interface and Ways of using commands

7.1 What is AutoCAD and Auto desk
7.2 Explain the interface of AutoCAD
7.3 State the means of commands in CAD

8 Understand use of Coordinate System in preparation of drawing

8.1 State Cartesian and polar coordinates
8.2 State Absolute coordinates
8.3 State Relative coordinates
8.4 Use Direct distance entry system for drawing lines
8.5 Set U.C.S for different situations

9 Understand the use of Menu of Auto CAD

9.1 State the various options and their purpose in File, Edit, View, and Insert Menus
9.2 Explain various styles formations and other options of Format and Tools Menus.
9.3 State use of various options of Draw, and modify Menus.
9.4 State use of various options of Windows and help Menus.

10 Understand the use of various Tool Bars

10.1 State use of tools of Standards tool bas
10.2 State use of tools of Properties
10.3 State use of tools of Layers and their practical application

11 Understand CAD Commands and their Aliases

11.1 State use of various 2D commands for plane figures and their practical applications
11.2 State use of various Aliases of different commands.

12 Understand different Drafting Settings.

12.1 State the process of Units, limits, grid, snap, snaps and other options to prepare drawing with precision and easiness.
12.2 State steps involved in Model setting and layout setting.
12.3 State the use and setting of Layers and properties options settings,

13 Prepare 2D Drawings

13.1 State steps to prepare Composite geometrical figures, isometric views and their orthographic projections.
13.2 State steps to prepare Plans, elevation and sections of buildings

14 Understand how to Dimension a drawing & add Text in it.

14.1 State Dimensioning types, styles & application
14.2 Text settings & application

15 3D Commands

15.1 State how to draw Solid figures
15.2 State steps how to Modification of solid figures
15.3 State steps to Convert of 2D into 3D
15.4 State steps to Shading and Rendering of existing drawing.
15.5 State multiple View setup

16 Understand Plotting Procedure for hard copy output.
16.1 State steps to for Layout setting.
16.2 State steps how to setup a Print layout.
16.3 State steps in Use of plotters

LIST OF PRACTICALS	**HOURS**
1. Detailed Drawings of building components as given in theory (at least 8 sheets).	60

2.	Detailed drawings of irrigation structures (at least 6 sheets).	
3.	Ink tracing of a given drawing and taking its prints.(at least 4 sheets)	21
4.	Detailed drawing of septic tank and soakage pit.	21
5.	Practice of Installation of Auto CAD software	6
6.	Practice of applying drafting setting (units, limits, snap, auto on. Off	3
7.	Practice of various 2D commands i.e. Line, trim, offset, extend etc	3
8.	Practice of using layer option	15
9.	Practice of using dimensioning & text option	3
10.	Practice of preparing plan, elevation & section of building	3
11.	Practice of x-section & L-section of road & canal	39
12.	Practice of using basic 3D commands	9
13.	Practice of layout setting and printing of CAD drawing	6
		3

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-253 MECHANICS OF STRUCTURES

TOTAL CONTACT HOURS:	**160**	**T**	**P**	**C**
Theory:	64	**2**	**3**	**3**
Practical:	96			

AIM: On completion, the student will understand and analyze the strength and behavior of engineering materials & elementary structural members.

COURSE CONTENTS

1 Center Of Gravity(C.G) 4 Hours

1.1 Introduction and definition of terms used.
1.2 Methods of determining C.G
1.3 Steps for the calculation of centroid of composite sections.
1.4 Calculation of C.G. of various structural sections, i.e. I-Section, H-Section, T-section, Channel Section, Angle Section and Composite Section.

2 Moment Of Inertia. 4 Hours

2.1 Introduction and definition of terms used.
2.2 Moment of Inertia of rectangle, triangle and circle.
2.3 Theorems of perpendicular and parallel axes.
2.4 Calculation of moment of inertia of common structural sections, I, T, Circular, Angle and Composite sections.
2.5 Calculation of polar moment of inertia for circular sections.

3 Mechanical Properties of Materials 2 Hours

3.1 Brief description of Tension, compression, hardness, Toughness, Brittleness, ductility, Resilience, Flexural.
3.2 Brinell Hardness Test & Rockwell Hardness test.

4 Shear Force and Bending Moment. ***10*** Hours

4.1 Definition of beam, support and load.
4.2 ***Types of supports, beams and loads***.
4.3 Calculation of reactions for different types of ***Statically determinate beams***
4.4 ***Introduction to*** Shear force and bending moment.
4.5 Calculation of S.F. & B.M. for different types of beams carrying Point loads, U.D.L. and combined loadings.
4.6 Drawing of Shear Force Diagram, Bending Moment Diagram.

4.7 Calculation of maximum and minimum shear force and bending moments for the beams and their locations and ***Point of zero shear and point of contraflexure.***
4.8 Standard ***rules*** for S.F. and B.M.

5 Simple Stresses and Strains 6 Hours

5.1 Introduction, definitions of stress
5.2 Description of strain
5.3 Hook's Law
5.4 Different modulii
5.5 Introduction of universal testing machine, tensile and compression test and stress-strain curve.
5.6 Numerical problems.

6 Stresses In Beams 4 Hours

6.1 Types of stresses in beams (bending and shearing stresses).
6.2 Assumptions in simple bending
6.3 Bending equation
6.4 Normal stress distribution in beams of Rectangular section.
6.5 Practical application and simple problems, based on bending equation.
6.6 Shear stress in beams and distribution of shear stress for rectangular, circular and I-sections.
6.7 Problems based on shear stress

7 Deflection of Beams. 4 Hours

7.1 Introduction and significance of deflections
7.2 Name of various methods of deflection calculation.
7.3 Maximum deflection in different types of beams.
7.4 Formula for calculation of maximum deflection in cantilever and simply supported beams for various loading conditions.

8 Column. 6 Hours

8.1 Introduction of different terms used
8.2 Failure patterns of columns
8.3 Buckling load, crushing load, safe load, F.O.S, slenderness ratio, radius of gyration, fatigue, effective length of column
8.4 End conditions of column
8.5 Euler's formula and Rankine's formula
8.6 Numerical problems based on Euler's and Rankine's formulae.

9 Torsion. 2 Hours

9.1 Introduction of different terms used

9.2 Effects of torsion

10 Riveted Joints. 4 Hours

10.1 Introduction to different terms related to riveted joints.
10.2 Different types of riveted joints.
10.3 Failure of riveted joints, strength and efficiency of a joint.
10.4 Design of riveted joints, strength, efficiency and pitch.

11 Welded Joints. 3 Hours

11.1 Introduction and comparison of riveted and welded joints.
11.2 Types of welded joints.
11.3 Design of welded joint, fillet welds only (strength and dimension).

12 Fundamentals of Steel Structures 2 Hours

12.1 Introduction to Steel Structures
12.2 Merits of Steel Construction
12.3 Demerits of Steel Construction
12.4 Types of Structural Steel
12.5 Hot Rolled Structural Shapes
12.6 Cold-formed Shapes
12.7 Built-up Sections
12.8 Cladding

13 Trusses 6 Hours

13.1 Introduction of truss, steel truss, parts.
13.2 Methods of truss analysis.
13.3 Determination of forces in members of statically determinate trusses by method of section and method of joints.

14 Retaining Walls. 6 Hours

14.1 Introduction and description of terms used.
14.2 Pressures on retaining wall and stresses at base (toe and heel) Rankine's formula and application.
14.3 Stress distribution diagram.
14.4 Conditions of stability of retaining wall.
14.5 Checking stability of retaining wall.
14.6 Numerical problems

RECOMMENDED / REFERENCE BOOKS:

1 Strength of Materials: **Singer.**
2 Strength of Materials: **William A. Nash.**
3 Strength of Materials: **R.S. Khurmi**.
4 Mechanics of Solids: **F. Warnik.**
5 Elementary Structural Analysis : **Schneider**
6 Strength of Materials : **G.H. Ryder**
7 Mechanics of Structures : **Junarkar**
8 Strength of Materials for Civil Engineers: **T. H. G. Megson,** [1987], Van Nostrand Reinhold, UK
9 Elementary Structural Analysis: **Charles Head Norris, John Benson Wilber and Senol Utku**, [1987], McGraw-Hill Singapore
10 Mechanics of Structures: Engr. **Zia ul Haq**,[2000], Sajid Publishers
11 Mechanics of Structure: Engr. Azhar Iqbal Shad & Engr. Iftikhar Ahmed,
12 Steel Structures(Revised Second Edition): Zahid Ahmed Siddiqui & Muhammed Ashraf

INSTRUCTIONAL OBJECTIVES

1. Understand the Concept and Computation of Center of Gravity

1.1 Define and explain the terms: Center of gravity, Centroid, first moment of area, reference axes, centroidal axes and symmetrical axes.
1.2 Describe the methods of finding center of gravity.
- By geometrical consideration
- By the method of moments

1.3 Explain the steps for the calculation of centroid of composite sections
1.4 Determine position of C. G. for various structural sections i.e. I-section, H-section, T-section, channel section, angle section, Z-section and composite sections by method of moments.

2. Understand the Concept of Moment of Inertia and its Determination

2.1 Define moment of inertia, second moment of area, polar moment of inertia, radius of gyration and their units.
2.2 State moment of inertia of simple geometrical shapes; rectangle, triangle and circle etc (their formulae).
2.3 State perpendicular and parallel axes theorems.
2.4 Determine moment of inertia of simple and composite sections by applying parallel axes theorem with sketches.
2.5 Determine polar moment of inertia for circular section applying perpendicular axes theorem

3. Understand the Mechanical Properties of Material.

3.1 Define Hardness ***Tension, compression, hardness, Toughness, Brittleness, ductility, Resilience, Flexural.***

3.2 Explain Hardness tests; (a) Brinell`s Hardness test (b) Rockwell Hardness test (c) limitations of Brinell's hardness test (d) comparison of Brinell & Rockwall hardness tests..

4. Determine Shear Force and Bending Moment, Draw S.F.D. & B.M.D.

4.1 Define beam, support and load.

4.2 State difference between statically determinate and indeterminate structures.

4.3 Calculate reactions for simply supported, overhanging and cantilever beams under various loading conditions (Point loads-U.D.L & Combined loading).

4.4 Explain shear force & Bending Moment in beams and their significance.

4.5 Calculate shear forces and Bending Moments at various sections of different types of beam, under different loading conditions (Point loads-U.D.L & Combined loadings).

4.6 Draw shear force and Bending Moment diagrams of beams (simply supported beam, over hanging beam & cantilever beam).

4.7 Calculate maximum and minimum shear force and bending moment and determine their positions.

4.8 Explain Point of zero shear, point of contraflexure and their significance and calculations.

4.9 State standard formulas for shear force and bending moments for:

- Simply supported beam subjected to a central point load and U.D.L on a whole span.
- Cantilever beam subjected to a point load at free end and U.D.L on whole span.

5. Understand Behavior of Materials under Simple Stress.

5.1 Define and explain the terms stress, and its types (tensile, compressive and shear)

5.2 Define and explain strain, its types (tensile, compressive, shear, linear, lateral and volumetric) and poisson's ratio.

5.3 Define and explain Hook's Law.

5.4 State modulus of elasticity, modulus of rigidity and bulk modulus.

5.5 Explain mechanical properties of materials like elasticity, plasticity, ductility, brittleness and hardness, etc.

5.6 Identify parts and attachments of U.T.M for tensile and compression tests. Also explain the salient points in stress strain curve for ductile material.

5.7 Numerical problems relating to simple stress, strain, Poisson's ratio and Hook's Law.

6. Understand the Shear and Bending Stresses in a Beam.

6.1 Explain the types of stresses in beams (Bending & Shear stresses).

6.2 State the assumptions made in theory of simple bending.

6.3 State and explain bending equation.

6.4 Explain Bending stress distribution across rectangular section.

6.5 Solve problems on theory of simple bending.
6.6 State formula for shear stress and shear stress distribution across rectangular, circular & I-sections of beam.
6.7 Solving problems on shear stress.

7. Understand Deflection of Beams under Loading.

7.1 Define deflection of beam and state its significance.
7.2 Name various methods of deflection calculation i.e. moment area method, double integration method, Machauly's method and unit load method, etc.
7.3 State maximum deflection in different types of beams.
7.4 State formulae for calculation of maximum deflection in cantilever & simply supported beam for following loading conditions.

a. For cantilever beam.
- i Point load at free and.
- ii U.D.L on full span.
- iii U.D.L covering a part of span from fixed end
- iv combination of above loads

b. For simply supported beam.
- i Point load at mid span.
- ii U.D.L on whole span.
- iii Combination of above loads.

8. Understand the Behaviors of Columns under Axial Loads.

8.1 Define the terms: column, strut, long column, short column, axial and eccentric loading
8.2 State failure patterns of short and long columns.
8.3 Define the terms: buckling load, crushing load, safe load, F.O.S, slenderness ratio, radius of gyration, fatigue, effective length, etc.
8.4 State four end conditions for the calculation of affective length of column.
8.5 State Euler's formula & Rankine's formula for calculating ultimate load.
8.6 Practice of numerical problems based on Euler's and Rankine's formulae.

9. Understand the Effects of Pure Torsion on Solid and Hollow Circular Shafts.

9.1 Define the terms: torque, torsion, angle of twist, shear stress, shear modulus, polar moment of inertia, etc.
9.2 Describe effects of torsion.

10. Understand the Behavior of Rivetted Joint.

10.1 Define terms: Pitch, back pitch, margin, edge distance, nominal diameter of rivets, gross dia of rivets.
10.2 Explain the different types of riveted joints.
10.3 Explain failure strength and efficiency of riveted joints.
10.4 Calculate the strength, efficiency, pitch etc, of riveted joints.

11 Understand the Behavior of Welded Joints.

11.1 Define welded joint and compare riveted joints and welded joints
11.2 State different types of welded joints
11.3 Calculate strength & dimensions of fillet welded joints only.

12 Understand the theoretical fundamental concepts of Steel Structures

12.1 State the types of steel structures
12.2 Describe the merits of steel construction
12.3 Describe the demerits of steel construction
12.4 State the types of structural steels
12.5 Describe and sketch the hot rolled structural shapes
12.6 Describe and sketch the cold formed shapes
12.7 Describe and sketch the built-up sections
12.8 Define cladding

13 Understand the Effect of Loads on Statically Determinate Truss.

13.1 Define truss, state types and parts of steel trusses.
13.2 State methods of truss analysis.
13.3 Determine forces in members of statically determinate truss by method of joints & method of sections.

14 Understand Stability and Stresses Developed in Retaining Walls.

14.1 State the terms: retaining wall, classification of retaining wall, angle of repose, level & surcharge backing, active and passive earth pressure.
14.2 Explain the pressures on retaining wall and stresses at base (toe and heel) Rankine's formula and its applications.
14.3 Describe the stress distribution diagram at base of the retaining wall.
14.4 Describe conditions of stability of retaining walls.
14.5 Check and compare the results of stability of retaining walls with standards in numerical problems.
14.6 Numerical problems relating to stresses at base of retaining wall.

	LIST OF PRACTICALS	**HOURS**
1.	Solving problems of centroid for composite sections.	6
2.	Solving problems of M.O.I for composite sections.	6
3.	To find the relation between the stress and strain of a given copper wire with the help of a Young's modulus apparatus. Plot a graph between the stress and strain. Hence find the Young's modulus of the material of the wire.	3
4.	To find tensile strength of a mild steel specimen plotting and interpretation of stress strain curve.	6
5.	Draw S.F.D. and B.M.D in case of simply supported beams under various loading conditions.	6
6.	Draw S.F.D. & B.M.D in case of overhanging beams under various loading conditions.	6 6

7.	Draw S.F.D & B.M.D of cantilever beams under various loading conditions.	3
8.	Practice in designing the homogeneous beam by simple bending equation.	6
9.	Drawing of bending and shear stress distribution for symmetrical sections of beams.	6
10.	Show by means of deflection of beam apparatus that the deflection is proportional to the cube of span also draw a graph and also show that the deflection is proportional to the load.	6
11.	Solving problems on deflection of beams	6
12.	Solving problems on Euler's and Rankine's formulae.	6
13.	Design & drawing of butt-joint and lap joint.	6
14.	Design problems on welded joints	6
15.	Practice in finding stresses in various members of a given truss by joint and section methods.	6
16.	Check stability of given retaining wall.	6
17.	Sketch stress distribution diagrams for retaining walls.	6

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-262 QUANTITY SURVEYING

TOTAL CONTACT HOURS:	**128**	**T**	**P**	**C**
Theory:	32	**1**	**3**	**2**
Practical:	96			

AIM: The student will be able to understand the procedures governing estimation of earth work and complete estimate of single storey building in order to:

1. Work out the rate analysis and material statement of various items of work.
2. Understand complete estimates of bituminous and concrete roads, and sewerage scheme.

COURSE CONTENTS

1. Introduction — 3Hours

1.1 Review of area, perimeters and volumes of various plane and solid geometrical figures.
1.2 Estimate and its types.
1.3 Data for estimating.

2. Specifications. — 2 Hours

2.1 Definition ***and*** purpose of specifications
2.2 Principle of writing specs
2.3 General specifications.
2.4 Detailed specifications of all items of work.

3. Building Estimates. — ***6 Hours***

3.1 Terms used in quantity surveying (provisional sum, prime cost, input rates, MRS, CSR, Premium, rebate, contingencies, petty establishment charges, cost, value, bill and BOQs, ***FIDIC***).
3.2 Rough cost estimate of Buildings ***with different methods***.
3.3 P.W.Ds, MES and English method of writing measurement in MB.
3.4 Methods of detailed ***Estimate***.
3.5 Instructions on working out quantities of various types of wall Shapes/sections.
3.6 Rules for deduction in different ***items of*** work.
3.7 Instructions on working out quantities and Abstract of quantities of various items of work of a single storey building (building portion only).
3.8 Study of schedule of rates and preparation of abstract of cost for all item of work of a single storey building (building portion only).
3.9 Annual and special repair estimates for building maintenance.

4. Earth Work — 4 Hours

4.1 Units of measurement/payment, methods of calculation.
4.2 Technical terms used in earth work (lead, lift, dead man, borrow pit).
4.3 Preparation of proforma for earth works.
4.4 Taking out quantities for embankment, roads in plain and hills and irrigation channel (including remodeling).

5. Road Estimates. 3 Hours

5.1 Types of road & their structures along with ***technical*** terms
5.2 Units of measurements/payments.
5.3 Instruction regarding complete estimate of bituminous road, cement concrete road.(for original & repair works)

6. Rate Analysis. 5 Hours

6.1 Definition & prerequisite for analysis of rates
6.2 Labor required for constructional work.
6.3 Instruction on Market rates, (Materials, labour, carriage and equipment) (PWD, MES Rate Schedules)
6.4 Schedule of labour, schedule of equipment, hiring and cost owing, of machinery work their output.
6.5 Rate analysis for:
- Cement concrete of different ratios.
- Brick work in cement mortar.
- Cement conglomerate floor
- Dry brick paving.
- Cement plaster of given ratios.
- Cement pointing (Struck & Flush type)
- White washing/ Distemper to wall and painting to doors/windows.
- Item Works for water supply & sewerage
- Flush Door
- Tile Work
- Electrical Work (ET)
- ***Plumbing Work (PH-I)***
- Carpentry / Woodwork

6.6 Material statement for various items of building work.

7. Sewerage and Water Supply Schemes. 4 Hours

7.1 Items of work for water supply and sewerage (Internal and External)
7.2 Units of measurements & payments.
7.3 Rough cost estimate for water supply and sewerage schemes.
7.4 Detailed estimate for sewer line and its appurtenance (Manholes, septic tank)
7.5 Prepare hydraulic statement for a sewerage scheme comprising of 10 manholes.
7.6 Prepare hydraulic statement for a water supply scheme for 1000 ft. length in five parts

8. Valuation of Property. 5 Hours

8.1 Introduction-definition and purpose of valuation.
8.2 Methods of valuation
8.3 ***Sinking fund, scrap value, salvage value, market value, book value, assessed value; potential value, year purchase, Monopoly value, amenity, gross income, net income, outgoing etc.***
8.4 Depreciation of buildings-methods of calculating depreciation.
8.5 Calculation of standard rent of buildings on capital %age basis method

RECOMMENDED / REFERENCE BOOKS:

1. Rasul Manual No.4 on Estimating.
2. Estimating and Costing: BN **Dutta.**
3. Estimating and Costing: **M.A. Aziz**.
4. Construction Cost Estimating: **Len Holm, John Schaufelberger, Dennis Griffin and Thomas Cole**, [2005], Prentice-Hall, USA
5. Civil Engineering Quantities: **Ivor Seeley and George P. Murray**,[2001], Palgrave Publishers
6. Estimating and Costing by GS Bridge**.**
7. ***Construction Cost Estimates by US Army Corps of Engineer (UFC)***
8. **Standard Methods of Measurement (Released by PEC Body)**

INSTRUCTIONAL OBJECTIVES

1. Know the Importance and Types of Estimates of Works.

1.1 State formulae for area, perimeters and volumes of various plane and solid geometrical figures.
1.2 Describe the importance of estimates.
1.3 State the data required for preparation of estimates.
1.4 State the type of estimate.

2. Understand Specifications of all Items of Works of a Building & Road.

2.1 Define specifications.
2.2 Explain the purpose and types of specification.
2.3 State general specifications of a building & Road.
2.4 Discuss the detailed specifications of important items of works.

3. Understand Principles Involved in Preparation of Building Estimates.

3.1 Terms used in quantity surveying (provisional sum, prime cost, input rates, MRS, CSR, Premium, rebate, contingencies, petty establishment charges, cost, value, bill and BOQs).
3.2 Prepare rough cost estimate of a building from given line plan or covered area.
3.3 Distinguish between P.W.D and English method of recording measurements.
3.4 List the all items of works for a residential building (only building position except public health and electrification installation).
3.5 ***Determine quantities of all items of works for straight; D, F, H, T, U shaped walls and circular walls.***
3.6 Workout quantities of all items of works for a single storey building (building portion only) from given drawings.
3.7 Prepare bill of quantities and abstract of cost with the help of composite schedule of rates.
3.8 Prepare annual and special repair estimate for a given building.

4. Understand the Principles Involved in Calculation of Earth Work for Embankments, Roads, and Irrigation Channels etc.

4.1 State data required for computation of earth works.(Intermediate point-IMP)
4.2 Explain methods to determine quantity of earth work and their respective proforma (mid area, mean area, coordinates Prismoidal & Graphical).
4.3 Work out (determine) quantity of earth work for embankments, roads and irrigation channels.
4.4 Explain remodeling of irrigations channels.
4.5 Work out quantity of earth work for remodeling of a channel from given x-sections of channels.

5. Understand the Preparation of Detailed Estimate of Various Types of Roads.

5.1 Describe parts of road structure and their specifications.
5.2 State the units and method of measurement of all items of works for a road.

5.3 Prepare detailed & repair estimate for bitumen and cement concrete road.

6. Understand Rate Analysis of Major Items of Works.

6.1 Describe the purpose of rate analysis.
6.2 Explain prerequisites for analysis of rate of items of works, i.e. market rates of materials and labour, carriage, out-turn of labour, specifications, overhead costs etc labour required for different constructional works output of machinery.
6.3 Determine quantity of materials required for various items of building works.
6.4 Prepare material statement for various items of building works.
6.5 Prepare analysis of rates for important items of work as given in subject contents.

7. Understand Detailed Estimate for Water Supply and Sewerage Schemes

7.1 List all item of works for a sewer line and their measurement units.
7.2 Explain the preparation methods rough cost estimate of water supply and sewerage schemes.
7.3 Work out quantities of each item of work for sewer line and manhole from given drawing.
7.4 Prepare bill of quantities and abstract of cost.

8. Understand Valuation of Building and Fixation of Rent.

8.1 State the purpose of valuation.
8.2 Explain terms, book value, market value, salvage value, scrap value, sinking fund, year's purchase, annuity, capitalized value and depreciation.
8.3 Determine the depreciation of a building by straight line method, constant percentage method and sinking fund method.
8.4 Determine the value of a building by rental method, valuation based on profit and depreciation method.
8.5 Determine rent for government and private building

	LIST OF PRACTICALS	**HOURS**
		6
1.	Preparation of rough cost estimates of buildings.	6
2.	Writing specifications/Description of various items.	6
3.	Taking out measurements of a straight wall, T, L, H, F, U, shaped walls and circular walls.	12
4.	Complete estimate of a single storey building. (Except PHI & EI)	6
5.	***Preparation of annual repair/special repair estimates. (Building and Roads)***	6
6.	Working out earth work of earthen embankment of given design and data.	6
7.	Working out earth work of road (in plain and hilly areas), and irrigation channel.	9
8.	Complete estimate of arterial roads (bituminous and concrete road).	12
9.	Rate analysis for various items of building work viz cement concrete of ***different ratios***, Brick work in cement mortar in foundation and plinth and superstructure, dry brick paving, cement conglomerate floor, cement plaster of ratios, cement pointing, white washing. Tile work flush door.	6

10.	Preparation of material statements of various items of building works.	9
11.	Preparation of estimate rough cost estimate of water supply and sewerage schemes including analysis of rates for woks.	6
12.	Preparation of estimate of sewer line including manhole etc.	6
13.	Calculation of present market value of an existing building by standard rent method and depreciation method.	

اسلامیات / مطالعہ پاکستان

سال سوئم

حصہ اول اسلامیات

تدریس مقاصد

قرآن حکیم

عمومی مقصد: منتخب سورتوں اور آیات کی روشنی میں اسلام کے بنیادی مقاصد اور عبادات جان سکے

خصوصی مقاصد: طالب علم اس قابل ہو جائے گا کہ

سورۃ الفاتحہ: آیۃ الکرسی۔ سورۃ بقرۃ کی آخری آیات از امن الرسول سے اور سورۃ اخلاق کا ترجمہ و تشریح کر سکے

طالب علم درج ذیل کا مفہوم بیان کر سکے

☆ رب العالمین صرف اللہ تعالیٰ ہے
☆ اللہ رحم کرنے والا ہے
☆ قیامت کے دن بادشاہی اللہ کی ہو گی
☆ عبادت اور استعانت کا حقدار صرف اللہ ہے

طالب علم درج ذیل کا مفہوم بیان کر سکے

☆ اللہ پاک ہر عیب سے پاک ہے
☆ اللہ کے اسمائے حسنہ حق اور قیوم ہیں
☆ تعلیم انبیاء پر ایمان لانا ضروری ہے
☆ رسول، ملائکہ، کتب سماویہ پر ایمان لانا فرض ہے
☆ اطاعت حقیقی صرف اللہ کے لیے ہے
☆ اسلامی احکامات پر عمل کرنا انسانی بسلامت میں ہے
☆ کفر کو اللہ کی مدد کے بغیر شکست نہیں دی جا سکتی
☆ اللہ ایک ہے
☆ اللہ کسی کا محتاج نہیں نہ اس کا کوئی شریک ہے

منتخب احادیث

عمومی مقصد: احادیث کی روشنی میں اسلامی تعلیمات پر عمل پیرا ہو سکے

خصوصی مقصد:

☆ احادیث کا ترجمہ بیان کر سکے

- ☆ احادیث کی تشریح کر سکے
- ☆ معاشرتی اور انفرادی زندگی میں احادیث سے راہنمائی حاصل کر سکے

حقوق و فرائض

عمومی مقصد: اسلامی معاشرے کا ایک اچھا فرد بن سکے

خصوصی مقاصد:

- ☆ والدین کے حقوق و فرائض بیان کر سکے
- ☆ ہمسایوں کے حقوق بیان کر سکے
- ☆ اسلام میں حقوق و فرائض کی آگہی کی صورت میں اپنے اندر خدمت خلق کا جذبہ پیدا کر سکے

اسلامی اقدار

عمومی مقصد: طالب علم جان سکے گا کہ تعلیم کا مقصد حسن اخلاق سے متصف ہونا ہے

خصوصی مقاصد

- ☆ اخلاق کے معنی و مفہوم کو بیان کر سکے
- ☆ اسلام میں حسن اخلاق کی اہمیت بیان کر سکے
- ☆ قرآن و سنت کی روشنی میں صبر و استقلال کی اہمیت بیان کر سکے
- ☆ اسلام میں عفو و درگزر کی اہمیت بیان کر سکے
- ☆ ایفائے عہد کی اہمیت بیان کر سکے
- ☆ اخوت کے معنی و مفہوم کو بیان کر سکے
- ☆ اخوت اسلامی کی اہمیت بیان کر سکے
- ☆ اسلام کی اعلیٰ اقدار کو اپنا کر مثالی معاشرہ پیدا کر سکے

نصاب (سال سوئم)	GEN 311	ٹی	پی	سی
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موضوعات

- ☆ قیام پاکستان
- ☆ باؤنڈری کمیشن
- ☆ ریڈ کلف ایوارڈ
- ☆ تقسیم بنگال و کلکتہ
- ☆ تقسیم پنجاب
- ☆ مسئلہ مہاجرین
- ☆ ریاست کا الحاق
- ☆ ریاست جموں و کشمیر
- ☆ نہری پانی کا تنازعہ
- ☆ قرار داد مقاصد
- ☆ علماء کے بائیس نکات
- ☆ 1962-1956 اور 1973 کے دساتیر کی اسلامی دفعات
- ☆ پاکستان کا محل وقوع اور اس کی جغرافیائی اہمیت
- ☆ قدرتی وسائل (تیل۔ گیس۔ کوئلہ)

مطالعہ پاکستان (حصہ دوئم)
قیام پاکستان

تدریس مقاصد

عمومی مقاصد: قیام پاکستان کے بعد درپیش مسائل سے آگاہی حاصل کرے اور بیان کرے

☆ خصوصی مقصد:
☆ باؤنڈری کمیشن تشکیل اور اس کے فرائض بیان کر سکے
☆ ریڈ کلف اور اس کے ایوارڈ کے بارے میں بیان کر سکے
☆ بنگال اور کلکتہ کی تقسیم کی وجوہات بیان کر سکے
☆ پنجاب کی تقسیم کی تفصیل بیان کر سکے
☆ مہاجرین کی آمد سے جو مسائل پیدا ہوئے انہیں بیان کر سکے
☆ ریاستوں کے الحاق کے بارہ میں تفصیل بیان کر سکے
☆ ریاست جموں کشمیر کے بارے میں بیان کر سکے
☆ نہری پانی کے تنازعہ کو بیان کر سکے
☆ قرار داد مقاصد کی تفصیلات بیان کر سکے
☆ 22 علماء کے متفقہ اسلامی نکات بیان کر سکے
☆ قیام پاکستان کے بعد نفاذ اسلام کی کوششوں کو بیان کر سکے
☆ پاکستان کے محل وقوع اور اس کی جغرافیائی اہمیت بیان کر سکے
☆ پاکستان میں قدرتی وسائل (تیل۔ گیس۔ کوئلہ) کے بارہ میں بیان کر سکے

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات		ٹی	پی	سی
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☆ احساس ذمہ داری
☆ مثبت ذہن
☆ عدل و انصاف
☆ قومی خدمت کا جذبہ
☆ ذکر و نظر کی پاکیزگی
☆ احترام آدمیت
☆ شائستگی
☆ عفو و درگزر
☆ بردباری
☆ خود انحصاری
☆ اثر و نفوذ
☆ جامعیت
☆ اپنی ذات کی معرفت (بذریعہ ہم عمر طلباء۔ اساتذہ۔ اہم شخصیات ادارہ)

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات

سال سوئم

تدریس مقاصد

عمومی مقصد: ملکی ترقی کے لیئے اعلی اوصاف کے ساتھ بہتر طور پر ملک و ملت کی خدمت کر سکے

خصوصی مقاصد: طالب علم اس قابل ہو گا کہ

- ☆ موضوعات کا مطلب بیان کر سکے
- ☆ عملی زندگی سے مثالوں کی نشاندہی کر سکے
- ☆ موضوعات کی اہمیت بیان کر سکے
- ☆ اپنی شخصیت اور معاشرے پر موضوعات کے مطابق اثرات پیدا کرنے کے طریقے بیان کر سکے
- ☆ مثبت ذہن کے ساتھ کام کر سکے
- ☆ عدل و انصاف سے ادارہ میں' دفتر میں بہتر ماحول پیدا کر سکے
- ☆ ماحول کو اخلاقی طور پر پاکیزہ بنائے
- ☆ کارکنوں کی بہتر طور پر دل جوئی کر سکے
- ☆ کارکردگی میں اضافہ کر سکے
- ☆ باہمی احترام کی برکات سے استفادہ کر سکے

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-312 PROJECT MANAGEMENT

		T	P	C
TOTAL CONTACT HOURS:	**64**			
Theory:	**64**	**2**	**0**	**2**
Practical:	0			

AIM: The student will understand the theory and practice in managerial concepts and points required in the execution of a civil engineering project with a view to achieve the desired goal

COURSE CONTENTS

1 Introduction. 6 Hours

1.1 Objectives and functions of Project Management.
1.2 Construction stages.
1.3 Types of civil engineering projects.
1.4 Classification of works-original, major, minor & petty work, annual repair and special repair works.
1.5 Parties/Professionals - scope of duties & responsibilities of construction team
1.6 Project Management Life Cycle

2. Organization Aspects 4 Hours

2.1 Forms of organizations-
2.2 Organizational structure of different engineering departments-duties of various officers/officials, power of sanction of various officers.
2.3 Classes of Establishment in works department.
2.4 Essential qualities of project Manager

3. Preliminary Planning. 4 Hours

3.1 Preliminary aspects of planning.
3.2 Pre feasibility study.
3.3 Types of feasibility study.
3.4 Steps involved in fusibility study.
3.5 Collection of data and preparation of project report.

4. Construction Planning. 12 Hours

4.1 Construction activities.
4.2 Construction schedule, rate of executing work, time calculations.
4.3 Material, labour and equipment schedule.
4.4 Procurement of labour, material and equipment.
4.5 Planning by bar chart/time and progress chart Gantt Chart
4.6 Project planning with net work analysis (CPM)-terms used, advantages of CPM.
4.7 Steps in CPM method-preparation of net work, critical path, determination of network time.
4.8 Review of network and crash programming
4.9 Preparation of work progress charts.
4.10 Site organization of a construction job.

5. Planning and Management of Construction 6 Hours

5.1 Characteristics, operations and safety of construction machinery
5.2 Cost of owning and operating construction machinery
5.3 Main factors in selection of construction machinery
5.4 Productivity of different construction machinery, e.g. Bulldozer, Excavator, etc

6. Inspection and Quality Control 6 Hours

6.1 Duties of inspecting officers-Assistant Engineer, Executive Engineer etc
6.2 Duties of sub-engineer-regarding works, stores and accounts, Handing over and taking over charge. Including duties of Sub Engr. Railways and his responsibilities about record keeping.
6.3 Site order book-principles of supervision.
6.4 Quality control-enforcement of specifications, sampling and testing materials.

7. Entrepreneurship/Self Employability 6 Hour

7.1 How to get registered with PEC as contractor and firm.
7.2 Enlistment with Government Department
7.3 Issuance of bidding documents
7.4 Pricing of bidding documents'
7.5 Signing of contract agreement
7.6 Establishment of guarantees
7.7 Actual performance
7.8 Project completion & documentation
7.9 Defect liability period

8. Methods of Execution of Works. 4 Hours

8.1 Departmental execution of works - daily labour, day work and piece work

8.2 Contract:-

8.2.1 Definitions-contract, tender.

8.2.2 Types of contracts-Lumpsum contract, item rate contract, cost plus fee contract, cost plus percentage contract, labour contract, Negotiated rate contract, turn-key contract and package contract etc.

8.2.3 Merits and limitations of each contract system.

8.3 Work order-difference between work order and contract.

9 Tendering

6 Hours

9.1 Pre-requisite for tendering-administrative approval, technical sanction, Budget provision and allocation of funds

9.2 Invitation of tenders- by negotiation, selective tenders and public notice.

9.3 Prequalification of Bid. Tender notices - Characteristics, instruction on calling tender.

9.4 Tender document-components, condition of contract, special condition of tender, guarantees from tender, tender fee, Tender report.

9.5 Submission of tenders/bids-instruction to bidders.

9.6 Earnest money, security deposit.

9.7 Opening of tenders, tender evaluation, scrutiny of tenders, comparative statement, acceptance of tenders, Bid bond, performance bond, and insurance bond.

9.8 Award and commencement of work, possession of site.

9.9 Mobilization advance, secured advance, retention money.

9.10 Conditions of contract agreement-penalty, Liquidated damages, time of completion, Extension of time, termination of contract, Arbitration Delays.

9.11 Variation order

10 Work Records and Payment. 6 Hours

10.1 Measurement Book (MB), standard measurement book, rules to be followed in recording measurements, preparation of abstract of payment in measurement book, irregularities in M.B.

10.2 Muster-roll, preparation, daily labour report, casual labour.

10.3 Preparations of bills, running bills, final bills, deductions to be made from bills checking of bills, value engineering, cost accounting (interim payment certificate)

10.4 Mode of payment-bills, vouchers, first and final bill, interim payment, final payment, advance payment, secured advance payment, bill forms, Hand receipt, imprest, recoverable payments.

10.5 Terms-competent authority, controlling officer, Disbursing officer, Divisional officer, contingencies of work, deposit work, supervision charges, issue rate, market rate, storage rate and charges, suspense account.

10.6 Major expenditure heads-major head, minor head, sub head and detailed head.

11 Stores. 4 Hours

11.1 Classification of stores - stock, tools and plants, Road metal and materials charged direct to the work.

11.2 Stock-sub-heads of stock receipts and issue of stock, stock account, Register of stock receipts and issues, shortages and surpluses of stock, monthly stock account.

11.3 Material at site account, Road metal account.

11.4 Tools and plants-sub heads of tools and plants, Issues and receipts of T & P, T & P account, verification of tools and plants (Shortage and surplus).

11.5 Principles of storing materials, Location of T & P protection of stores, store room record, bin card, ordering procedure of store.

11.6 Indenting of materials-instruction for preparation of indents, specifications, and supply procedures in works departments.

RECOMMENDED / REFERENCE BOOKS:

1. Construction Management and Accounts: **Vazirani.**
2. Estimating and Costing: **B. N. Dutta.**
3. Professional practice: **Vazirani.**
4. Rasul Manual on P.W. Accounting

INSTRUCTIONAL OBJECTIVES

1. Understand Management, Functioning of Civil Engineering Projects

1.1 Explain the objectives and functions of project management
1.2 Explain the different stages and activities involved in construction projects i.e. planning stage, designing stage, tendering stage and execution stage.
1.3 State the types of civil engineering projects
1.4 State the classification of works
1.5 List the parties/persons involved in a construction project
1.6 Explain the importance and role of each member of construction team
1.7 Explain project management life cycle i.e. project initiating, planning, execution and project closer.

2. Understand Organization and Organizational Structure of Govt Engineering Departments

2.1 Explain that organizations i.e. line staff, direct and functional organization, their features, merits and demerits giving merits and demerits of each
2.2 List the engineering departments of government
2.3 Draw organizational chart of C&W department Irrigation & power department, public Health Engineering department
2.4 List the duties of different officers of works departments
2.5 State the power of sanction of various officers of works departments
2.6 Explain the classes of establishments in works department
2.7 State Essential qualities of project Manager

3. Understand Various Aspects of Preliminary Planning

3.1 Explain the importance of preliminary planning
3.2 Explain Pre feasibility study.
3.3 Explain Types of feasibility study.
3.4 Explain Steps involved in fusibility study.
3.5 Explain difference between feasibility report and project report
3.6 Explain the data to be collected and aspects to be considered in feasibility report
3.7 Explain aspects to be considered during preparation of project report

4. Understand the Principles of Planning and Organizing a Construction Project

4.1 State the objectives of scheduling
4.2 Break down the constructions work in to activities
4.3 Explain the procedure of making constructions schedule i.e. sequencing and time computation of each activity
4.4 State the need for material, equipments and Labour schedule

4.5 Explain methods of procurement of Labour, materials and equipments
4.6 Prepare bar chart and explain its limitation
4.7 Explain the advantages of project planning by network analysis (only with critical path method)
4.8 Plan and draw c.p.m network for a construction project
4.9 Calculate net work time, critical path, free float and total float
4.10 Draw progress charts for a construction project

5. Understand the Methodologies behind Planning and Management of Construction

5.1 Explain characteristics, operations and safety of construction machinery
5.2 Explain cost of owning and operating construction machinery
5.3 List main factors in selection of construction machinery
5.4 Describe productivity of different construction machinery, e.g. Bulldozer, Excavator, etc

6. **Understand the Principles of Inspection and Quality Control**

6.1 Explain the need for inspection of works
6.2 List the duties of various inspecting officers
6.3 Explain the duties of sub-engineer regarding works, store and account
6.4 Explain the use of site order book
6.5 Explain the principles of supervision
6.6 Explain need and methods of quality control
6.7 List the points to be considered in enforcing specifications
6.8 State the necessity for sampling and testing of materials

7. Understand Entrepreneurship/Self Employability

7.1 Explain how to get registration in PEC
7.2 Explain enlistment with Government Department
7.3 Discus Issuance of bidding documents
7.4 Discus Pricing of bidding documents'
7.5 Discus Signing of contract agreement
7.6 Discus Establishment of guarantees
7.7 Explain actual performance
7.8 Project completion & documentation
7.9 Define liability period

8. Understand the Methods of Execution of Works

8.1 State methods of departmental execution of works i.e. daily Labour, piece work and day work
8.2 Define terms contract, tender
8.3 Explain the various contracting systems for construction works i.e. Lumpsum

contract, item rate contract, cost plus fee contract, cost plus percentage contract, labour contract, Negotiated rate contract, turn-key contract and package contract etc.

8.4 List the merits and limitations of each contracting system

8.5 Distinguish between work order and contract

9. Understand the Procedures of Fixing Agencies for Execution of Works

9.1 Define terms budget provision, administrative approval, Technical sanction and Allocation of funds

9.2 State the pre-requisites for tendering

9.3 State the methods of invitation of tender

9.4 Draft a tender notice

9.5 Prepare tender documents

9.6 Explain the need of earnest money and security deposit

9.7 Lists the steps involved in fixing up the agency through tender system

9.8 Discuss the instruction to bidders/contractor for filling tenders/bids

9.9 Prepare comparative statement and selection of contractor from tenders

9.10 Explain the conditions of contract such as penalty, Arbitration, Time of completions and Extension of time

10. **Understand the Procedures of Measurements and Payments**

10.1 State the importance of measurement book

10.2 List the rules to be followed in recording measurement

10.3 Record measurements in M.B and prepare abstract of payment in M.B

10.4 Explain the mode of payment to contractors

10.5 State the types of bills to be used

10.6 Prepare works bills of payment, surveying bills, final bills

10.7 Prepare muster roll. daily labour report etc

10.8 Explain terms, Hand receipt, imprest, recoverable payment, competent authority, controlling officer, Disbursing officer, Divisional officer, cogences of work, deposit work, supervision charges, suspense account, market rates, storage rate and charges, major head, minor head, sub head, Detailed head

11. **Understand Store Management**

11.1 Explain need for store in a project

11.2 State the classification of stores

11.3 State the classification of the items held in general stock

11.4 Explain the principles of storing materials and T&P in store

11.5 Prepare the register of store issuer and receipt

11.6 State the need for materials at site account

11.7 Explain the verification procedures of stores

11.8 Explain the procedure of taking delivery from stores

11.9 Explain procedure involved in indenting of materials

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-323 ADVANCED QUANTITY SURVEYING

		T	P	C
TOTAL CONTACT HOURS:	**224**			
Theory:	**32**	**1**	**6**	**3**
Practical:	192			

AIM: To understand :

1. Estimation of multi-storied buildings, R. C. C. bridges, water tanks including bar scheduling, etc
2. Estimation of building services and wells
3. Application of software in estimation (MS EXCEL, Eagle Point, Prima Vera)

COURSE CONTENTS

1 Estimation of Framed Structure Buildings. 6 Hours

1.1 Enlist different ***items of*** work for RCC Framed Structure Building.
1.2 Instructions on calculation of quantities of different items of work.
1.3 Instructions on preparation of quantity of structural steel work, beams and columns of different shape (I, L, H, etc) and truss of 60' span (60x100 shed)
1.4 Instructions on Preparation of Abstract of Cost & Bar Bending Schedule

2 Estimation of Bridge and Water Tanks 4 Hours

2.1 Enlist different items of work for RCC Over Head Deck Bridge and single span masonry arch culvert.
2.2 Instructions on calculation of quantities of different items of work.
2.3 Instructions on preparation of Abstract of Cost.
2.4 Enlist different works for RCC Over Head and Under Ground Water (Circular ***polygonal***)
2.5 Instructions on calculation of quantities of different items of work.
2.6 Estimation of single span plate girder steel bridge 40' span

3 Building Services Estimation. 4 Hours

3.1 Introduction on calculation of quantities of various items of work for C Class residence
1. Water supply installations
2. Sanitary installation
3. Electrification
4. Telephone and cable

5. Gas installations

4 Well Estimation 4 Hours

4.1 Calculation of quantities of
- tTube well boring
- lLowering of pipes
- tTurbine installation and accessories
- pPump rooms

4.2 Excavation of Persian well
4.3 Construction and sinking of Persian well

5 Application of Softwares 14 Hours

5.1 Instructions regarding use of MS EXCEL software and Eagle Point software in estimation
5.2 Use of Prima Vera software for project planning

RECOMMENDED / REFERENCE BOOKS:

1. Rasul Manual No: 4 on Estimating.
2. Estimating & Costing: **M. A. Aziz.**
3. Estimating and Costing: ***G.S. Bridge*.**
4. Estimating and Costing in Civil Engineering: **B.N. Dutta**, [2005], UBSPD, New Delhi
5. Eagle Point by Naveed Akhtar
6. Prima vera Software Help reference

INSTRUCTIONAL OBJECTIVES

1 Under Stand Procedure for Estimation of Framed Structure Buildings.

1.1 State list of different ***items of*** work for RCC Framed Structure Buildings.
1.2 Know procedure on Calculation of quantities of different items of work. i***ncluding steel*** reinforcement
1.3 Prepare of Abstract of Cost & Bar schedule.
1.4 Workout quantities and cost of steel roof trussed shed of size 60ft x 100 ft.

2. Estimation of Bridge and Water Tanks

2.1 State list of different ***items of*** work for RCC Over Head Deck Bridge and single span masonry arch culvert.
2.2 Know procedure on Calculation of quantities of different items of work.
2.3 Prepare Abstract of Cost.

2.4 State list of different works for RCC Over Head and Under Ground Water reservoir (Circular ***polygonal***)
2.5 Know procedure on Calculation of quantities of different items of work ***plate girder bridge***.
2.6 Prepare of Abstract of Cost
2.7 Workout quantities and cost of plate girder steel bridge 40 ft span

3. Understand Building Services Estimation

3.1 Enlist different items of work for water supply and gas installations for a building
3.2 Instructions on calculations of quantities for water supply and gas installations for the buildings
3.3 Enlist different items of work for sanitary installations for a building
3.4 Instructions on calculations of quantities for sanitary installations for the buildings
3.5 Enlist different items of work for electrification, telephone and cable installations for a building
3.6 Instructions on calculations of quantities for electrification, telephone and cable installations for the buildings

4 Understand Estimation of Wells

4.1 Explain to work out the quantities of various items of under mentioned works:
- tube well boring
- lowering of pipes
- pump/turbine installation and accessories
- Pump room/Station

4.2 Enlist different items of work for the construction of Persian well
4.3 Explain the procedure for working out quantities of various items of work for Persian well

5 **Understand Softwares Used for Estimation and Planning**

5.1 Instructions for application of formulae for estimation of civil engineering structures in tabulated form in MS EXCEL
5.2 Explain purpose of Eagle Point software in quantity surveying
5.3 State interface of Eagle Point
5.4 State use of relevant menus and tool bars for quantity surveying
5.5 Instructions on preparation of a simple earthwork project for road in Eagle Point
5.6 Explain purpose of Prima Vera software in project planning
5.7 State interface of Prima Vera
5.8 State Use of Tools and Commands for project planning.

LIST OF PRACTICALS

	HOURS
1. Complete estimate of a small two storeyed R. C. C. frame structure building (of given drawing) including bar scheduling and abstract of cost.	27
2. Complete estimate of ***steel roof shed 60, x 40'.***	9
3. Complete estimate of brick masonry 8' span segmental arched culvert.	18
4. Complete estimate of R. C. C. Bridge (high level Three Spans Bridge) including bar scheduling and abstract of cost.	18
5. Complete estimate of R. C. C. under ground water tanks and overhead water tank.	24
6. Complete estimate of single span plate girder steel bridge 40' span	18
7. Use of software in estimation	
i. MS EXCEL (Estimates, Rate Analysis and Layout calculations)	36
ii. Eagle Point	18
8. Use of Prima Vera software	24

Note: - The above exercises must span over a period of 192 hours and the number of assignments (Projects) should match with this duration especially in Excel.

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-332 ENVIRONMENT, HEALTH AND SAFETY

TOTAL CONTACT HOURS:	64	T	P	C
Theory:	64	2	0	2
Practical:				

AIM: To understand the need of environmental technology including pollution & their effects. & remedies
Safety practices adopted for civil engineering works.
Health hazards, site dangers and body protection.
Welfare of employees / workers.

COURSE CONTENTS

1. Environmental Pollution 2 Hour

1.1 Introduction to environmental pollution
1.2 Environment interaction between humans and environment
1.3 The role of environmental scientist, technologist and Engineer
1.4 Ecology and eco system

2. Water Pollution 8 Hours

2.1 Definition
- Sources of Water Pollution
- Composition of Sewage
- Properties of Sewage(physical, chemical, biological)
- Tests for Sewage (physical, chemical, biological)
- Biochemistry
- Sewage treatment and disposal
- Water standards for different uses

3. Air Pollution 6 Hours

3.1 Definition, sources and emission of air pollutants
3.2 Methods of detection and measurement of air pollution
3.3 Common air pollutants, their sources and pathological effects on man

4. Solid waste pollution 8 Hours

4.1 Definition,
4.2 Sources of solid waste
4.3 Classification of solid wastes

4.4 Disposal of solid wastes(sanitary, landfill, incineration, compositing, recycling)

5. Noise Pollution 6 Hours

5.1 Definition
5.2 Sources of noise Pollution (Noise from traffic, Aircraft noise, Noise from construction and civil engineering works, Noise from industry
5.3 Measurements of intensity of sound
5.4 Effects of noise on peoples' lives
5.5 Control of noise pollution

6. Land Pollution 3Hours

6.1 Definition
6.2 Main soil pollutants and their influence
6.3 Control of land pollution

7. Industrial waste pollution **9 Hours**

9.1 Paper and card Industry
- Main pollutants, their sources & Effects
- Remedial measures

9.2 Fertilizer industry
- Main pollutants, their sources & Effects
- Remedial measures

9.3 Dairy industry
- Main pollutants, their sources & Effects
- Remedial measures

9.4 Petro Chemical Industry
- Main pollutants, their sources & Effects
- Remedial measures

9.5 Tannery Industry
- Main pollutants, their sources & Effects
- Remedial measures

Accidents **3 Hours**

1.1 Types

1.2 Causes
1.3 Effects
1.4 Remedial measures

Fire Hazards **3 Hours**

1.1 Introduction.
1.2 Causes
1.3 Control

Health Hazards **3 Hours**

1.1 Introduction
1.2 Causes.
1.3 Prevention.

Safety **6 Hours**

1.4 Introduction
1.5 Industrial ventilation, exhaust systems.
1.6 Industrial noise and its control.
1.7 Safety Precautionary Measures for
- Scaffolding, Formwork, and Ladder.
- Drilling & Blasting.
- Demolition.
- Hot bituminous works.
- Fire hazards in building.
- Excavation

Fire Control Systems **3 Hours**

1.8 Type of equipments/ tools
Operations and practices

Natural Hazards (Earth Quakes, Slides, Etc) **3 Hours**

8.1 Causes
8.2 Effects
8.3 Remedial measures

INSTRUCTIONAL OBJECTIVES

1. Understand the meaning of Environment Pollution

1.1 State interaction of humans and environment
1.2 State the role of Environmental scientist, Technologist and Engineer
1.3 State ecology and ecosystem

2. Understand the sources, properties and Sewage treatment

2.1 State Sources, composition of sewage

2.2 Explain Properties of sewage
2.3 Explain Tests of sewage
2.4 Explain sewage treatment and water standards

3. Understand the Concept of air Pollution

3.1 Define air Pollution
3.2 State sources and emission of air pollution
3.3 Explain methods of detection and measurement of air pollutants
3.4 State air pollutants, sources and its effects

4. Understand the concept of solid waste Pollution

4.1 Define solid waste Pollution
4.2 State sources and classification of solid wastes
4.3 Explain disposal of solid wastes

5. Understand the concept of noise pollution

5.1 Define noise pollution
5.2 State sources, of noise pollution
5.3 Explain intensity of sound and its effects
5.4 Explain Control of noise pollution

6. Understand the concept of land pollution

6.1 Define land pollution
6.2 State soil pollutants and its influence
6.3 Explain control of land pollution

7. Understand the concept of industrial waste pollution with reference to indust

7.1 State pollutants
7.2 State Sources of pollutants
7.3 Explain effects of pollutants
7.4 Explain remedial measures

1. Understand Accidents

1.1 Define accidents and explain types of accidents
1.2 Explain causes of accidents
1.3 Explain effects of accidents
1.4 Explain remedial measures

2. Understand Fire Hazards

2.1 Introduction of fire hazards.
2.2 Explain Causes of fire hazards.
2.3 Explain Control of fire hazards.

3. Understand Health Hazards

3.1 Give Introduction
3.2 Explain Causes.
3.3 Explain Prevention.

4. Understand Safety Measures w.r.t. Building and Environment

4.1 Introduction of safety measures
4.2 Explain Industrial ventilation, exhaust systems.
4.3 Explain safety Precautionary Measures for
- Scaffolding, Formwork, and Ladder.
- Drilling & Blasting.
- Demolition.
- Hot bituminous works.
- Fire hazards in building.
- Excavation

5. Understand the fire Control System
5.1 Explain types of Equipments/ Tools
5.2 Explain Operations and Practices

6. understand Natural Hazards (Earth Quakes, Slides, Etc)

6.1 state reasons of earthquake, slides
6.2 Explain remedial measures of earthquake, slides.

Recommended / Reference Books:

1. **Fundamentals of Construction: P.T Armstrong.**
2. **Safety and security in building design : Ralph Sinnot**
3. **Labour Compensation Act 1923.**
4. **Safety Practices and Procedures : NISTE**

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-344 HYDRAULICS AND IRRIGATION

TOTAL CONTACT HOURS:	**192**	**T**	**P**	**C**
Theory:	**96**	**3**	**3**	**4**
Practical:	96			

AIM:

11.9.1 Apply the fundamental principles of hydraulic to Civil Engg projects.
11.9.2 Gain knowledge about the principles involved in irrigation engineering.
11.9.3 Apply principles of irrigation engineering and study irrigation system of Pakistan.

COURSE CONTENTS

1. Introduction 3 Hours

1.1 Introduction to the Hydraulics
1.2 Physical properties of fluids; density, specific weight, specific volume, specific gravity, surface tension, viscosity and capillary action.

2. Fluid Pressure and its Measurement. 3 Hours

2.1 Pressure, intensity of pressure, pressure head and Pascal's law.
2.2 Atmospheric pressure, Gauge pressure, Absolute pressure
2.3 Measurement of fluid pressure through Piezometer tube and simple Manometer.

3. Hydrostatics. 6 Hours

3.1 Introduction
3.2 Pressure on immersed surface.
3.3 Total pressure on a horizontal and vertical immersed surface.
3.4 Center of pressure, resultant pressure and center of pressure of immersed surface.

4. Floating Bodies Equilibrium. 3 Hours

4.1 Buoyancy & floatation, buoyant force, center of buoyancy
4.2 Metacentre, metacentric height
4.3 Kinds of equilibrium of a floating body

5. Hydro kinematic. 3 Hours

5.1 Introduction
5.2 Discharge-equation of continuity of a liquid flow
5.3 Types of flow lines-path lines and stream lines

6. Hydrodynamics. 6 Hours

6.1 Introduction
6.2 Kinds of energy of flowing liquid
6.3 Total head of flowing liquid
6.4 Bernoulli's theorem definition, formula.
6.5 Practical application of Bernoulli's equation.

7. Flow through Pipes. 3 Hours

7.1 Introduction
7.2 Types of flow in a pipe
7.3 Loss of head in pipes & Darcy's formula
7.4 Chezy's formula for loss of head in pipe
7.5 Hydraulic gradient and total energy lines

8. Flow through Orifices. 3 Hours

8.1 Introduction
8.2 Types of orifices
8.3 Jet of water, vena contract
8.4 Co-efficient of discharged
8.5 Discharge through a large rectangular orifice
8.6 Mouth pieces

9. Flow over Notches. 3 Hours

9.1 Introduction
9.2 Types of notches
9.3 Discharge formula for notches
9.4 Numerical problems

10. Flow over Weir. 3 Hours

10.1 Introduction
10.2 Types of weirs
10.3 Velocity of approach discharge formula for weirs
10.4 Velocity of approach
10.5 Numerical problems

11. Flow through Open Channel. 6 Hours

11.1 Introduction
11.2 Chezy's formula for discharge through open channel
11.3 Manning's formula for discharge through open channel
11.4 Bazin's formula for discharge through open channel
11.5 Kennedy's Critical velocity & Lacy's regime velocity
11.6 Most economical section of channel, conditions for maximum discharge through channel
11.7 Discharge through rectangular & trapezoidal channel sections
11.8 Numerical problems

12. Introduction of Irrigation. 3 Hours

12.1 Historical Background of Irrigation
12.2 Definition, necessity and scope of Irrigation
12.3 Benefits of Irrigation and ill effects of Irrigation
12.4 Types of Irrigation
12.5 Sources of irrigation water

13. Irrigation System in Pakistan 6 Hours

13.1 Characteristics of Pakistan rivers
13.2 Irrigation net-work in Pakistan
13.3 Important barrages of country
13.4 Indus Basin project
13.5 Need and details of water replacement works
13.6 Water regulatory bodies

14. Water Requirement Of Crops 3 Hours

14.1 Brief Description
14.2 Factors affecting Water Requirements
14.3 Definitions of Some Common Important Terms
14.4 Factors Affecting Duty and Methods of Improving Duty
14.5 Relation between Duty (D), Base (B) and Delta

15. Methods of Water Distribution to Crop Fields 2 Hours

15.1 Basic Methods of Distribution
15.2 Sprinkler Irrigation Method
15.3 Sub-surface Irrigation (Drip or Trickle Irrigation)

16. Storage Irrigation. 3 Hours

16.1 Necessity.
16.2 Various terms used.
16.3 Assessment of maximum runs off from a catchment area.

17. Reservoirs 6 Hours

17.1 Definition
17.2 Purposes of Reservoir: classification
17.3 Site Selection of Reservoir
17.4 Classification of Dams
17.5 Choice of Kinds of Dam for Hydro project
17.6 Construction details of earthen dams.
17.7 Causes of failure of Earthendams and their remedies.
17.8 Seepage Control in Earth Dam

18. Weirs & Barrages. 3 Hours

18.1 Introduction to weir
18.2 Purpose of weir/barrage
18.3 Types of weirs
18.4 Site selection
18.5 Component parts
18.6 Surface flow at weirs

19. Regulating and Silt Controlling Works. 3 Hours

19.1 Brief Description.
19.2 Head regulator
19.3 Types of head regulators
19.4 Types of silt controlling works

20. Canals 6 Hours

20.1 Irrigation Canals and their types
20.2 Components of canal Section
20.3 Classifications of Canal
20.4 Alignment of Canal
20.5 Necessity of Lining
20.6 Types of Lining
20.7 Selection of Type of Lining
20.8 Merits & Demerits of Lined and unlined channel
20.9 Kemmedy's critical velocity and Lacy's Regime velocity
20.10 Design of canals

21. Canal Falls. 3 Hours

21.1 Introduction, Definition & basic requirements.
21.2 Types of Canal Fall
21.3 Site selection for canal falls

22. Cross Drainage Works. 3 Hours

22.1 Introduction
22.2 Types; aqueduct, siphon, and drainage inlet.
22.3 Super passage, siphon super passage, level crossing.
22.4 Drainage out let, tail escape

23. Maintenance of Canals. 3 Hours

23.1 Up-keep and maintenance.
23.2 Breaches in canals-courses, preventive measures and methods of closing.
23.3 Silting tanks, their classes, objects and working.
23.4 Repair to berms, formation of new berms.

24. Distribution Works. 6 Hours

24.1 Introduction of outlets
24.2 Essential requirements of an outlet.
24.3 Characteristics of outlet.
24.4 Types of outlet-modular, semi modular and non-modular outlet.
24.5 Design of outlet-modular, semi-modular and non-modular

25. Water Logging & Salinity. 2 Hours

25.1 Water logging, definition
25.2 Causes and prevention
25.3 Salinity, definition
25.4 Causes & prevention
25.5 Methods of reclamation of soil

26. River Training Works. 2 Hours

26.1 Spurs and their types.
26.2 Groynes
26.3 Guide Banks

RECOMMENDED / REFERENCE BOOKS:

1 Hydraulic Fluid Mechanics and Hydraulic Machines : **R.S Khurmi**
2 Irrigation Engineering : **Dr. Iqbal Ali**
3 Hydraulics & Fluid Mechanics: **E.H. Lewitt.**

4 Fluid Mechanics : **Daughty**
5 Civil Engineering Hydraulics : **J.R.D. Francis & Minton**
6 The Fundamental Principles Irrigation Water Power : **V.B Priyani**
7 Principles & Practice of Irrigation Engineering: **S.K. Sharma**
8 Irrigation Engineering : **Birdie & Dass**
9 Hydraulic Engineering Schaum Series
10 Irrigation Engineering : **Punmia**
11 Irrigation Engineering : **V.B. Priyani**
12 Irrigation Hand Book : **Syed Inam Ali**
13 Asan Abpashi : **Abdullah Jan**
14 Irrigation and Water Power Engineering: **M. M. Das and M. D Saikia**, [2009], PHI Learning New Dehli
15 Introduction to Hydrology: **W. Viessman, Jr. and G. L. Lewis**, [2009], PHI Learning New Dehli
16 Hydrology and Soil Conservation Engineering: **G. Das**. 2nd Edition [2009], PHI Learning New Dehli
17 Irrigation and Hydraulic Structures: **Iqbal Ali,** [2001], Laser Enterprises Karachi
18 Irrigation and Water Power Engineering:**B.C.Punmia and B.B.Lal**,[1992], Jodhpur Publishers, Delhi

INSTRUCTIONAL OBJECTIVES

1. Know the Scope, Significance and Basic Definitions of Hydraulics.

1.1 State development, scope and significance of Hydraulics in civil engineering.
1.2 Define density, specific weight, specific volume, specific gravity, surface tension, viscosity and compressibility.

2. Understand Fluid Pressure and its Measurement.

2.1 State pressure, intensity of pressure, pressure head, Pascal's law and its simple applications.
2.2 Distinguish among atmospheric pressure, gauge pressure and absolute pressure.
2.3 Describe measurement of fluid pressure by Piezometer tube and simple manometer.

3. Understand the Application and Location of Total Pressure on Immersed Surface.

3.1 Define Hydrostatics
3.2 State pressure on immersed surface.
3.3 Define center of pressure and resultant pressure.
3.4 Calculate the total pressure and center of pressure on a horizontal and vertical

surface immersed in a liquid (i.e. water)

4. Know the Equilibrium of Floating Bodies.

4.1 Define the terms, buoyancy, floatation, buoyant force and center of buoyancy.
4.2 Define metacentre and metacentric height.
4.3 State the kinds of equilibrium of a floating body.

5. Understand the Different Types of Flow of Liquids.

5.1 Define hydro kinematics
5.2 State discharge and equation of continuity of a liquid flow.
5.3 Distinguish path lines and stream lines.
5.4 Distinguish the type of flow in pipes i.e. steady and unsteady flow, uniform and non uniform flow, turbulent flow.

6. Understand the General Principles of Flow of Liquids.

6.1 State the term hydrodynamics.
6.2 State the energies of liquid in motion.
6.3 State the total head of flowing liquid.
6.4 Explain Bernoulli's theorem with its formula, limitations and practical application i.e., venturimeter & pipit tube.

7. Understand the Flow Through Pipes.

7.1 State and explain difference between flow through pipes and open channel flow
7.2 Distinguish types of flow in pipes i.e. steady and unsteady flow, uniform and non-uniform flow, turbulent flow.
7.3 Explain the major and minor losses of head of water flowing through pipes.
7.4 State Chezy's and Darcy's formulae for friction loss in pipe flow.
7.5 Apply Chezy's & Darcy's formulae for calculation of losses in pipes.
7.6 Explain with sketches the hydraulic gradient and total energy line under different conditions.

8. Understand the Function and Flow Through Orifices.

8.1 Define orifice
8.2 State types of orifices
8.3 State the terms; jet of water, vena contracta, co-efficient of discharge and velocity of approach.

8.4 Derive formulae for discharge through orifices
8.5 Differentiate between orifice and mouth piece.

9. Use Discharge Formula for Solving Problems on Notches.

9.1 Define notch
9.2 State types of notches
9.3 State the discharge formulae for notches.
9.4 Solve problems based on discharge formulae.

10. Understand the Flow Over Weirs.

10.1 Define weir
10.2 State types of weirs
10.3 Differentiate sharp crested and broad crested weirs.
10.4 State the discharge formulae for weirs.
10.5 Solve problems based on discharge formulae.

11. Understand the Principles of Flow Through Open Channel.

11.1 State the flow through open channels.
11.2 State Chezy's, Manning & s Bazin's formulae for discharge through open channel.
11.3 State most economical section of channel and condition for maximum discharge through channel.
11.4 State discharge through rectangular & trapezoidal channel section and their formulae.
11.5 Solve problems on discharge through open channels.

12. Understand the History, Necessity and Scope of Irrigation.

12.1 State history of irrigation.
12.2 Define irrigation.
12.3 State necessity and scope of irrigation.
12.4 State merits and demerits of irrigation
12.5 Explain types of irrigation i.e. flow irrigation and lift irrigation
12.6 Explain various sources of irrigation water.

13. Understand the Salient Features of Irrigation System of Pakistan.

13.1 Describe with map the irrigation net work in Pakistan.
13.2 State the characteristics of Pakistan’s rivers.
13.3 State the important barrages of Pakistan.
13.4 State Indus Basin Project

13.5 Explain need and details of replacement works in Indus Basin Project
13.6 Know IRSA and PIDA

14. Understand Water Requirement of Crops.

14.1 Describe the term water requirement of crops.
14.2 Enlist factors affecting water requirement
14.3 Define the terms crop period, base period. Kharif Rabi ratio, core watering, cash crop, crop rotation, delta.
14.4 Explain duty of water, factors affecting and its significance.
14.5 State relation between duty and delta.

15. Understand Water Distribution to Crop Field

15.1 Explain basic methods of water distribution to fields i.e. Surface irrigation method, Furrow method, Contour method, flooding method.
15.2 Explain Sprinkler irrigation method
15.3 Explain Drip or Trickle irrigation method.

16. Understand the Basic Idea of Storage Irrigation.

16.1 State the necessity of storage irrigation.
16.2 Define the various terms used in storage irrigation.
16.3 Explain the methods of assessment of maximum run off from a catchment area

17. Understand Reservoirs

17.1 Define reservoirs
17.2 State the purpose of reservoir and its classification
17.3 Describe the location of site selection for reservoir
17.4 State classification of dams i.e. based on function and use, structural design, materials of construction, shape of X-section
17.5 State factors to be considered during choice of dam for hydro project
17.6 Explain the construction details of earthen dams
17.7 State the causes of failure of earthen dams and their remedies
17.8 Explain methods to control seepage in earthen dams

18. Understand Features and Function of Weir/Barrages.

18.1 Define weir and barrages.
18.2 Distinguish between barrages and weirs and explain their purposes.
18.3 Describe with sketches the components/parts of a barrage.
18.4 State the factors governing the site selection of a barrage.
18.5 State the types of weirs.
18.6 Explain surface flow at weirs.

19. Understand the Regulating and Silt Controlling Works.

19.1 Describe the necessity and importance of regulation and silt controlling works.
19.2 Explain head regulator and its types, i.e. flume, meter flume.
19.3 Describe with sketches the silt ejector, silt vanes, silt excluder and skimming platform.

20. Understand the Basic Ideas About Canals.

20.1 State the types of canal.
20.2 Explain with sketches, components of a canal section
20.3 State classification of canals
20.4 Explain the factors governing alignment of canal.
20.5 Explain lining and its types.
20.6 Enlist factors to be considered for selection of type of lining
20.7 State merits and demerits of lined and unlined channels.
20.8 Describe Kennedy's critical velocity and Lacy's regime velocity for design of canals

21. Understand the Basic Idea of Canal Falls.

21.1 Define canal falls.
21.2 State the basic requirement of canal fall.
21.3 Describe the types of canal falls.
21.4 Explain the factors governing the site selection of canal falls.

22. Understand the Basic Idea Cross Drainage Works.

22.1 Describe with sketches the different types of cross drainage works.
22.2 Describe with sketches, super passage, syphon supper passage and level crossing.
22.3 Describe drainage outlet and tail escape.

23. Understand the Principles of Maintenance of Canals.

23.1 Describe up keep and maintenance of canals.
23.2 Explain breaches in canal, water courses, preventive measure and methods of closing.
23.3 Describe with sketch the silting tanks their classes, objects and working.
23.4 Explain repair to bunds and formation of new bunds.

24. Understand the Basic Idea of Distribution Works.

24.1 Define outlet.
24.2 State essential requirements of an outlet.
24.3 Explain the characteristics of outlets.

24.4 Describe with sketches the types of outlets (modular, semi modular and non modular).
24.5 Design of outlet, modular, semi-modular and non-modular

25. Understand Water Logging & Salinity causes and remedial measures.

25.1 State Water logging,
25.2 State Causes and prevention measures.
25.3 Explain Salinity.
25.4 State Causes & prevention measures.
25.5 Explain Methods of reclamation of soil.

26 Understand the Types of River Training Works.

26.1 List the objects of river training.
26.2 Explain with sketches different types of protective and river training works.

LIST OF PRACTICALS

		HOURS
1.	Find the properties of fluids through hydrostatic bench:	
a.	Study of pressure gauges	3
b.	Determination of discharge through a pipe with Pitot tube.	3
c.	Find Hydrostatics pressure and center of pressure of vertically immersed surface.	3
d.	Numerical problems on floating bodies equilibrium	
2.	Find the Metacentreic height of a floating body in Lab.	3
3.	Numerical problems on Hydro kinematics	3
4.	Numerical problems on Hydrodynamics	3
5.	Determination of coefficient of discharge using Venturimeter	3
6.	Finding the velocity by velocity rod and by current meter.	3
7.	Numerical problems on flow through pipes	3
8.	To find the co-efficient of discharge through a rectangular notch.	3
9.	Determination of hydraulic characteristics of various orifices	3
10.	Numerical problems on uniform flow in open channels	3
11.	Draw a skeleton map of Pakistan showing rivers, main and link canal, Head works and barrages	3
12.	Draw a plan showing general layout of river training and protection works.	3
13.	Draw typical cross-sections of a weir floors	3
14.	Draw a plan showing the general layout of head works of a perennial canal	3
15.	Draw the alignment of a canal, distributor minors and water courses on contour map	3
16.	Numerical problems on duty, delta and discharge	3
17.	Draw the typical X-sections of channels	3
18.	Numerical problems on velocity (Kennedy critical velocity & Lacey's regime velocity)	3

19.	Draw the plan and section of a silt ejector	
20.	Draw the plane and L-section of a masonry flume	3
21.	Drawings of an Aqueduct crossing	3
22.	Drawings of a pipe outlet	3
23.	Drawings of an A.P.M	3
24.	Sketches of various canal falls	3
25.	Practical on discharge measurement	6
26.	Draw the plan of a multipurpose irrigation project	6
27.	Practice for Lining in the campus for irrigation channels	3
		3

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-353 TRANSPORTATION ENGINEERING

		T	P	C
TOTAL CONTACT HOURS:	**160**			
Theory:	64	**2**	**3**	**3**
Practical:	96			

AIM: To understand the fundamentals of various forms of transportation engineering involving highways, airports, runways, railways, alignment and maintenance of tracks, docks and harbors

COURSE CONTENTS

1. **Highway Development and Planning.** 2 Hours

1.1. Introduction importance of transportation and modes of transportation.
1.2. Historical development of roads with special references to Pakistan.
1.3. ***Technical*** terms Road highway, carriage way dual carriageway etc.

2. **Road Alignment** ***2*** Hours

2.1. Introduction
2.2. Fundamental principles.
2.3. Factors controlling selection of road alignment.
2.4. Special consideration for hilly road, grades and camber.

3. Highway Geometric Design 4 Hours

3.1. Kerb, shoulder, footpath, driveway, right of way, bay of road.
3.2. Sight distance
3.3. Necessity of super elevation.
3.4. Derivation of formula for super elevation.
3.5. Method of introducing super elevation.
3.6. Widening at curves and formula.
3.7. Highway cross section.

4. **Road Structures.** 2 Hours

4.1. Types of roads.
4.2. Components of roads.
4.3. Types of surfacing earth, gravel,
4.4. Economic consideration for selection of road surfaces.
4.5. Road materials-stone aggregates, bituminous materials, cement and concrete.

4.6. Retaining walls.

5. **Road Construction.** 4 Hours

5.1. Construction of water bound macadam, road.
5.2. Dust nuisance and its prevention.
5.3. Construction of bituminous roads.
5.4. Construction details of surfacing cold and hot process bituminous macadam, premix asphalt macadam bituminous concrete pavement, sheet asphalt pavement.
5.5. Standard highway construction items of works

6. **Concrete Road.** 2 Hours

6.1. Premix concrete, roads, cement bound macadam.
6.2. Construction of concrete roads.
6.3. Comparison between rigid and flexible pavements.

7. **Road Drainage.** 2 Hours

7.1. Introduction
7.2. Importance of highway drainage.
7.3. Surface drainage/causeway.
7.4. Sub-surface drainage.
7.5. Drainage of slopes and erosion control.
7.6. Catch water drain in hilly area.

8. **Traffic Engineering.** 2 Hours

8.1. Road accidents and their causes.
8.2. Method of prevention of accidents.
8.3. Road junction.
8.4. Design consideration for provision of junctions.
8.5. Traffic island, refuge island, pedestrian crossing

9. **Road Signs & Signals.** 2 Hours

9.1. Types of road signs
9.2. Characteristics of signs.
9.3. Road signals, types and purposes.

10. **Road Maintenance.** 2 Hours

10.1. Resurfacing.
10.2. Causes of defects of concrete roads and repair of concrete roads

11. ***Highway*** **Construction Equipment** 4 Hours

11.1. Rollers, bulldozers and grader
11.2. Types of rollers and bulldozer
11.3. Tar boiler, premix plant, Asphalt paver, tractor, trolleys, batching plant, excavator, dragline, trencher, shovel, etc.

12. **Air Ports and Runways** 4 Hours

12.1. Important ***technical*** terms
12.2. Consideration of airport selection.
12.3. Classification of air ports.
12.4. Factors affecting site selection of an airport.
12.5. Runway pavement and its types
12.6. Patterns of runway
12.7. Drainage systems of an airport
12.8. Repair of runway.

13. **Role of Railways in Development of a Country.** 2 Hours

13.1. Introduction
13.2. Railway system in Pakistan
13.3. Comparison between Rail & Road transport

14. **Permanent Way.** 6 Hours

14.1. Definition
14.2. Requirements of permanent way
14.3. Components of permanent way, their functions and types
14.4. Gauge, its types
14.5. Factors governing adoption of a particular gauge
14.6. Rails-types Rail joints (including fastening-fish plates, bolts, spikes, chair and bearing plates)
14.7. Railway carriage wheel, conning of wheels
14.8. Requirement of good rail joint and ballast.

15. **Creep.** 2 Hours

15.1. Definition
15.2. Cause of creep
15.3. Magnitude of creep
15.4. Results of creep
15.5. Methods of correction of creep

16. **Points & Crossing.** 4 Hours

16.1. Purpose
16.2. Sleepers for point & crossing (through & inter laced sleepers)
16.3. Switches-shapes, length of stock & tongue rails, heal clearance, switch angle, through switches
16.4. Types of crossing
16.5. Theoretical & actual nose of crossing
16.6. Crossing angle & number
16.7. Station yards and their layout.

17. **Signals.** 3 Hours

17.1. Purpose & types
17.2. Classification of signals according to function & location
17.3. Signaling-objects
17.4. Inter locking, principles & requirements
17.5. Methods of inter-locking

18. **Tunnels.** 3 Hours

18.1. Necessity of tunnels
18.2. Importance of tunnel engineering
18.3. Alignment of tunnels and their construction

19. **Docks Harbors.** 6 Hours

19.1. Definition of harbors
19.2. Classification of harbors
19.3. Requirement of a commercial harbor its location & size
19.4. Tidal waves break water & their classification
19.5. Wharves, quay walls & jetties, piers
19.6. Classification of docks.
19.7. Beach erosion & protection
19.8. Locks & lock gates

20. **Dredging.** 4 Hours

20.1. Definition
20.2. Necessity of dredging
20.3. Types of dredging devices
20.4. Methods of dredging
20.5. Disposal of dredged material

21. **Navigational Aids.** 2 Hours

21.1. Define: Navigation aids
21.2. Types of signals-light house, beacons, light ship & buoy

RECOMMENDED / REFERENCE BOOKS:

1. Road, Railways, Bridges and tunnel: **Deshpande and Antia.**
2. Railway Engineering: **Deshpande.**
3. Principles of Railway Engineering: **S.C. Rangwala**.
4. Docks and Harbors : **A.T. Khan**
5. Railways, Dock and Harbors (Urdu) : **A.B. Mallick**
6. Railway Bridges and Tunnels: **Vazarni.**
7. Operational Safety of Rail Transport in Pakistan: **Abdul Kadoos**.
8. Railway Tracks: **Antia.**
9. Railway Track Engineering : **Agor**
10. Highway Engineering: **Gurcharan Singh**, [2001], Standard Publishers, Delhi
11. Highways: **C.A. O'Flaherty**,[2001], Butterworth Heinmann, Oxford
12. Highway Engineering: **Paul H. Wright and Karen Dixon**,[2004], John Wiley & Sons
13. Port Engineering: **Gregory P. Tsinker,[**2004], John Wiley and Sons
14. Road Engineering: **Piryani.**
15. Highway Engineering: **Gurcharn Singh.**
16. Development of Road and Road Transport in Pakistan : **Khalifa Afzal Hussain**
17. Highway Engineering and Airports: **K.L.Bhanot and S.B.Sehgal.**

INSTRUCTIONAL OBJECTIVES

1. Understand Highway Development Planning.

1.1 Explain the necessity, importance and modes of transportation.
1.2 State early roads and historical development of roads with special reference to Pakistan.
1.3 Describe the terms road, highway, carriage way, dual carriage way etc.

2. Understand Highway Surveys Required for Roads.

2.1 Define the term road alignment.
2.2 State the fundamental principles of road alignment.
2.3 State the factors influencing selection of alignment for a road in plain and hilly area.
2.4 Explain the surveys required for fixing alignment.

3. Understand Road Geometrics (Super Elevation).

3.1 Define the terms Kerb, Shoulder, Footpath, Drive way, Right of way, Bay of roads.
3.2 Explain sight distance, stopping and over taking sight distance.
3.3 Define super elevation and state its necessity
3.4 Describe method of introduction super elevation.
3.5 Explain methods of introducing super elevation.
3.6 Derive formula for super-elevation.
3.7 Explain widening at curves.

4. Understand the Component Part of Road Structure.

4.1 Describe the types of roads with sketches.
4.2 Explain the component of road i.e. sub-grade, sub-base, base and wearing course.
4.3 State the types of surfacing earth surface, general surface, water bound, bituminous and concrete roads.
4.4 State the economic consideration for selection of road surfaces.
4.5 Describe the road materials, stone aggregate, bituminous materials, cement and cement concrete.
4.6 Describe the necessity and function of retaining walls, with sketches.

5. Understand the Construction Process of Flexible Pavements.

5.1 Explain the construction procedure of water bound macadam road.
5.2 Explain the dust nuisance and its prevention.
5.3 Explain the construction procedure of concrete roads.
5.4 Explain the construction detail of surfacing cold and hot process bituminous macadam, premix asphalt macadam, bituminous concrete pavements and sheet asphalt pavement.

6. Understand the Construction of Concrete Roads

6.1 Explain the construction procedure of water bound macadam road
6.2 Explain the construction of concrete roads.
6.3 Compare rigid and flexible pavements.

7. Understand the Drainage of Roads

7.1 Introduction of highway drainage
7.2 State the necessity and importance of highway drainage.
7.3 Describe with sketch surface drainage.
7.4 Describe with sketch sub-surface drainage.
7.5 State drainage of slopes and erosion control.
7.6 State catch water drain in hilly area.

8. Understand the Causes and Prevention of Accidents, Road Junctions, Traffic Islands and Pedestrian Crossings.

8.1 State accidents and their causes.
8.2 State method of prevention of accidents.
8.3 Describe with sketches road junction.
8.4 State design consideration for provision of junctions.
8.5 Describe with sketches traffic island refuge Island and pedestrian crossing.

9. Understand the Purpose of Road Signs and Signals.

9.1 Describe with sketches different types of road sign.
9.2 Explain the characteristics of road sign.
9.3 Describe the purpose of road signals and their types.

10. Understand the Maintenance of Roads

10.1 Explain resurfacing.
10.2 Describe the causes and repair of concrete roadside pot holes, corrugations and ruts.
10.3 Describe the causes of defects of concrete road and its repair.

11. Understand the Function of Different Types of Machinery used in Road Construction.

11.1 Explain the working and uses of rollers, bulldozer, and grader.
11.2 Explain types of rollers and bulldozers
11.3 Explain the working and uses of tar-boiler, premix plant, asphalt paver, tractor, trolleys, batching plant, excavator, dragline, trencher, shovel, etc.

12. Understand the Layout and Components of an Airport and Runway.

12.1 Explain the terms, landing strip, approach zone, run way length, taxiway, apron, etc.
12.2 Consideration of selection of airport
12.3 State the classification of an airport.
12.4 Sketch the general layout of various types of airport.
12.5 Explain the factors affecting for site selection of an air port.
12.6 Describe the run way pavements and its types.
12.7 Sketch different patterns of run way.
12.8 Explain the drainage systems of an air port.
12.9 Describe the routine and special repairs of run way.

13. Understand the Importance of Railway.

13.1 State the advantages of railway.
13.2 State salient features of railway system in Pakistan.
13.3 Compare rail and road transport.

14. Understand the Functions of the Permanent Way.

14.1 Define permanent way.
14.2 State the requirements of permanent way.
14.3 Explain the components of permanent way, their functions and types (formation, ballast and sleepers).
14.4 Explain gauge and its types
14.5 Explain factors governing adoption of a particular gauge
14.6 Explain the different types of rails, rail joints, rail fittings
14.7 Explain carriage wheel and conning of wheels.
14.8 State the requirement of good rail joint and ballast.

15. Understand Creep and its Correction.

15.1 Definition of creep.
15.2 Explain the causes of creep.
15.3 Explain with sketch magnitude of creep.
15.4 State the results of creep.
15.5 State the methods of correction of creep.

16. Understand the Arrangements of Points and Crossing for Safe Running of Trains.

16.1 State the purpose of points and crossing.
16.2 Describe with sketches the sleepers for point and crossing (through and interlaced sleepers).
16.3 Explain the terms switches, shapes, length of stock and tongue rails, heal clearance, switch angle, through switches.
16.4 State the types of crossing.
16.5 Explain theoretical and actual nose of crossing.
16.6 Explain the terms crossing angle and number.
16.7 Explain station yards and sketch their layout.

17. Understand the Arrangements of Signals for Safe Running of Trains.

17.1 State the purpose and types of signals.
17.2 State the classification of signals according to function and location.
17.3 Explain signaling and its objects.
17.4 Describe with sketches the inter locking its principles and requirements.
17.5 Explain the methods of inter locking.

18. Understand Alignment and Construction of Tunnels.

18.1 State necessity of tunnels
18.2 State importance of tunnel engineering
18.3 Demonstrate alignment of tunnels and their construction

19. Understand the Idea behind Docks and Harbors.

19.1 Define harbors.
19.2 State the classification of harbors.
19.3 Explain the requirement of a commercial harbor, its location and size.
19.4 Explain the terms tidal waves, break water and their classification.
19.5 Explain terms: Wharves, quay walls, jetties, piers, and moorings.
19.6 State the classification of docks.
19.7 Explain beach erosion and its protection
19.8 State the terms locks and lock gates.

20. Understand the Purpose of Dredging.

20.1 Define dredging
20.2 State the necessity of dredging.
20.3 Explain the types of dredging devices.
20.4 Explain methods of dredging.
20.5 Explain disposal of dredging material.

21. Understand Fundamentals of Navigation Aids.

21.1 Describe navigation aids.
21.2 Explain types of signals, light house, beacons, light ship and buoys.

	LIST OF PRACTICALS	**HOURS**
1	Ductility test for bitumen	2
2	Softening point test for bitumen (ring and ball apparatus)	2
3	Marshal stability test for bituminous mixture	2
4	Viscosity determination for cutback or emulsion	2
5	Flash and fire test for bitumen / cutback	2
6	Quantitative extraction of bitumen from bituminous paving	2
7	Penetration (consistency) of bituminous material	2
8	Los Angles Abrasion test	2
9	Visit to a nearby railway station and tracks, observation of parts drawing plan & cross section of permanent way	5
10	Drawing of the connection of rails to sleepers	2
11	Drawing of broad gauge track in cutting & filling	3
12	Drawing of various types of rails and chairs.	2

13	Sketching various fastening	2
14	Sketching railway carriage wheel.	2
15	Sketching points and crossing and stating yards.	3
16	Sketching various types of signals. (common, semaphore, light disc and dwarf signals)	3
17	Sketching of various tools used in rail track maintenance.	2
18	Visit to a nearby harbor (if convenient) or sketching general layout of harbor.	5
19	Drawing sections of breakwater.	3
20	Drawing layout of typical harbor and outline the important structures.	3
21	Sketching jetties and pier, lock gates, quay, draggers	3
22	Sketching a typical light house, floating signal (beacon, buoys, mooring buoys.)	4
19	Drawing skeleton plan/map of Pakistan showing major roads.	2
20	Demarcation of road alignment on a given contour map.	4
21	Drawing typical cross-section of National and Provincial Highway.	3
22	Measurement of Stone metal at site and marking main quarries on Pakistan map.	2
23	Drawing typical cross-section of hill roads.	3
24	Sketching various road junctions, traffic and refuge islands.	3
25	Sketching various types of traffic signs.	2
26	Sketching of subsurface drainage.	3
27	Visit to a road project under construction.	5
28	Preparation of general layout plan of an air port showing typical cross-section of run way.	5
29	Sketches of various air port patterns.	2

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-364 CONCRETE TECHNOLOGY & RCC DESIGN

TOTAL CONTACT HOURS:	**192**	**T**	**P**	**C**
Theory:	**64**	**2**	**3**	**3**
Practical:	96			

AIM: To establish an understanding of the behavior of structural concrete and develop and understanding of the methods used in design practice

COURSE CONTENTS

1 Ingredients of Concrete 4 Hours

1.1 ***Binding materials and its properties***
1.2 ***Tests of cement***
1.3 ***Fine aggregate & coarse aggregate and their tests***
1.4 ***Water Additives and Admixtures***

2 Properties of Concrete 4 Hours

2.1 Properties of fresh concrete
2.2 Factors affecting workability of concrete
2.3 ***Tests of concrete***
2.4 Measurement of workability
2.5 Recommended slump values
2.6 Properties of hardened concrete
2.7 Factors affective properties of hardened concrete
2.8 ***Non destructive tests of concrete***
2.9 ***Mix Design methods***

3 Concreting Under Special Conditions. 4 Hours

3.1 Effects of temperature on concrete.
3.2 Recommended precautions and practice for hot weather concreting.
3.3 Recommended precautions and practice for cold weather concreting.
3.4 Under water concreting-method, precautions.

4 Pre-stressed Concrete. 2 Hours

4.1 Introduction ***to*** pre-stressing and methods of tensioning
4.2 System of pre-stressing
4.3 Steel and concrete used in pre-stressing

4.4 Advantages of pre-stressed concrete over R.C.C.

5 Reinforcement for R.C.C. *Structures* 2 Hours

5.1 Types and their properties.
5.2 Storing, cleaning, bending, fixing, placing ***and*** binding ***of*** reinforcement.

6 R.C.C Design. 6 Hours

6.1 Introduction to R.C.C. Design.
6.2 Different types of Loads
6.3 Advantages and disadvantages of R.C.C.
6.4 Grades of concrete, characteristics, compressive strength, tensile strength, modulus of elasticities, modular ratio.
6.5 Working and ultimate stresses of concrete and steel
6.6 Bending moment and shear force in beams bending, moment and shear force ***co-efficients.***
6.7 Loads to be adopted in R.C.C design-live loads, dead loads, wind load, seismic loads.
6.8 Methods of design: service load method (working stress method), strength method (limit-state design).
6.9 Codes of practice for R.C.C design: BS Code and ACI Code.

7 Shear and Bond Design in Beam. 6 Hours

7.1 Shear stresses in beam-horizontal shear, diagonal tension and compression
7.2 Types of shear reinforcements-stirrups, inclined bars
7.3 Design for horizontal shear diagonal tension, bent up bars, spacing of stirrups
7.4 Design problems
7.5 Bond between concrete and reinforcement bond stresses, development length, checking bond stresses in beam

8 Design of Rectangular Beam. 4 Hours

8.1 Method of design (Strength design Method), assumptions used in Strength design Method.
8.2 Derivation of flexure formula for R.C.C beam
8.3 Design Factors
8.4 Balanced, under reinforced and over reinforced sections
8.5 Design of simple R.C.C beam code provisions, steps in design of R.C.C simple beam-design of simply supported, cantilever, over hanging beam under different situations.
8.6 Design of R.C.C lintel
8.7 Problems solving related to beam of lintel.

9 Design of one Way Slab/Slab Spanning in One Direction) 6 Hours

9.1 Definition, one way slab, two way slab
9.2 Design steps and formulae
9.3 Design of simply supported, overhanging one way slab in various situation

10 Design of Doubly Reinforced Beam. 6 hours

10.1 Definition, necessity and use, limitation
10.2 Elements and assumption related to design, design steps.
10.3 Design of simply supported doubly reinforced beam.

11 Design of Two Way Slab. 4 Hours

11.1 Definition, code provisions and assumption related to design.
11.2 Loads, bending moment coefficients and its use, torsion steel
11.3 Design of isolated and two spans two way slab.

12 Design of Tee and Ell Beam. 6 Hours

12.1 Definition, necessity, advantages, main and secondary beam
12.2 Design of ***simply supported*** reinforced Tee and Ell beam.

13 Design of Axially Loaded Columns and Footings. 6 Hours

13.1 Columns
13.2 Design formulae and code provisions
13.3 Design depth of footing and reinforcement details
13.4 Design of isolated column footing

14 Design of Simple Stair Case. 4 Hours

14.1 Types, spanning horizontally and spanning longitudinally.
14.2 Loads, design elements procedure
14.3 Design of stair spanning horizontal and longitudinally.

RECOMMENDED / REFERENCE BOOKS:

1 R. C. C. design : ***Winter and Nilson***
2 Concrete Technology : **Hando**
3 Properties of Concrete : **Nevile**
4 *Concrete and Structures by Prof.* ***Dr. Z.A. Siddiqui***
5 R.C.C Design : **C.K Wang**
6 Concrete Technology: **A,M. Neville and J.J. Brooks**, [2006], Dorling Kindersley India, Delhi
7 Design of Reinforced Concrete Structures**: N.Krishna Raju,**, [2003], Satish Kumar Jain

8 Design of Concrete Structures: **Arthur H. Nilson, David Darwin and Charles W. Nolan**,[2006], John Wiley and Sons
9 Design of Reinforced Concrete Structures PWS Engineering: Hasson M. N.

INSTRUCTIONAL OBJECTIVES

1. Understand the properties of Cement and Concrete

1.1 Explain the various tests of cement (i.e. initial and final setting time tests, soundness test, compression strength test and tensile strength test and tensile strength test, etc.
1.2 Explain compression strength test, tensile strength test, shear strength test and bond strength test of concrete.
1.3 Explain different non-destructing tests of concrete (smith hammer, PUNDIT test, etc.
1.4 Explain different methods of mix design i.e. (ordinary, minimum void w/c maximum density rate to method fineness methods)

2. Understand the factor influencing concrete properties

2.1 State properties of fresh concrete: segregation, blending, workability, etc.
2.2 State different factors affecting the workability of concrete
2.3 Describe the different tests for the measurement of workability, i.e. slump test, compacting factor test, vee-bee test, etc.
2.4 State the different recommended values of slumps for various conditions of placements
2.5 State the different properties of hardened concrete. I.e. strength impermeability, durability, elasticity, shrinkage, creep, thermal expansion, etc.
2.6 Describe the various factors affecting the properties of hardened concrete.

3 Understand Standard Practices for Concreting Under Special Conditions

3.1 Explain the effects of temperature on concrete
3.2 Explain standard practices and precautions for hot and cold weather concreting
3.3 Explain methods of concreting under water

4 Know About Principles of Pre-stressed Concrete

4.1 Understand principles of pre-stressing and methods of tensioning, i.e. past and pre tensioning.
4.2 State the systems of pre-stressing such as Freyssinet, Magnel Blaton, and Lee Mecall systems
4.3 State the requirements of concrete and steel for pre-stressing
4.4 Explain the advantages of pre-stressed concrete over conventional R.C.C

5 Understand Methods and Procedures of Laying Reinforcement

5.1 State the types of steel and their properties used in R.C.C
5.2 State standards for storing, straightening, cutting, bending, placing and binding reinforcement

6 Understand Basic Concepts to Design an R.C.C Member

6.1 Define R.C.C
6.2 State advantages and disadvantages of R.C.C
6.3 State grades of concrete, steel and their respective permissible stresses
6.4 Use standard tables of bending moment and shear force coefficients for finding bending moment in continuous beam
6.5 State the loads to be considered for design
6.6 State the methods of design of R.C.C structures i.e. E.T.M and L.E.M method
6.7 State the codes of practice for R.C.C design such as B.S code and A.C.I code ***(Adopt A.C.I. code of practice for design).***

7 Understand Shear and Bond Stresses in Beams

7.1 State shear stress in homogenous beam
7.2 Explain shear stress in R.C.C beam
7.3 Explain horizontal shear, diagonal tension and compression developed in a beam
7.4 Explain formulae and steps to be followed in the determination of number of stripes and mild bars as shear reinforcement
7.5 Explain bond between concrete and reinforcement

8 Understand the Flexural Formula and Design of Simple R.C.C Beam

8.1 State the assumption used in ***Strength Design method(Limit State Method).***
8.2 Derive flexure formula for R.C.C beam
8.3 Calculate design factors
8.4 Explain balanced, under reinforced and over reinforced sections
8.5 Define simple R.C.C beam
8.6 State the steps and formulae to be followed in design of lintels
8.7 Practice of relevant numericals

9 Understand the Principles Involved in the Design of Slab

9.1 Distinguish between on way and two way slab and state the loads taken into account for design of slab
9.2 State the steps and formulae for designs of one way slab
9.3 Design simply supported, and overhanging one way slab in various situations

10 Understand Principles Involved in the Design of Doubly Reinforced Beam

10.1 Define doubly reinforced beam and explain necessity of compression reinforcements in beam
10.2 Explain various methods of design of doubly reinforced beam, ***ACI code***
10.3 Explain elements and assumption related to design of doubly reinforced beam, also state steps and formulae for design
10.4 Design a simply supported doubly reinforced beam

11 Understand the Principles Involved in the Design of Two Way Slab

11.1 Define two way slab and explain design elements
11.2 Use banding moment coefficients for different conditions
11.3 State assumptions for design of simply supported and two spans continuous slabs
11.4 Solve problems on two way simply supported slab

12 Understand Principles Involved in the Design of Tee and Ell Beam

12.1 Define Tee and Ell beam and explain advantages of Tee and Ell beams
12.2 Solve problem on simply supported Tee and Ell beam

13 Understand The Principles Involved in the Design of Axially Loaded Column and Simple Column Footings

13.1 State short and long columns
13.2 Explain formulae for the design of column and its footing
13.3 Calculate depth of footing and reinforcement details
13.4 Design of isolated column footing; punching shear and BM in base, etc.

14 Understand the Procedure Involved in the Design of Stairs

14.1 Distinguish between stair spanning horizontally and stair spanning longitudinally
14.2 Compute loads taken into accounts for design of stairs and explain assumptions and steps involved in the design of stairs
14.3 Design a simple stair
- Spanning horizontally
- Spanning longitudinally

LIST OF PRACTICALS **HOURS**

1. **Test on cement** 96

1.1 Preparation of cement paste of standard consistence
1.2 Determination of Initial and final setting time
1.3 Le-Chatellier's test for soundness of cement
1.4 Test for compressive strength of cement using mortar (1:3) cube
1.5 Briquette test for tensile strength of cement using mortar (1:3)

2. **Test on aggregates**

2.1 Determine clay percentage in sand
2.2 Determination of particle size distribution of fine and coarse aggregates by sieve analysis
2.3 Determination of bulk density and voids in aggregates
2.4 Determination of flakiness index and elongation index of coarse aggregates
2.5 Determination of specific gravity and water absorption of aggregates

3. **Test on concrete**

3.1 Test for workability of concrete by slump cone
3.2 Test for workability of concrete by compacting factor apparatus
3.3 Preparation of concrete cubes and cylinders vibrated and hand compacted, hand mixed and machine mixed and with different water cement ratio
3.4 Determination of compression strength of concrete using cubes
3.5 Preparation of standard size beams for flexural strength of concrete
3.6 Modules of rupture test, (breaking of beam prepared in above practical)
3.7 Split cylinder test for tensile strength of R.C.C concrete Design
3.8 Solve problems on bending moment and shear force in beams
3.9 Design and drawing of simple rectangular R.C.C beam with U.D.L
3.10 Design and drawing of simply supported and overhanging one way slab
3.11 Design and drawing shear force reinforcements for a rectangular beam and check for bond
3.12 Design of cantilever beam and lintels.
3.13 Design and drawing of doubly reinforced beams along with shear reinforcement and check for bond
3.14 Design and drawing of two way slab
3.15 Design and drawing of simply supported Tee and Ell beams.
3.16 Design and drawing of main and secondary Tee & Ell beam for a hall
3.17 Design and drawing of R.C.C column with isolated footing
3.18 Design and drawing of stair case

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-373 SOIL MECHANICS AND BRIDGE ENGINEERING

TOTAL CONTACT HOURS:	**160**	**T**	**P**	**C**
Theory:	**64**	**2**	**3**	**3**
Practical:	96			

AIM:

1. To know the importance of soil as a foundation and source for construction material for every building, bridge, dam, power station, roads, railroad, etc.
2. To understand the physical properties of soil and behavior of soil masses subjected to various types of forces

COURSE CONTENTS

1. Introduction 5 Hours

1.1 Soil, soil mechanics, soil engineering
1.2 Types of soil and their formation
1.3 Three phase diagram of soil
1.4 Physical properties of soil
1.5 Specific gravity and various densities
1.6 Various interrelationships
1.7 Numerical problems

2. Soil Classification. 5Hours

2.1 Classification of soils
2.2 System of classification: particle size classification, Textural classification, AASHTO classification
2.3 Particle size analysis

3. Plasticity. 5Hours

3.1 Consistency of soil
3.2 Description of Atterberg's Limit.
3.3 Different Indices
3.4 Methods of determination of Atterberg's Limits for given soil sample.

4. Compaction. 5 Hours

4.1 Compaction and necessity of compaction
4.2 Principles of compaction
4.3 Compaction and consolidation
4.4 Standard proctor test and modified proctor test
4.5 Field compaction test
4.6 Factors affecting compaction

5. Permeability 6 Hours

5.1 Introduction to permeability
5.2 Description of factors affecting permeability.
5.3 Darcy's Law.
5.4 Laboratory permeability tests
5.5 Field permeability tests

6. Shear Strength of Soils. 6 Hours

6.1 Introduction to shear strength of soils.
6.2 Coulomb's Law for shear strength of soil.
6.3 Laboratory measurement of shear strength
6.4 Factors affecting shear strength of soil
6.5 ***Differentiation*** between cohesive and non-cohesive soil

7. Stability of Slopes. 3 Hours

7.1 Necessity, types and failure of slopes
7.2 Factors contributing to slope failure.
7.3 Remedial measure to avoid slope failures.

8. Bearing Capacity of Soils. 5Hours

8.1 Introduction to bearing capacity of soil.
8.2 Factors affecting bearing capacity.
8.3 SPT
8.4 CBR

9. Introduction to Development of Bridges 3 Hours

9.1 Definition of terms related to bridge engineering
9.2 Structural parts of bridges
9.3 Factors affecting the development of bridges

10. Permanent Bridges 6 Hours

10.1 Permanent girder bridges, component parts and type – (R.C.C, steel and pre-stressed concrete.)

10.2 Arch bridges-types (masonry, R.C.C, steel and prestressed concrete)
10.3 Suspension and Rigid Frame Bridge (R.C.C and Steel)
10.4 Permanent big bridges – Abutment, wing walls, approaches, piers and their foundation.

11. Culvert 3 Hours

11.1 Culvert and causeway
11.2 Difference between culvert and causeway
11.3 Types of culverts (pipe, box, arch and slab)
11.4 Types of causeway

12. Temporary Bridges 4 Hours

12.1 Introduction types (wooden, suspended, floating and moveable)
12.2 Necessity and suitability

13. Selection of Bridge Type and Site 4 Hours

13.1 Comparison of various types
13.2 Characteristics of an ideal site for a bridge (River and Banks, foundation design and construction facilities, approaches)
13.3 Location of an alignment and site
13.4 Factor governing the choice of a bridge

14. Maintenance of Bridge 4 Hours

14.1 Brief description of general maintenance
14.2 Brief description of maintenance of steel, masonry, R.C.C. bridges
14.3 Brief description of maintenance of causeways

RECOMMENDED / REFERENCE BOOKS:

1. Soil Mechanics: **Jumikis.**
2. Soil Mechanics: **M.S. Smith.**
3. Soil Mechanics and Foundations: B.C**. Punmia.**
4. Soil Mechanics and Foundation Engineering : **P. Purushothama Raj**
5. Soil Mechanics & Foundation Engineering: **P. Purushotthama Raj, [2009],** Pearson Education
6. Soil Mechanics: **Alfred R. Jumikis**, [2003], McGraw-Hill
7. Soil Mechanics and Foundation Engineering: **K.R. Arora**, [2003], Standard Publishers, Delhi
8. Bridge Engg. By Khattak
9. Bridge Engg. By J.S Alagia.
10. Soil Mechanics: B.C Punmia. [2002]Laxmi Publications, New Dehli.

11. Geotechnical Engineering: Braja M.Das. [2000], Brooks/ Cole USA
12. Soil Mechanics by Prof. Shoukat
13. Soil Mechanics by Prof. Dr. Aziz Akbar and Sardar Babar

INSTRUCTIONAL OBJECTIVES

1. Understand the Preliminary Definitions and Relationships.

1.1 Define the terms, solids, voids, voids-ratio, porosity, degree of saturation, percentage air voids and moisture contents.
1.2 Define specific gravity and various densities of soil.
1.3 Solve the numerical problems based on 1.1 to 1.2
1.4 Derive the various relationships

2. Understand the Classification Systems of Soil.

2.1 State classification of soil and it necessity.
2.2 Explain PRA classification system, particle size classification system and textural classification system.
2.3 Explain the particle size analysis for different soils.

3. Understand the Plasticity Variation of Soil.

3.1 State the consistency of soil
3.2 Describe the Atterberg limits.
3.3 Define the various indices
3.4 Explain the methods of determination of Atterberg limits.

4. Understand the Compaction Tests (Field And Lab).

4.1 State term compaction its significance and necessity.
4.2 Discuss the principles of compaction
4.3 Compare between compaction and consolidation.
4.4 List the procedure of standard proctor test and modified compaction test.
4.5 List the procedure of field compaction tests, core cutter method and sand replacement method.
4.6 State the factors affecting compaction.

5. Understand the Methods Of Determining the Permeability of Soil.

5.1 Define permeability.
5.2 Describe factors affecting permeability.

5.3 State the Darcy's law of permeability.
5.4 Explain the method of determining the permeability of soil in the Lab
5.5 Explain the methods of determining the permeability of soil in the field.

6. Know the Shear Strength of Soil.

6.1 State the term shear strength of soil & its significance.
6.2 State Coloumb's law for shear strength of soil.
6.3 State and explain the shear box test
6.4 Describe the factors affecting shear strength of soil.
6.5 Differentiate between cohesive and non-cohesive soils.

7. Understand the Need of Stability of Slope.

7.1 State the necessity, types and failure of slope.
7.2 State the factors contributing to slope failure.
7.3 Explain the remedial measure to avoid slope failure.

8. Understand the Bearing Capacity of Soil.

8.1 Define bearing capacity, ultimate bearing capacity and safe bearing capacity of soil.
8.2 State the factors affecting bearing capacity of soil.
8.3 Explain the method for finding bearing capacity of soil by standard penetration test.
8.4 Explain the California Bearing Ratio (CBR) method for finding bearing capacity of soil.

9. Introduction To Development Bridges

9.1 Definition of terms related to Bridge Engineering
9.2 Structural parts of a Bridge
9.3 Factors Affecting the Development of Bridges

10. Permanent Bridges

10.1 Permanent girder bridges
10.2 components parts and type (RCC, steel and pre stress conc)

LIST OF PRACTICALS	**HOURS**
1. Determination of moisture content in a given soil sample by i) Speedy moisture content apparatus	**(96)**

ii) Oven method in the lab

2. Determination of specific gravity of given soil sample by pycnometer
3. Sieve analysis for a given soil sample in the lab.
4. Atterberg's (Liquid, Plastic & Shrinkage) Limit determination
5. Performing standard and modified Proctor test.
6. Finding field density by
   i) Core cutter method
   ii) Sand replacement method

7. Permeability test and problem solving relating to Permeability
8. Direct shear test for determining shear strength of soil in the laboratory
9. Performing standard penetration test and finding bearing capacity of the soil
10. California bearing ratio (CBR) test for finding bearing capacity for soil
11. Sketching bridges according to:
    i. function / purpose
    ii. materials of construction
    iii. Relative portion of permanent floor
    iv. types of super structures

12. Drawing of R.C.C slab culvert
13. Drawing of low level and high level causeways
14. Drawing of R.C.C deck slab bridge having two span 10 m each
15. Visit of a railway / highway bridges.

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-382 CIVIL ENGINEERING PROJECTS

TOTAL CONTACT HOURS:	**192**	**T**	**P**	**C**
Theory:	**0**	**0**	**6**	**2**
Practical:	192			

AIM: Apply concepts of Civil Engineering on designing actual projects and schemes.

LIST OF PROJECTS

Note: Preparation of Contract Documents, Preparation of Working Drawings, Specifications, Engineering Estimation, Layout of Structure and Planning. Assign or any two of the followings for each group of students, distributing all the projects in single class. (192)

1. Double storey R.C.C. frame structure building: Slab, beams, columns, lintels & foundation. Prepare complete set of drawings (Architectural structural drawings and report.

2. Design underground and over head R.C.C water reservoir (50,000 gallons - capacity) prepares structural drawing and report.

3. Layout, design, preparation of drawing and specification for a water supply scheme of a small Town (200 houses in 25 acres) for population of 1000 persons

4. Layout, design, preparation of drawing and specification for a sewerage scheme of a colony (200 houses in 25 acres) for population of 1000 persons.

5. Carry out high way project-layout, reconnaissance survey, selection of road alignment, topographic map and drawing longitudinal section and cross-section of a road (2 km long) and preparation of report.

6. Irrigation Project for 2 RD Canal Field work, topographic map, marking of alignment, detailed drawing, schedule of quantities and abstract of cost,

RECOMMENDED / REFERENCE BOOKS:

1- Civil Engineering Projects for Students : **Earl Bell**
2- Relevant Books on the subject relating to the project

INSTRUCTIONAL OBJECTIVES

To apply skills/knowledge gained on civil technology projects

List of Equipment and Machinery for DAE in Civil Technology (For the Class of 50 Students)

S.#	Name of Equipment / Machinery with specifications	Quantity Required
1.	**Electronic Total Station**	8
2.	**Electronic Digital Theodolite (Optional)**	8
3.	**Microptic Theodolite**	10
4.	**Auto Levels**	10
5.	**Auto Set Level : with built-in, Micrometer: (Tilting Level)**	5
6	**Laser level**	2
7.	**LEVELLING STAFF**	20
8.	**PLANE TABLE SET**	10
9	**Prismatic Compass with tripod:**	20
10.	**Telescopic Alidade:**	05
11.	**Telescope Survey Compass:**	5

12.	**ENGINEER'S CHAIN**	10
13	**METRIC CHAIN:**	10
14.	**GUNTER'S CHAIN**	4
15.	**STEEL TAPE**	20
16.	**STEEL BAND**	10
17.	**METALLIC TAPE**	20
18.	**INVAR TAPE**	4
19.	**ARROWS**	100
20.	**RANGING RODS**	100
21.	**Ranging Rods(Two pieces)**	40
22.	**CROSS STAFF**	20
23.	**OPTICAL SQUARE**	10

24.	**OPTICAL Square**	10
25.	**VELOCITY ROD**	4
26.	**MALLET**	20
27.	**ABNEY'S LEVEL**	4
28.	**SOUNDING ROD (Aluminum)**	20
29	**PLUMB BOB**	20
30	**PLANIMETER**	2
31	**BALL PEIN HAMMER**	10
32	**Leveling Tripod:**	20
33	**Target Staff:**	10
32	**Single frequency GPS**	2
35	**Hand Held GPS**	4

36	**Thermometer (Mercury):**	10
37	**Spring Balance**:	10
38	**Barometer**:	2

Equipment required for DAE Civil Technology (Group/Section Strength = 50 Students)

b) Material Testing Lab (Concrete, Highway & Soil Mechanics)

S.#	Name of Equipment / Machinery with specifications	Quantity Required
1	**Compression Testing Machine**	1
2	**Flexure / Tension Machine (cement, Mortar, Briquette Tensile Testing)**	1
3	**Electronic Digital Balance (Top-Pan Type)**	1
4	**Electronic Digital Precision Balance (Top-Pan Type)**	1
5	**Top Pan Weighting Balance**	3

6	**Vicat Apparatus**	8
7	**Lechatlier's Apparatus**	2
8	**Desiccators cabinet**	1
9	**Specific Gravity Test Set** (Fine and course aggregates) • Confirming with ASTM + BS Standards **for fine aggregate** Glass Pycnometer • Conical mould and temper: • For Coarse Aggregates:	10
10	**Set of Sieve**	3 Sets
11	**Sieve shaker**	3
12	**Speedy Moisture Content Apparatus** •	8
13	**Standard Proctor Compaction Apparatus:**	8
14	**Modified Proctor Compaction Apparatus:**	8
15	**Sand Cone Apparatus for Measurement of Field Density**	8
16	**Constant Head Permeability Apparatus**	1
17	**Direct Shear Test Machine**	1
18	**Digital Stop Watch**	10

19	**Atterberg's Limit Determination** **1.** Liquid Limit Test a) Liquid Limit Device with Grooving tool and counter b) Glass Plate 2. Plastic Limit Test a) Porcelain Dish b) Spatula / Knife c) Glass Surface / Plate d) 12 number of Moisture Containers e) Steel Rod (3mm dia approximately) 3. Shrinkage Limit Test a) Shrinkage Dish 45mm dia x 12.7mm height b) Crystallizing Dish 57mm x 31mm (approximate) c) Prong Plate with 3 metal prongs d) Evaporating Dish e) Spatula f) Graduated Cylinder 25ml	8
20	**Core Cutter Test Apparatus**	8
21	**Soil Samling Kit**	5
22	**Sample Extriuder**	2
23	**Standard Penetration Test Apparatus**	2
24	**Marshal Stability Test (30KN Capacity)**	2
25	**Saybolt Viscometer**	2
26	**Bitumen Ductility Test Apparatus**	1
27	**Thermostatic Lab Oven**	1
28	**Softening Point Test**	2
29	**Equipment Flash and Fire Test**	2
30	**Penetration of Bituminous Material**	2

31	**Loss Angles Abrasion Test**	1
32	**Extraction of Bitumen**	2
33	**Non-Destructive Test (Concrete Test Hammer)**	2
34	**Young's Modulus Apparatus:**	8
35	**Basic Roof Truss:**	8
36	**Shearing Force Apparatus:**	8
37	**Bending Moment Apparatus:**	8
38	**Loaded Beam Assembly:**	8
39	**Deflection of Beam Apparatus:**	8
40	**Flakiness Sieve Set**	2
41	**SPATULA**	10
42	**Wire Brush**	20
43	**Trimming Knife**	10
44	**Graduated Cylinders**	10
45	**Flakiness Index Gauge**	8
46	**Elongation index gauge (length gauge)**	5
47	**Wire Basket**	20
48	**Tray SET**	10
49	**Pycnometer**	10
50	**Conical Flask**	10

51	**Beakers**	20
52	**Thermometers**	10
53	**Wash Bottle**	10
54	**Specific Gravity Bottles**	10
55	**Metallic Scoops**	20
56	**Mortar & Pestle**	10
57	**Mixing Spoon Set**	20
58	**Mixing Bowl**	20
59	**UNIVERSAL TESTING MACHINE**	1

Equipment required for DAE Civil Technology(Group/Section Strength) = 50 Students)

c) Construction Lab

S.#	Name of Equipment / Machinery with specifications	Quantity Required
1	**Concrete Drum Mixer (Tilting Type)**	1
2	**Platform scale**	1
3	**MOULDS:**	
a)	cubes 150mm (6") with clamp attached based plate, easily collapsible sides (made of cast iron)	10
b)	cubes 100mm (4") with clamp attached based plate, easily collapsible sides (made of steel)	10
c)	cylinders 150mm dia X 300mm height (6" dia x 12" height) complete with base plate and locking arrangement, made of Steel	10
d)	mortar cubes 50mm (2") made of brass / steel, three gnag mould, machined in internal surfaces, easily collapsible	10
e)	beams 150 x 150x600mm (6"x6"x24") made of steel	10
f)	Set of Spanners for (cubes and cylinder, beam moulds)	10
i	Tamping Rod for cubes/cylinders 16 mm dia 600 mm long ASTM	10
g	Tamping Rod for mould, 25 x 25 x380 mm (BS 1881)	10

4	**Concrete cylinder capping** complete including: 1. two steel retainers for 6" (15cm) dia cylinders 2. Electric melting pot for melting capping compound (with 20kg capping compound Tin)	2 Sets
5	**Vibrating Table**	2
6	**Poker Vibrator**	2
7	**Slump Test Apparatus**	10
8	**Compacting Factor Apparatus**	5
9	**Mechanical Sieve Shaker**	1
10	**Wheel Barrow:**	5
11	**Bucket**	10
12	**Paint Scraper Set**	10
13	**Potien Filler Knife Set**	10
14	**Mason Trowel**	10
16	**Chiesel Set (9"-12"-18")**	10
17	**Brick Hammer**	25
18	**Hammer**	10
19	**Plumb Bob**	25
20	**Mason's Spirit Level**	25
21	**Straight Edge**	10
22	**Shovels with handle**	10
23	**Kassi (Plies) with handle**	10
24	**Spirit Level (Alumen 2 ft. length)**	25
25	**Pick Axe** **+B46**	10

26	**Steel float Set** (Small, medium, large) Wooden Handle	10
27	**Wooden Float** (small, medium, large) Wooden Handle	25
28	**Wooden Scaffolding for Mason**	
	Bamboo (10 feet)	60
	Bamboo (15 feet)	40
	Battens (5'x3½"x2½")	40
	Shesham Wood Planks (7'x7"x1½")	40
29	**Mortar Pan**	10
30	**Adjustable Wrench Set**	10
31	**Steel Tape**	20
32	**Mixing Spoon Set**	25
33	**Tray (Galvanised Iron, 14 SWG) SET**	20
34	**Pointing Trowel**	25
35	**Pointing Tray**	20
36	**Striker for vertical joint (pointing)**	25
37	**Striker for horizontal joint (pointing)**	25
38	**Metallic Tape**	10

Equipment / Machinery List

DAE Civil Technology

(Group/Section Strength = 50 Students)

d) Public Health Engineering & Hydraulic Lab

S.#	Name of Equipment / Machinery with specifications	Quantity Required
1.	**ADJUSTABLE WRENCH Set**	20
2.	**Pipe Wrench Chain Type**	10
3.	**ADJUSTABLE PIPE WRENCH**	20
4.	**PIPE REAMER**	10
5.	**PIPE VICE (STAND TYPE)**	10
6.	**PIPE VICE (BENCH TYPE)**	10
7.	**PIPE THREAD CUTTING KIT**	10
8.	**TAP SET**	10
9.	**PIPE CUTTER**	10
10.	**PLIERS Adjustable**	10
11.	**COLD CHISEL Set**	10
12.	**STEEL TAPE**	20
13.	**Mason's Spirit Level**	20

14.	**STEEL RULE**	20
15.	**ELEC TRIC DRILL MACHINE**	1
16.	**SCREW DRIVER SET**	20
17.	**Trowel (200-280 mm long steel)**	20
18.	**Mortar Pan**	20
19.	**Shovel with handle**	10
20.	**HACK SAW**	10
21.	**Bench Vice**	5
22.	**BALL PEIN HAMMER Set**	10
23.	**CLAW HAMMER**	10
24.	**FILES Set**	10
25.	**SCISSORS**	10
26.	**CENTRE PUNCH**	10
27.	**MELTING POT**	4
28.	**Ladle**	5
29.	**PIPE YARNING AND CAULKING TOOLS**	10

30.	**DRAIN CLEANING RODS**	2
31.	**Oil Cane**	10
32.	**DRILL/BIT SET**	2
33.	**Complete Set of Bath Room Fitting**	2
34.	**Complete set of Bath Sanitary Fixture**	2
35.	**HYDRAULIC BENCH**	2
36.	**METACENTRIC HEIGHT MEASURING APPARATUS:**	2
37.	**HYDROSTATIC PRESSURE APP.**	2
38.	**VENTURIMETER APP.** **Compatible with Hydraulic Bench.**	2
39.	**MANOMETER (U-TUBE)**	2
40.	**FLOW OVER WEIR APPARATUS** **Complete compatible with hydraulic bench.**	5
41.	**PITOT TUBE**	5
42.	**Energy losses in pipe Apparatus**	2
43.	**CURRENT VELOCITY METER**	1
44.	**WATER HARDNESS TEST APPARATUS:**	2
45.	**Turbidity Test Apparatus**	2

e) Computer Application / Auto CAD Lab

(For class of 50 students)

Sr. No.	Name of Item with Specifications	Qty
1	**Computer**	51
2	**Net working**	-
3	**Computer Chair (will be added in furniture portion)** Without arm rest – 5 legs base	51
4	**Computer Table (will be added in furniture portion)** 2½ x 2 x 2½	51
5	**UPS**	10
6	**Multimedia Projector**	01
7	**Scanner A-3**	01
8	**Printer LaserJet,**	01
9	**Plotter LaserJet A-0 Size**	01
10	**License software for education Latest Versions** Auto CAD, Prima Vera M.S Office	 50 50 50

TOOLS & EQUIPMENT LIST		
WORKSHOP PRACTICE: ELECTRICAL WIRING		
SR. #	**EQUIPMENT / INSTRUMENT**	**QUANTITY REQUIRED (NOS.)**
1.	3-Phase Electric Motors	10
2.	3-Phase Energy Meter	10
3.	AVO Meters	15
4.	Clamp on Meter	15
5.	Cold Chisels 10” Long	10
6.	Combination Pliers 8”	15
7.	Electric Bells	50
8.	Fluorescent Tubes (with electric choke) Complete	50
9.	Hack Saws 15”	50
10.	Hand-Drill Machine Electric Two Speeds 3/4” Chuck Heavy Duty	10
11.	Kerosene Burners	10
12.	Long Nose Pliers 6”	25
13.	Megger/Insulation Tester	10
14.	Main Switch 3-Phase	50
15.	Main Switch Single Phase	50
16.	Masonry Drill Bit Set	50
17.	Masonry Hand Bit	25
18.	Phase Testers	25
19.	Plumb Bobs	12

20.	Rip Saw 12”	12
21.	Rough Cut File 12”	10
22.	Screw Driver Sets	30
23.	Screw Drivers 12”	30
24.	Side Cutter 6”	30
25.	Single-Phase Electric Motors	25
26.	Single–Phase Energy Meter	10
27.	Small Hammers	15
28.	Smooth Files 12”	10
29.	Spirit Levels 15”	25
30.	Two-way Switch	30
31.	Wiring Boards 3’ x 5’ Wall Mounted	20
32.	Wood Chisel 1”	5
33.	Work Benches 4’ x 6’ x 2.5’	15
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Air Conditioners	2
2.	Circuit Breakers	30
3.	Electric Ballasts (40 W)	50
4.	Panel Board	25

f) Drawing Hall / DRAFTING LAB

List of Equipments for 50 students

Sr. No.	Name of Item with Specifications	Qty
1)	**Drafting Table** Portable (Taper Type) Table size 32" x 24"	**51**
2)	**Instruments Box** Special Compass Set	**05 Set**
3)	**Tee Square** (600 mm) Transparent	**05Set**
4)	**Set Square** Transparent medium size (300 mm)	**05 Set**
5)	**Templates** Circle Square, Hexagon, Triangle (03 each)	**02 Set**
6)	**French Curves** Good Quality, medium size	**02 Set**
7)	**Clutch Pencil** (0. 5 mm)	**12**
8)	**Eraser**	**12**
9)	**Sharpener Machine**	**05**
10)	**Portable Drawing Board** (3'x2' with scale)	**05**

11)	**Drafting Machine Elbow type** Table size A o complete with all accessories	**01**
12)		

CHEMISTRY LABORATORY

List of apparatus and Chemicals required for DAE Chemistry practical of all Technologies. (For 50 Students)

1. List of Apparatus

Sr. #	Apparatus	Specification	Quantity	Unit Cost in Rs.
1.	Beakers 100ml	100ml	50 Nos.	35
2.	Beakers 250 ml Beakers 500 ml	250ml 500 ml	50 Nos. 25 Nos.	58 75
3.	Glass Rod	8 inches	25 Nos.	10
4.	Funnel	3 inches or 75mm	25 Nos.	40
5.	China Dish	60cc	25 Nos.	32
6.	Filter paper sheets	10 x 12 inches	100 Sheets	15
7.	Sprit Lamp or Bunsen Burner	With stop cork	50 Nos.	225-45
8.	Tripod stand	8 inches / 6 inches	50 Nos.	45
9.	Thermometer	(110 ^{o}C)	50 Nos.	35
10.	Capillary tubes	Good Quality	5 Packs	90

11.	Universal pH Paper Rang (1-14)	1-14	20 Packs	150
12.	Chromatograph Tank	-----	50 Nos.	850
13.	Cork with hook	------	25 Nos.	5
14.	Watch Glass	3”	50 Nos.	10
15.	Glass pipe	Local	10 m	10
16.	Ostwald’s Viscometer	------	50 Nos.	225
17.	Pipette 10ml	10 ml	50 Nos.	150
18.	Specific Gravity Bottle	25 ml	25 Nos.	90
19.	Analytical / Electronic Balance	0.1 gm to 500 gm	06 Nos.	750
20.	Crucible with lid	-----	10 Nos.	55
21.	Stop watch	Digital	25 Nos.	55
22.	Pipette sucker	------	25 Nos.	50
23.	Stalagmometer	------	50 Nos.	120
24.	Pinch Cock	------	50 Nos.	25
25.	Rubber Tubes	½ “	50 Nos.	20 /Meter
26.	Hoffman’s Voltameter	------	10 Nos.	2200
27.	Connecting Wires	------	20 Meter	350
28.	Battery (12 V) D.C /Adapter	300 milli ampere	10 Nos.	150
29.	Distilled Water Plant. (Gas or Electric)	5 liter /h	02 Nos.	9500
30.	Copper Foils (5cm x 2cm)	5cm x 2cm	10 Nos.	150
31.	Ammeter	0-3 ampere	10 Nos.	225
32.	Test Tubes	16 x 150 mm	300 Nos.	5
33.	Test Tubes Stands	Steel	25 Nos.	75
34.	Tube Test Brush	Good Quality	25 Nos.	10
35.	Test Tube Holder	Good Quality	25 Nos.	10

Sr. #	Apparatus	Specification	Quantity	Unit Cost in Rs.
36.	Platinum wire	------	25 Nos.	75
37.	Measuring Flask	1 Litre	10 Nos.	275
38.	Measuring Flask	500 ml	10 Nos.	190
39.	Measuring Flask	250 ml	10 Nos.	120
40.	Measuring Flask	1000 ml	10 Nos.	90
41.	Graduated Cylinder Graduated Cylinder	100 ml 50 ml	25 Nos. 25 Nos.	150 95
42.	Kipp's Apparatus	250 ml	4 Nos.	950
43.	Desiccators	150 mm	2 Nos.	850
44.	Conical Flask	250 ml	50 Nos.	65
45.	Burette	50 ml	50 Nos.	225
46.	Iron stand with clamps	------	50 Nos.	350
47.	Wire Gauze	------	50 Nos.	5
48.	Hot Plate	Small Size 8"	2 Nos.	1200
49.	Fusion tubes	Glass	250 Nos	250
50.	Pestle and Mortar	Medium Size	2 Nos.	150
51.	Wash Bottle - plastic	Medium Size	20 Nos.	60
52.	Dropper	Medium Size	20 Nos.	10
53.	Glass Stirrer	Medium Size	50 Nos.	10
54.	Steal Spatula	Medium Size	25 Nos.	55
55.	Water Bath	Ordinary Size	20 Nos.	350

56.	Burette Stand		25 Nos.	275
57.	Tongs		25 Nos.	50

2. List of Chemicals

Sr. #	Apparatus	Specification	Quantity	Unit Cost in Rs.

1.	Sodium Chloride	BDH/ Merck/China	500gm	25 kg
2.	Copper Sulphate		1000 gm	450-500
3.	Naphthalene		500 gm	190
4.	Hydro Chloric Acid		5 Liter	900
5.	Nitric Acid		5 Liter	950
6.	Acetone		5 Liter	2800
7.	Benzene		5 Liter	3600
8.	Ether		2 ½ Liter	1400
9.	Ammonia		2 ½ Liter	900
10.	Ethanol		2 ½ Liter	2400
11.	Butanol		2 ½ Liter	1800
12.	Potassium Dichromate		500 gm	1400
13.	Zinc sulphate		500 gm	650
14.	Phenolphthalene		500 gm	1800
15.	Carbon Tetra Chloride		2 ½ Liter	3200
16.	Sand paper		10 No.	10
17.	Silver Nitrate		250 gm	4800
18.	Sodium Hydroxide		2 Kg	400
19.	Potassium Hydroxide		500 gm	600
20.	Sodium Carbonate		500 gm	225
21.	Potasium Nitrate		500 gm	450
22.	Potassium Chromate		500 gm	1200
23.	Cobalt Nitrate		500 gm	2800
24.	Borax		500 gm	1200
25.	Potassium Iodide		500 gm	2800

26.	Sodium Thiosulphate		500 gm	1200
27.	Stannous Chloride		500 gm	1800
28.	Phosphoric acid		One Liter	400
29.	Disodium Hydrogen Phosphate		500 gm	1200
30.	Sodium Stannate		500 gm	650
31.	Ammonium Molybdate		500 gm	4200
32.	Ammonium Chloride		500 gm	400
33.	Ammonium Sulphocyanide		500 gm	1200
34.	Sodium Phosphate		500 gm	600
35.	Ammonium Sulphate		500 gm	450
36.	Ammonium Oxalate		500 gm	400
37.	Ammonium Carbonate		500 gm	900
38.	Picric acid		500 gm	650
39.	Nesslers reagent		500 gm	450
40.	Tartaric Acid		500 gm	200
41.	Potasium Pyroantimonate		500 gm	1200
42.	Potasium Sulphate		500 gm	450
43.	Magnesium Sulphate		500 gm	200
44.	Calcium Chloride		500 gm	120
45.	Lead Acetate		500 gm	900
46.	Starch (Powder)		500 gm	25
47.	Potassium Permanganate		500 gm	4800
48.	Diphenyl amine		500 gm	1600
49.	Barium Chloride		500 gm	1200
50.	Ferric Chloride		500 gm	900

51.	Ferrous Chloride		500 gm	2400
52.	Ferrous Sulphate		500 gm	1200
53.	Ferric Sulphate		500 gm	1400
54.	Barium Nitrate		500 gm	1200
55.	Ammonium Acetate		500 gm	1400
56.	Potassium Ferro cyanide		500 gm	950
57.	Methyl Orange		One pack	125
58.	Ammonium Sulphide Yellow		One Liter	400
59.	Acetic Acid		2 ½ Liter	650
60.	Paraffin (Wax)		01 kg	350
61.	Dimethyl Glyoxime (DMG)		200 g	4800
62.	Sulphuric Acid		5 Liter	650
63.	Sodium Cobalt nitrate		500 gm	4400
64.	Sodium Sulphide		500 gm	900
65.	Methylated Spirit		5 Liter	400
66.	Cadmium Sulphate		500 gm	600
67.	Mercuric Chloride		500 gm	4800
68.	Plumbic Chloride		500 gm	1200
69.	Bismuth Chloride		500 gm	2800
70.	Antimonium Sulphate		500 gm	1200
71.	Aluminum sulphate		500 gm	400
72.	Manganese Sulphate		500 gm	400
73.	Nikel Sulphate		500 gm	900
74.	Sodium Bicarbonate		500 gm	250
75.	Barium Chloride		500 gm	350

76.	Potassium Ferricyanide		500 gm	1400
77.	Lead Nitrate		500 gm	1200
78.	Sodium Phosphate		500 gm	650
79.	Zinc chloride		500 gm	750
80.	Zinc nitrate		500 gm	650

PHYSICS LABORATORY

List of Apparatus (for 50 Students)

Sr. #	Apparatus	Specification	Quantity	Unit Cost in Rs.
1.	Vernier Calipers	------	50 Nos.	325/each
2.	Solid Cylinders (Brass)	set of three	50 Nos.	25/set
3.	Magnifying Glass	3”	50 Nos.	40/each
4.	Micrometer (screw gauge)	0.25mm	50 Nos.	290/each
5.	Wire pieces (iron made)	10 cm long 2mm dia	25 Nos.	10/set
6.	Fletcher’s trolley	with all accessories	12 Nos.	5500/set
7.	Weight boxes	0.1 mg to 200g	12 Nos.	650/set
8.	Pan	50 gm	25 Nos.	15/each
9.	Gravesand’s apparatus	(with pulleys, spirit level, plumb line) with weight 10X5=50 gm brass	25 each	490set
10.	Hanger and slotted	weights 20x5=100 gm	25 each	120/set
11.	Set square		50 set	150/set
12.	Spring balance	100gm, 250gm, 500gm	50 each	90/each
13.	Iron stands	big	50 Nos.	350/set

14.	Meter strips/rod	(wooden)	50 Nos.	10/set
15.	Wedges	(wooden)	25 Nos.	25/each
16.	Searl's apparatus/young's modulus apparatus		12 Nos.	650/each
17.	Slotted weights with hanger	(for searle's apparatus) ½ x 5kg = 2.5 kg 1x5kg = 5 kg	50 each	450/set 650/set
18.	measuring tap		12 Nos.	10/each
19.	Steel wires	0.36mm and 0.45mm dia	50 m	12/meter
20.	Helical spring with weight	50x5 = 250 gm brass	50 Nos.	425/set
21.	Iron stand	tripod base	50 Nos.	390/set
22.	Pan with pointer	usable with helical spring	50 Nos.	25/each
23.	Sonometer	wooden resonance box	12 Nos.	350/
24.	Rubber pad	striking hammer rubber type	50 Nos.	15/each
25.	Tuning forks	(consisting forks of frequency approx. (440 hz, 512 hz,480 hz)	2 set of 16 forks	650/each
26.	Resonance apparatus	complete with plastic tube	12 Nos.	600/set
27.	Beakers	100 ml	50 Nos.	35/each
28.	Thermometer	½ degree up to 110^{o} C ½ degree up to nearly 240^{o}F	50 Nos.	35/each
29.	Kundt's tube	Complete set	12 Nos.	6000/each
30.	Screen metal	300rnm x 300mm painted white	25 Nos.	70/each
31.	Electrical lamp	Table lamp type adjustable height and direction	25 Nos.	300/each
32.	Point source adjustment	Wooden box type	25 Nos.	2800/each
33.	Spherical ball	Different diameter 76mm with	25 Nos.	20/each

		hook 19mm		
34.	Drawing boards		50 Nos.	75/each
35.	Mirror strips		50 Nos.	3/each
36.	Concave mirror	Focal length 150mm Focal length 250mm	50 Nos.	75/each
37.	Up rights with needles		50 Nos.	55/each
38.	Up rights for lens holding		50 Nos.	55/each
	Index rod		50 Nos.	60/each
40.	Convex lens	Focal length 150mm Focal length 250mm	50 Nos.	75/each
41	Optical bench		50 Nos.	450/each
42.	Glass – slabs		50 Nos.	15/each
43.	Microscope vernier	Traveling Type	8 Nos.	8500/each
44.	Spectrometer	Complete Set	8 Nos.	7500/each
45.	Sodium Lamp	18Watt	8 Nos	2400-set
46.	Prism		50 Nos	70/each
47.	Spirit Level		50 Nos	90/each
48.	Pin Hole Camera	Kit complete made of card Board	50 Nos	1200/each
49.	Sextant		12 Nos.	4500/each
50.	Hypsometer		25 Nos	250/each
51.	Lead Shots	1 kg packet	12 Nos	200/each
52.	Calorimeter	Copper made with wooden lid	25 Nos	200/each
53.	Expansion Apparatus	Complete set with spherometer arrangements	12 Nos.	4000/each
54.	Galvanometer	3 mA	50 Nos	225/each

55.	Power Supply	0-10 volts Variable – 5 Amp	12 Nos.	2200/each
56.	Gas Burner/ Spirit lamps		25 Nos	200-450/each
57.	Balance	Physical	12 Nos.	2800/each
58.	Wet and dry bulb hygrometer		12 Nos	350/each
59.	Beaker	250ml	50 Nos	58/each
60.	Blotting Paper		20 sheets	10/each
61.	Steam Generator	Complete with delivery tube and water trap system	12 Nos.	600/each
62.	Tripod with wire gauze		50 Nos	45/each
63.	Lycopodium Powder		50 g	10000Rs
64.	Resined Flannel cloth		2 Meter	100Rs

NAMES OF NATIONAL CURRICULUM

& REVIEW COMMITTEE MEMBERS

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Recommendations by National Curriculum Review Committee for DAE Civil

1. The task for reviewing the following subjects may be assigned to the experts having relevant qualification:

    a. Islamiat and Pakistan Studies
    b. English
    c. Applied Mathematic-I and II
    d. Applied Chemistry
    e. Applied Physics
    f. Communication Skill and Report Writing

2. Merging of the subjects of Civil 332 Environmental Technology and Civil 371 Occupational Health and Safety Environment is suggested and renamed as “Civil 332 Environment, Health and Safety” and experts may be hired for its further improvement.
3. Gen 221 Communication Skills and Report Writing may be converted in Theory and Practical (Spoken English) and Code may be replaced by Gen 222.