CURRICULUM

For

THREE YEARS' DIPLOMA OF ASSOCIATE ENGINEER

IN

CIVIL TECHNOLOGY

Entry Level: -	Matriculation (Science)
Duration of Course: -	Three Years
Credit Hours:	SEVENTY-One (Annual System)
Methodology:	Theory 40%
	Practical 60 %
Examination & Certification Body:	Punjab Board of Technical Education
Examination System:	Annual System (same as for all the DAEs programs)

Technical Education and Vocational Training Authority

TEVTA

SCHEME OF STUDIES

DAE in CIVIL TECHNOLOGY (3-Years' Course)

FIRST YEAR				
Code	**Subject Name**	**T**	**P**	**C**
Gen 111	Islamiat & Pakistan Studies	1	0	1
TTQ 111/ CIVIC-111	Tarjuma-Tul-Quran	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 124	Civil Engineering Surveying-I	2	6	4
Civil 153	Civil Engineering Materials & Building Construction	2	3	3
Civil 103	Civil Engineering Drawing-I	1	6	3
Shop 131	Engineering Workshop Practice	0	3	1
Comp 121	Computer Applications	0	3	1
	T o t a l	14	27	23

SECOND YEAR				
Code	**Subject Name**	**T**	**P**	**C**
Gen 201	Islamiat & Pakistan Studies	1	0	1
TTQ 211/ CIVIC-211	Tarjuma-Tul-Quran	1	0	1
Math 212	Applied Mathematics-II	2	0	2
Gen 221	Communication Skills & Report Writing	1	0	1
Civil.pht-203	Public Health Technology	2	3	3
Civil 204	Civil Engineering Surveying-II	2	6	4
Civil 273	Construction Techniques	2	3	3
Civil 283	Quantity Surveying	2	3	3
Civil 292	Civil Engineering Drawing-II	0	6	2

Civil.EM 263	Engineering Mechanics	2	3	3
Civil 212	Health Safety & Environment	2	0	2
	T o t a l	17	24	25

THIRD YEAR				
Code	Subject Name	T	P	C
Gen 301	Islamiat & Pakistan Studies	1	0	1
Civil 313	Advanced Quantity Surveying	1	6	3
Civil 304	Construction Project Planning & Management	2	6	4
MGM 341	Entrepreneurship	1	0	1
Civil 324	Hydraulics & Irrigation Engineering	3	3	4
Civil 333	Transportation Engineering	2	3	3
Civil 374	Concrete Technology and RCC Design	3	3	4
Civil 393	Soil Mechanics & Foundation Engineering	2	3	3
	T o t a l	15	24	23

DAE CIVIL TECHNOLOGY
YEAR 1

اسلامیات/مطالعہ پاکستان

		ٹی	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 یجرمنکم شنان قوم علی ان لا تعدلوا
1.4 ان اللّٰہ یامرکم ان تودوا الامانات الی اھلھا
1.5 ان اللّٰہ یامر بالعدل والاحسان
1.6 ان الصلوتہ تنھی عن الفحشاء وامنکر

-1 انما الاعمال بالنیات
-2 امابعث لاتم مکارم الاخلاق
-3 لا یومن احدکم حتی یحب لاخیہ مایحب لنفسہ
-4 المسلم من سلم المسلمون من سنہ المسمون من لسانہ ویدہ
-5 قل امنت باللّٰہ سلم استقم
-6 خیر کم خیر کم لاھلہ
-7 سباب المسلم فسوق وقتالہ کفر
-8 المومن اخو المومن
-9 کل المسلم علی المسلم حرام بمعہ ومالہ وعرضہ
-10 ایتہ المنافق ثلاث اذا حدیث کذب واذا اوتمن خان واذا وعد اخلف

دین اسلام

2.1 اسلام کے بنیادی مقاصد کی وضاحت اور انسان کی انفرادی و اجتماعی زندگی پر ان کے اثرات

-1 توحید
-2 رسالت
-3 آخرت
-4 ملائکہ
-5 آسمانی کتب

2.2 عبادات

-1 نماز 2- روزہ 3- حج 4- زکوٰۃ

متذکرہ بالا عبادات کی اہمیت و فضیلت، حکمتیں اور انسان کی انفرادی و معاشرتی زندگی پر ان کے اثرات

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 مقصد: 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 کی دمدنی 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 مقصد:

- ☆ 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 مقصد: احادیث کا ترجمہ و تشریح کر سکے
رسول اللہ ﷺ کے اسوۂ حسنہ کا 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 لغوی و اصطلاحی معنی بیان کر سکے
عقیدے اور عبادت کا فرق بیان کر سکے
عبادات (نماز، روزہ، حج، زکوٰۃ) کے فوری، انفرادی اور اجتماعی 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
حصہ دوم مطالعہ پاکستان

GEN III

ک	ع	ی
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
- ☆ وعدہ داری
- ☆ 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 مثبت قدر اضافہ 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
- ☆ وراثت 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) (Gen III)

حصہ دوئم | مطالعہ پاکستان | کل وقت 12 گھنٹے

موضوعات

- ☆ تحریک آزادی: مسلمان قوم میں آزادی فکر کی تاریخ، مسلمانوں میں سیاسی آزادی کی اہمیت اور ضرورت - زبان، جغرافیائی علاقائی کے تعلقات
- ☆ نظریہ پاکستان
  قیام پاکستان کی اساس (دین اسلام) قیام پاکستان کی غرض، اہمیت نظریہ پاکستان کی وضاحت۔ نظریہ پاکستان اور علامہ اقبال اور قائداعظم کے ارشادات کی روشنی میں
- ☆ نظریہ پاکستان کا تاریخی پس منظر
  محمد بن قاسم کی آمد، مجدد الف ثانی اور شاہ ولی اللہ کی تبلیغی خدمات سید احمد شہید کی تحریک مجاہدین
- ☆ تعلیمی تحریکیں
  علی گڑھ - ندوۃ العلماء (لکھنؤ) - مدرسۃ الاصلاح (سرائے میر) اسلامیہ کالج (پشاور) انجمن حمایت اسلام (لاہور)

مطالعہ پاکستان (حصہ دوئم)

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 ثانی کی علمی خدمات بیان کر سکے
- شاہ ولی اللہ کی علمی خدمات بیان کر سکے
- مجدد الف ثانی 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 - ندوت 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

TTQ 111/ CIVIC-111 TARJAMA TUL QURAN / CIVICS

Theory	**32**	**T**	**P**	**C**
Practical	**0**	**1**	**0**	**1**

As per syllabus of BISE from PCTB Book

Eng-112 ENGLISH

Total contact hours

		T	P	C
Theory	64			
Practical	0	2	0	2

AIMS At the end of the course, the students will be equipped with cognitive skill to enable them to present facts in a systematic and logical manner to meet the language demands of dynamic field of commerce and industry for functional day-to-day use and will inculcate skills of reading, writing and comprehension.

COURSE CONTENTS

ENGLISH PAPER "A"

1. PROSE/TEXT **16 hrs**

1.1 First eight essays of Intermediate. English Book-II

2. CLOZE TEST **4 hrs**

1.2 A passage comprising 50-100 words will be selected from the text. Every 11thword or any word for that matter will be omitted. The number of missing word will range between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

ENGLISH PAPER "B"

3. GRAMMAR **26 hrs**

3.1 Sentence Structure.
3.2 Tenses.
3.3 Parts of speech.
3.4 Punctuation,
3.5 Change of Narration.
3.6 One word for several
3.7 Words often confused

4. COMPOSITION **8 hrs**

4.1 Letters/Messages
4.2 Job application letter
4.3 For character certificate/for grant of scholarship
4.4 Telegrams, Cablegrams and Radiograms, Telexes, Facsimiles
4.5 Essay writing
4.6 Technical Education, Science and Our life, Computers,
Environmental Pollution, Duties of a Student. **4 hrs**

5. TRANSLATION **6 hrs**

5.1 Translation from Urdu into English.
For Foreign Students: A paragraph or a dialogue.

RECOMMENDED BOOKS

1. Technical English developed by Mr. Zia Sarwar, Mr. Habib-ur –Rehman, Evaluated by Mr.Zafar Iqbal Khokhar, Mr. Zahid Zahoor,Vol - I, National Book Foundation

Eng-112 ENGLISH

INSTRUCTIONAL OBJECTIVES

PAPER-A

1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY

1.1 Manipulate, skimming and scanning of the text.
1.2 Identify new ideas.
1.3 Reproduce facts, characters in own words
1.4 Write summary of stories

2. UNDERSTAND FACTS OF THE TEXT

2.1 Rewrite words to fill in the blanks recalling the text.
2.2 Use own words to fill in the blanks.

PAPER-B

3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING

3.1 Use rules of grammar to construct meaningful sentences containing a subject and a predicate.
3.2 State classification of time, i.e. present, past and future and use verb tense correctly in different forms to denote relevant time.
3.3 Identify function words and content words.
3.4 Use marks of punctuation to make sense clear.
3.5 ' Relate what a person says in direct and indirect forms.
3.6 Compose his writings.
3.7 Distinguish between confusing words.

4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICAL SITUATIONS

4.1 Use concept to construct applications for employment, for character certificate for grant of scholarship.
4.2 Define and write telegrams, cablegrams and radiograms, telexes, facsimiles
4.3 Describe steps of a good composition writing.
4.4 Describe features of a good composition.
4.5 Describe methods of composition writing.
4.6 Use these concepts to organize facts and describe them systematically in practical situation;

5. APPLIES RULES OF TRANSLATION

5.1 Describe confusion.
5.2 Describe rules of translation.
5.3 Use rules of translation from Urdu to English in simple paragraph and sentences.

Math-113 APPLIED MATHEMATICS

Total contact hours	96	**T**	**P**	**C**
Theory		3	0	3

Pre-requisite: Must have completed a course of Elective Mathematics at Matric level.

AIMS After completing the course the students will be able to

1. Solve problems of Algebra, Trigonometry, vectors. Menstruation, Matrices and Determinants.
2. Develop skill, mathematical attitudes and logical perception in the use of mathematical instruments as required in the technological fields.
3. Acquire mathematical clarity and insight in the solution of technical problems.

COURSE CONTENTS

1 QUADRATIC EQUATIONS 6 Hrs

1.1 Standard Form
1.2 Solution
1.3 Nature of roots
1.4 Sum & Product of roots
1 .5 Formation
1.6 Problems

2 ARITHMETIC PROGRESSION AND SERIES 3Hrs

2.1 Sequence
2.2 Series
2.3 nth term
2.4 Sum of the first n terms
2.5 Means
2.6 Problems

3 GEOMETRIC PROGRESSION AND SERIES 3Hrs

3.1 n'th term
3:2 sum of the first n terms
3.3 Means
3.4 Infinite Geometric progression
3.5 Problems

4 BINOMIAL THEOREM 6 Hrs

4.1 Factorials

4.2 Binomial Expression
4.3 Binomial Co-efficient
4.4 Statement
4.5 The General Term
4.6 The Binomial Series.
4.7 Problems

5 PARTIAL FRACTIONS 6 Hrs

5.1 Introduction
5.2 Linear Distinct Factors Case I
5.3 Linear Repeated Factors Case II
5.4 Quadratic Distinct Factors Case III
5.5 Quadratic Repeated Factors Case IV
5.6 Problems

6 FUNDAMENTALS OF TRIGONOMETRY 6 Hrs

6.1 Angles
6.2 Quadrants
6.3 Measurements of Angles
6.4 Relation between Sexagesimal& circular system
6.5 Relation between Length of a Circular Arc & the Radian Measure of its central angle
6.6 Problems

7 TRIGONOMETRIC FUNCTIONS AND RATIOS 6 Hrs

7.1 trigonometric functions of any angle
7.2 Signs of trigonometric Functions
7.3 Trigonometric Ratios of particular angles
7.4 Fundamental Identities
7.5 Problems

8 GENERAL IDENTITIES 6 Hrs

8.1 The Fundamental Law
8.2 Deductions
8.3 Sum & Difference Formulae
8.4 Double Angle Identities
8.5 Half Angle Identities
8.6 Conversion of sum or difference to products
8.7 Problems

9 SOLUTION OF TRIANGLES 6 Hrs

9.1 The law of Sine's
9.2 The law of Cosines

9.3 Measurement of Heights & Distances
9.4 Problems

10 MENSURATION OF SOLIDS 30 Hrs

10.1 Review of regular plane figures and Simpson's Rule
10.2 Prisms
10.3 Cylinders
10.4 Pyramids
10.5 Cones
10.6 Frusta
10.7 Spheres

11 VECTORS 9 Hrs

11.1 Sealers & Vectors
11.2 Addition & Subtraction
11.3 The unit Vectors I, j, k
11.4 Direction Cosines
11.5 Sealer or Dot Product
11.6 Deductions
11.7 Dot product in terms of orthogonal components
11.8 Deductions
11.9 Analytic Expression for a x b.
11.10 Problems.

12 MATRICES AND DETERMINANTS 9 Hrs

12.1 Definition of Matrix
12.2 Rows & Columns
12.3 Order of a Matrix
12.4 Algebra of Matrices
12.5 Determinants
12.6 Properties of Determinants
12.7 Solution of Linear Equations
12.8 Problems

REFERENCE BOOKS

Applied Mathematics Math-113, by Nasir -ud-Din Mahmood, Sana-ullah Khan, Tahir Hameed, Syed Tanvir Haider, Javed Iqbal, Vol - I, National Book Foundation

Math-113 APPLIED MATHEMATICS-I

INSTRUCTIONAL OBJECTIVES

1 USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATIONS

1.1 Define a standard quadratic equation.
1.2 Use methods of factorization and method of completing the square for solving the equations.
1.3 Derive quadratic formula.
1.4 Write expression for the discriminant
1.5 Explain nature of the roots of a quadratic equation.
1.6 Calculate sum and product of the roots.
1.7 Form a quadratic equation from the given roots.
1.8 Solve problems involving quadratic equations.

2 UNDERSTAND APPLY CONCEPT OF ARITHMETIC PROGRESSION AND SERIES

2.1 Define an Arithmetic sequence and a series
2.2 Derive formula for the nth term of an A.P.
2.3 Explain Arithmetic Mean between two given numbers
2.4 Insert n Arithmetic means between two numbers
2.5 Derive formulas for summation of an Arithmetic series
2.6 Solve problems on Arithmetic Progression and Series

3 UNDERSTAND GEOMETRIC PROGRESSION AND SERIES

3.1 Define a geometric sequence and a series.
3.2 Derive formula for nth term of a G.P.
3.3 Explain geometric mean between two numbers.
3.4 Insert n geometric means between two numbers.
3.5 Derive a formula for the summation of geometric Series.
3.6 Deduce a formula for the summation of an infinite G.P.
3.7 Solve problems using these formulas.

4 EXPAND AND EXTRACT ROOTS OF A BINOMIAL

4.1 State binomial theorem for positive integral index.
4.2 Explain binomial coefficients: (n,0), (n,1)……..(n,r),…….(n,n)
4.3 Derive expression for the general term.
4.4 Calculate the specified terms.
4.5 Expand a binomial of a given index. -

4.6 Extract the specified roots
4.7 Compute the approximate value to a given decimal place.
4.8 Solve problems involving binomials.

5 RESOLVE A SINGLE FRACTION INTO PARTIAL FRACTIONS USING DIFFERENT METHODS.

5.1 Define a partial fraction, a proper and an improper fraction.
5.2 Explain all the four types of partial fractions.
5.3 Set up equivalent partial fractions for each type.
5.4 Explain the methods for finding constants involved.
5.5 Resolve a single fraction into partial fractions.
5.6 Solve problems involving all the four types.

6 UNDERSTAND SYSTEMS OF MEASUREMENT OF ANGLES.

6.1 Define angles and the related terms.
6.2 Illustrate the generation of angle.
6.3 Explain sexagesimal and circular systems for the measurement of angles
6.4 Derive the relationship between radian and degree.
6.5 Convert radians to degrees and vice versa.
6.6 Derive a formula for the circular measure of a central angle.
6.7 Use this formula for solving problems.

7 APPLY BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRIC FUNCTIONS

7.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sides of a right triangle.
7.2 Derive fundamental identities.
7.3 Find trigonometric ratios of particular angles.
7.4 Draw the graph of trigonometric functions.
7.5 Solve problems involving trigonometric functions.

8 USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICAL PROBLEMS

8.1 List fundamental identities
8.2 Prove the fundamental law
8.3 Deduce important results
8.4 Derive-sum and difference formulas
8.5 Establish half angle, double angle & triple angle formulas
8.6 Convert sum or difference into product& vice versa
8.7 Solve problems

9 USE CONCEPTS, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES

9.1 Define angle of elevation and angle of depression.

9.2 Prove the law of sins and the law of cosines.
9.3 Explain elements of a triangle.
9.4 Solve triangles and the problems involving heights and distances.

10 USE PRINCIPLES OF MENSTRUATION IN FINDING SURFACES, VOLUME AND WEIGHTS OF SOLIDS.

10.1 Define menstruation of plane and solid figures
10.2 List formulas for perimeters & areas of plane figure.
10.3 Define pyramid and cone.
10.4 Define frusta of pyramid and cone.
10.5 Define a sphere and a shell.
10.6 Calculate the total surface and volume of each type of solid.
10.7 Compute weight of solids.
10.8 Solve problems of these solids.

11. USE THE CONCEPT AND PRINCIPLES OF VECTORS IN SOLVING TECHNOLOGICAL PROBLEMS.

11.1 Define vector quantity.
11.2 Explain addition and subtraction of vector
11.3 Illustrate unit vectors I, j, k.
11.4 Express a vector in the component form.
11.5 Explain magnitude, unit vector, direction cosines of a vector.
11.6 Derive analytic expression for dot product and cross product of two vectors.
11.7 Deduce conditions of perpendicularly and parallelism of two vectors.
11.8 Solve problems

12. USE THE CONCEPT OF MATRICES & DETERMINANTS IN SOLVING TECHNOLOGICAL PROBLEMS

12.1 Define a matrix and a determinant.
12.2 List types of matrices.
12.3 Define transpose, ad joint and inverse of a matrix.
12.4 State properties of determinants.
12.5 Explain basic concepts.
12.6 Explain algebra of matrices.
12.7 Solve linear equation by matrices.
12.8 Explain the solution of a determinant.
12.9 Use Crammers Rule for solving linear equations

Ch-112 APPLIED CHEMISTRY

T	P	C
1	3	2

Total Contact Hours

Theory **32**

Practical 9**6**

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 practical's in a Chemistry lab.

COURSE CONTENTS

1 INTRODUCTION AND FUNDAMENTAL CONCEPTS 2 Hrs

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 2 Hrs

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 2 Hrs

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 2 Hrs

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
4.5 Boiler feed water, scales & treatment

4.6 Sea-water desalination, sewage treatment

5 ACIDS, BASES AND SALTS 2 Hrs
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 2 Hrs
6.1 The process, definition& examples
6.2 Oxidizing and reducing agents
6.3 Oxides and their classifications

7 NUCLEAR CHEMISTRY 2 Hrs
7.1 Introduction
7.2 Radioactivity (alpha, beta and gamma rays)
7.3 Half life process
7.4 Nuclear reaction & transformation of elements

8 CEMENT 2 Hrs
8.1 Introduction
8.2 Composition and manufacture
8.3 Chemistry of setting and hardening
8.4 Special purpose cements

9 GLASS 2 Hrs
9.1 Composition and raw material
9.2 Manufacture
9.3 Varieties and uses

10 PLASTICS AND POLYMERS 2 Hrs
10.1 Introduction and importance
10.2 Classification
10.3 Manufacture
10.4 Properties and uses

11 PAINTS, VARNISHES AND DISTEMPER 2 Hrs
11.1 Introduction
11.2 Constituents
11.3 Preparation and uses

12 CORROSION 2 Hrs
12.1 Introduction with causes

12.2 Types of corrosion
12.3 Rusting of iron
12.4 Protective measures against-corrosion

13 REFRACTORY MATERIALS AND ABRASIVE 2 Hrs
13.1 Introduction to Refractories
13.2 Classification of Refractories
13.3 Properties and Uses
13.4 Introduction to Abrasives
13.5 Artificial and Natural Abrasives and their uses

14 ALLOYS 2 Hrs
14.1 Introduction with need
14.2 Preparation and Properties
14.3 Some Important alloys and their composition
14.4 Uses

15 FUELS AND COMBUSTION 2 Hrs
15.1 Introduction of fuels
15.2 Classification of fuels
15.3 Combustion
15.4 Numerical Problems of Combustion

16 LUBRICANTS 1 Hr
16.1 Introduction.
16.2 Classification.
16.3 Properties of lubricants.
16.4 Selection of lubricants:

17 POLLUTION 1 Hr
17.1 The problem and its dangers.
17.2 Causes of pollution.
17.3 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 McGraw 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 ho. 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/Iiter, 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 sea water

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 it least six examples of each
6.6 Define oxides
6.7 Classify the oxides and give example

7 UNDERSTAND THE FUNDAMENTALS OF NUCLEAR CHEMISTRY

7.1 Define nuclear chemistry and radio activity
7.2 Differentiate between alphas, Beta and Gamma particles
7.3 Explain hall-life process
7.4 Explain at least six nuclei reactions resulting in the transformation of some elements
7.5" State important uses of isotopes

8 UNDERSTAND THE MANUFACTURE, SETTING AND HARDENING CEMENT

8.1 Define port land cement and give its composition
8.2 Describe the method of manufacture
8.3 Describe the chemistry of setting and hardening of cement
8.4 Distinguish between ordinary and special purpose cement

9 UNDERSTAND THE PROCESS OF MANUFACTURE OF GLASS.

9.1 Define glass
9.2 Describe its composition and raw materials
9.3 Describe the manufacture of glass
9.4 explain its varieties and uses

10 UNDERSTAND THE NATURE AND IMPORTANCE OF PLASTICS POLYMERS

10.1. Define plastics and polymers
10.2 Explain the mechanism of polymerization
10.3 Describe the preparation and uses of some plastics/polymers

11 KNOW THE CHEMISTRY OF PAINTS, VARNISHES AND DISTEMPERS

11.1 Define paints, varnishes and distemper
11.2 State composition of each

11.3 State methods of preparation of each and their uses

12 UNDERSTAND THE PROCESS OF CORROSION WITH ITS CAUSES AND TYPES

12.1 Define corrosion
12.2 Describe different types of corrosion
12.3 State the causes of corrosion
12.4 Explain the process of rusting of iron
J2.5 Describe methods to prevent/control corrosion

13 UNDERSTAND THE NATURE OF REFRACTORY MATERIALS AND ABRASIVE

13.1 Define refractory materials
13.2 Classify refractory materials
13.3 Describe properties and uses of refractories
13.4 Define abrasive.
13.5 Classify natural and artificial abrasives
13.6 Describe uses of abrasives

14 UNDERSTAND THE NATURE AND IMPORTANCE OF ALLOYS

14.1 Define alloy
14.2 Describe different methods for the preparation of alloys
14.3 Describe important properties of alloys
14 4 Enlist some important alloys with their composition, properties and uses

15 UNDERSTAND THE NATURE OF FUELS AND THEIR COMBUSTION

15.1 Define fuels
15.2 Classify fuels and make distinction of solid, liquid & gaseous fuels
15.3 Describe important Fuels
15.4 Explain combustion
15.5 Calculate air quantities in combustion, gases

16 UNDERSTAND THE NATURE OF LUBRICANTS.

16.1 Define a lubricant
16.2 Explain the uses of lubricants
16.3 Classify lubricants and cite examples
16.4 State important properties of oils, greases and solid lubricants
16.5 State the criteria for the selection of lubricant tor, particular purpose/job

17 UNDERSTAND THE NATURE OF POLLUTION

17.1 Define Pollution (air. water, food)

17.2 Describe the causes of environmental pollution.

17.3 Enlist some common pollutants.

17.4 Explain methods to prevent pollution

CH-112 APPLIED CHEMISTRY 96 Hours

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 vasomotor.
8. To find the surface tension of a liquid with a stalagmometer.
9. To perform electrolysis of water to produce Hydrogen and Oxygen.
10. To determine the chemical equivalent of copper by electrolysis of Cu SO.
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^{+++}).
16. To detect and confirm II-B radicals Sn^{+++}, Sb^{+++}, As^{+++}).
17. To get introduction with the scheme of III group radicals (Fe^{+++} - Al^{+++}, Cr^{+++})
18. To detect and confirm Fe^{+++}, Al^{+++} and Cr^{+++}.
19. To get introduction with he scheme of IV group radicals.
20. To detect and confirm An^{++} and Mn^{++} radicals of IV group.
21. To detect and conform Co^{++} and Ni^{++} radicals of IV group.
22. To get introduction with the Acid Radical Scheme.
23. To detect dilute acid group.
24. To detect and confirm CO''_3 and HCO'_3 radicals.
25. To get introduction with the methods/apparatus of conducting volumetric estimations.
26. To prepare standard solution of a substance.

27. To find the strength of a given alkali solution.
28. To estimate HCO'_3 contents in water.
29. To find out the %age composition of a mixture solution of KNO_3 and KOH volumetrically.
30. To find the amount of chloride ions (Cl') in water volumetrically.

Phy 122 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 Fibre.**	**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 Practical.

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 vernier callipers.
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 lense 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-124 **CIVIL ENGINEERING SURVEYING-I**

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

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

COURSE CONTENTS

1. Introduction to Surveying 4 Hours

1.1 Definition of surveying
1.2 Divisions of surveying (Geodetic, Plane)
1.3 Classes of Surveying (Preliminary, Control and Layout Surveying)
1.4 Types of Surveying (Based on function and instrument)
1.5 Types of Surveying Instruments
1.6 Fundamental principles of surveying
1.7 Units of measurement
1.8 Accuracy and Precision in surveying

2 Distance Measurement 4 Hours

2.1 Distance measurement
2.2 Distance Measuring Techniques
2.3 Ranging
2.4 Introduction of chains
2.5 Taping
2.6 Taping corrections
2.7 Electronic Distance Measurement (EDM)
2.8 Measurement of base line
2.9 Offsets

3 Levelling 22 Hours

3.1 Introduction.
3.2 Definitions of different terms related to levelling
3.3 Bench mark and its types.
3.4 Types of levelling instruments, component parts
3.5 Types of levelling staves
3.6 Adjustment of a level(Temporary, Permanent)
3.7 Booking of measurement- height of instrument and rise & fall method, finding missing data in a level book page.
3.8 Finding Reduced Levels
3.9 Types of levelling.
3.10 Errors and corrections in levelling

3.11 Finding horizontal distances & elevations of different objects by tacheometry.
3.12 Introduction and use of Laser Level.

4 Contouring 6 Hours

4.1 Introduction to contouring and technical terms
4.2 Purpose and use of contour map
4.3 Characteristics of contour lines
4.4 Methods of contouring

5 **Angular measurements** 18 Hours

5.1 Introduction to Horizontal and vertical angles
5.2 Introduction to Bearing, Meridian & Azimuths
5.3 Bearing computations
5.4 Measurement of Bearing using Compass
5.5 Introduction to theodolite, types and parts
5.6 Technical terms associated with theodolite
5.7 Adjustment of theodolite
5.8 Measurement using theodolite
5.9 Measurement of line through different obstacles using triangulation approach

6 Traversing 10 Hours

6.1 Introduction, significance, types & methods of traversing
6.2 Accuracy of traversing
6.3 Checks upon of open & closed traverse
6.4 Plotting & graphical adjustment of closing error

RECOMMENDED / REFERENCE BOOKS:

1. Kavanagh, B.F. and Bird, S.J., 2014. Surveying: Principles and applications
2. Clark, D., 1923. *Plane and geodetic surveying for engineers* (Vol. 1). Constable.
3. Kanetkar, T.P. and Kulkarni, S.V., 2000. *Surveying and leveling*. A.V.G Publications..
4. Basak, N.N., 1994. *Surveying & Levelling*. McGraw-Hill Education.
5. S. K. Husain, M. S. Nagaraj, 1981, *Textbook of Surveying*, S. Chand.
6. Roy, S.K., 2010. *Fundamentals of surveying*. PHI Learning Pvt. Ltd..
7. **Rasul Manual** (volume I & II) on surveying

CIVIL 124 CIVIL ENGINEERING SURVEYING-I

INSTRUCTIONAL OBJECTIVES

1. Know Basic Facts About Surveying

1.1 Define Surveying.
1.2 State the purpose of surveying
1.3 State the divisions (plane, geodetic)
1.4 State classes of survey (Preliminary survey, control survey, layout survey)
1.5 State classification of surveying based on function of survey and type of instrument used including Chain & Compass Surveying, Control surveying, Land surveying, Topographic Surveying, Engineering Surveys, Cadastral Surveys.
1.6 Explain instruments used in surveying
1.7 State the fundamental principles of surveying
1.8 State units of measurement
1.9 Differentiate between accuracy and precision

2. Understand the Techniques of Distance Measurement

2.1 State distance measurement (horizontal, vertical and slope distance)
2.2 State distance measuring techniques (direct and indirect)
2.3 Explain procedure of ranging
2.4 State chains used in survey in 18^{th} and 19^{th} centuries
2.5 State taping, types of taping and accessories used in distance measurement with tapes for accurate measurement.
2.6 Explain taping correction along with computations
2.7 Explain the electronic distance measurement briefly
2.8 Enlist the steps in measurement of base line
2.9 Describe offsets and its types

3. Understand the Principles of Levelling for Different Engineering Purposes

3.1 Define levelling and describe the purpose of levelling.
3.2 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.
3.3 Describe bench mark and its types.
3.4 Identify the parts and function of various types of tilting levels, Auto set level and digital level
3.5 Explain with sketches levelling staves and their uses.
3.6 List the steps involved in performing temporary adjustment of a level.
3.7 Compute the reduced levels by rise & fall method and height of instrument method and recording the same on level book.
3.8 Determine the missing data of a level book page.
3.9 Define fly levelling, Longitudinal sectioning, cross-sectioning, reciprocal levelling, precise levelling, Barometric levelling .
3.10 State precautions in levelling operation.
3.11 Describe the procedures for taking readings to plot L-section x-section, and for reciprocal

levelling precise levelling etc.
3.12 Plot X-section and L-section
3.13 Solve numerical problem on reciprocal levelling
3.14 Describe errors in levelling
3.15 Compute correction due to curvature and refraction
3.16 Describe parts and functions of Laser Level
3.17 Explain the procedure of levelling by use of Laser Level.

4. Understand Methods of Contouring and Computation of Volumes

4.1 Define the terms relating to contouring and explain characteristics and the purpose of contouring
4.2 Explain the uses of contour map.
4.3 Explain the methods of performing contour survey.
4.4 Interpolate contours on a plan.
4.5 Explain the procedure to lay down alignment of road, railway and channel on contour map and describe procedure for measuring gradient.
4.6 Compute the capacity of reservoirs and volume of earth from the contour map.

5. Understand the Methods of Finding out Directions and Measurement of Angles

5.1 Define the terms horizontal angle and vertical angle
5.2 Define meridian and state its types
5.3 Define azimuths and bearings
5.4 Describe types of bearing based on direction and quadrants
5.5 Solve problems relating to bearings
5.6 State compass, its types, its parts and explain reading from it.
5.7 Define theodolite, sketch & label theodolite and list the types of theodolites
5.8 Define the terms; centring, transiting, face left, Face right, swinging the telescope, axis of level tube, horizontal & vertical axis
5.9 Explain the procedure of temporary adjustment of a theodolites
5.10 Explain the procedure of measuring horizontal & vertical angles.
5.11 Explain the procedure of setting out an angle and prolonging a line
5.12 Explain the procedure of fixing inter-mediate points between two given points
5.13 Explain procedure of measuring distance by stadia formula
5.14 Explain measurement of line through obstacle using triangulation

6. Understand the Methods of Traversing

6.1 Define the traverse and types of traverses
6.2 State the standards of accuracy in linear and angular measurement.
6.3 Checks on open and closed traverse
6.4 Explain various methods of traversing and enlist steps involved in traversing
6.5 Compute the bearings from angles & vice versa of traverse.
6.6 Explain the method of plotting traverse and adjustment of closing error.

CIVIL 124 CIVIL ENGINEERING SURVEYING-I

LIST OF PRACTICALS 192 HOURS

1. Perform pacing & ranging of various lines
2. Distance measurement by taping and comparison with pacing
3. Measurement of a survey line by taping and chaining
4. Measurement of a baseline using tape and apply taping corrections
5. Taking offsets from baseline using tape
6. Measurement of a survey line by EDM
7. Reading different types of staves.
8. Temporary adjustment of level and taking readings. (by auto set level)
9. Levelling of a line
10. Taking reduced levels of various points and recording in the field book. (by auto set level)
11. Fly levelling and finding R.Ls by height of collimation and rise &fall method. (by auto set level)
12. Shifting of Bench Mark by precise levelling
13. Route levelling (by auto set level).
14. Reciprocal levelling and its booking.
15. Finding and setting gradient using a level and staff.
16. Calculation of earth work by taking longitudinal section and cross section of a 1/2 mile long route.
17. Levelling by Laser Level (Fly Levelling, Route Levelling).
18. Determination of horizontal & vertical distances by stadia tacheometry.
19. Contouring of small area by radial and square method and preparing of a contour map
20. Practice to perform temporary adjustment of theodolite on a station. (by digital theodolite)
21. Measurement of horizontal angles. (by digital theodolite)
22. Practice to measure the horizontal angle by repetition and reiteration method (by digital theodolite)
23. Setting out angles in the field (by digital theodolite)
24. Practice to measure the magnetic bearing of a line (by digital theodolite)
25. Practice to prolong a survey line and lining-in.
26. Practice to measure the vertical angle (by digital theodolite)
27. Practice to measure the height of building or tower by digital theodolite. **(trigonometric levelling)**
28. Exercise to Compute the bearings from measured angles

DAE CIVIL TECHNOLOGY
YEAR 1

CIVIL-153 CIVIL ENGINEERING MATERIALS & BUILDING CONSTRUCTION

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

LEARNING OUTCOMES:

The student will be able to:

1. Identify the suitable construction materials, their characteristics and uses as building materials
2. Understand the fundamentals of building construction skills

COURSE CONTENTS

1. Bricks, Tiles and Blocks 5Hours

1.1 Introduction and evolution of bricks, tiles and blocks
1.2 Manufacturing schematic diagram of building clay products
1.3 Classification and characteristics of bricks& tiles with their uses
1.4 Types and Characteristics of construction blocks

2 Rocks, Stones and Aggregates 5Hours

2.1 Introduction to rocks, stones and aggregates
2.2 Quarrying and dressing of stone
2.3 Characteristics and uses of building stones
2.4 Classification of aggregates
2.5 Characteristics and uses of coarse & fine aggregates
2.6 Bulking of Sand
2.7 Deleterious matters in aggregates and washing of aggregates

3 Binding Materials 4Hours

3.1 Evolution of binding materials
3.2 Introduction to cement
3.3 Hydration process
3.4 Types of cement and their uses
3.5 Tests on cement
3.6 Bitumen, asphalt and tar grades and their uses
3.7 Types and uses of different pozzolanic materials
3.8 Introduction to different adhesives

4 Mortars and Concrete 3 Hours

4.1 Introduction to mortar and concrete
4.2 Mortar mix ratios and uses
4.3 Composition and proportioning of concrete
4.4 Batching of materials for mortar and concrete
4.5 Mixing of mortar and concrete materials

4.6 Transportation and compaction
4.7 Surface finishing and curing

5 Metals 3Hours

5.1 Types of ferrous and non-ferrous metals
5.2 Rolled steel sections and their uses in building construction.
5.3 Types of steel used in reinforced cement concrete
5.4 Properties and uses of steel for steel structures
5.5 Properties and uses of non-ferrous metals
5.6 Introduction to alloy steel

6 Timber 4Hours

6.1 Introduction to timber
6.2 Structure of timber and its classification
6.3 Characteristics of timber
6.4 Seasoning of timber
6.5 Diseases and decay with remedial measures
6.6 Wood products used in construction industry

7 Paints, Enamels and Varnishes 4Hours

7.1 Introduction to paints, enamels and varnishes
7.2 Types and uses of paints, enamels and varnishes
7.3 French polish types and uses.

8 Composite Materials 2Hours

8.1 Introduction to composite materials
8.2 Types and benefits of composite materials
8.4 Application of composite materials

9 Miscellaneous Materials 5 Hours

9.1 Materials and uses for heat, sound, water and fire proofing
9.2 Types, characteristics and uses of glass, fibre, plastic, linoleum, rubber and geosynthetic materials
9.3 Types, characteristics and uses of gypsum, ebonite and asbestos

10 Introduction to Building Construction 2 Hours

10.1 Building Classification
10.2 Elements of building and their functions
10.3 Steps of frame structure building construction

11 Building Components and their Construction Techniques

11.1 **Foundations** 3 Hours

11.1.1 Function of a building foundation
11.1.2 Bearing capacity of soil for foundation
11.1.3 Types of shallow and deep foundation and its suitability
11.1.4 Thumb rule for minimum depth, width and thickness of foundation

11.2 **Masonry work** 3 Hours

11.2.1 Function of masonry work
11.2.2 Brick bonds and their types
11.2.3 Brick masonry work
11.2.4 Classification of stone masonry
11.2.5 Block masonry and its uses

11.3 **Floors and Flooring** 4 Hours

11.3.1 Function of floors
11.3.2 Basic components of floor structure
11.3.3 Types of floors and flooring materials
11.3.4 Factors affecting the choice of materials
11.3.5 Composite floors

11.4 **Damp Proof Course** 2 Hours

11.4.1 Causes and effects of dampness
11.4.2 Necessity, Types and materials used for D.P.C
11.4.3 Methods of preventing dampness in structures

11.5 **Walls, Arches and Lintels** 3Hours

11.5.1 Purpose of walls
11.5.2 Classification of walls according to function and material
11.5.3 Classification of arches, terminologies, parts, and functions
11.5.4 Methods of different types of arch's construction
11.5.5 Lintels-types and construction
11.5.6 Plinth beams and grade beams

11.6 **Doors, windows and ventilators** 4Hours

11.6.1 Function and parts of doors, windows and ventilators
11.6.2 Types of doors and windows
11.6.3 Fixing the doors and windows
11.6.4 Fittings of doors, windows and ventilators

11.7 **Roofs** 4Hours

11.7.1 Definition, function
11.7.2 Classification of roofs
11.7.3 Pitched roofs and its types
11.7.4 Flat roof covering materials

11.8 Surface Finishing 4 Hours

11.8.1 Finishing of different types of pointing, plaster, and concrete surfaces
11.8.2 White washing, distempering and painting on different types of surfaces
11.8.3 Functions of wall, floor and ceiling finishes
11.8.4 Graffito & rock wall finishing

RECOMMENDED / REFERENCE BOOKS:

1. Duggal, S.K., 2017. *Building materials*. Routledge.
2. Singh, S.K., 1979. *Engineering materials*. Vikas Publishing House.
3. Raj, P.P., 2017. *Building construction materials and techniques*. Pearson Education India.
4. Varghese, P.C., 2016. *Building construction*. PHI Learning Pvt. Ltd..
5. Arora, N.L. and Gupta, B.R., 1988. *Building construction*. Satya Prakashan.
6. Fleming, E., 2009. *Construction Technology: an illustrated introduction*. John Wiley & Sons.
7. Allen, E. and Iano, J., 2019. *Fundamentals of building construction: materials and methods*. John Wiley & Sons.
8. Kulkarni, G.J., 1956. *A Text book of building construction*.
9. Marotta, T.W., 2005. *Basic construction materials*. Pearson Apprentice-Hall
10. Specifications of Materials Vol-I **Govt. of Pakistan**

CIVIL-153 CIVIL ENGINEERING MATERIALS & BUILDING CONSTRUCTION

INSTRUCTIONAL OBJECTIVES

1. Understand the Selection of Suitable Bricks, Tiles and Blocks for Construction Work

1.1 Introduction of bricks, tiles and blocks and describe their evolution
1.2 Describe the manufacturing schematic diagram of building clay products
1.3 Explain the classification and characteristics of bricks & tiles with their uses
1.4 Explain the types and characteristics of construction blocks

2. Understand about the Selection of Stones and Aggregates and their suitability for Construction Work.

2.1 Introduction to rocks, stones and aggregates
2.2 Describe quarrying and dressing of stone
2.3 Explain characteristics and uses of building stone
2.4 Introduction to aggregates and explain its classification
2.5 Describe the characteristics and uses of coarse and fine aggregates
2.6 State about the bulking of sand
2.7 Explain the effect of deleterious matters in aggregates and washing of aggregate

3. Understand the Evolution Process of Binding Materials and their uses for different Construction Work

3.1 State the evolution of different binding materials
3.2 Introduction to cement
3.3 Describe the hydration process
3.4 Explain the types of cement and their uses
3.5 Explain different test on cement
3.6 Explain bitumen, asphalt and tar grades and their uses
3.7 State the types and uses of different pozzolanic materials i.e. lime, fly ash, rise husk ash, blast furnace slag, calcined clay pozzolana (surkhi) and silica fume as binding material
3.8 Introduction to different adhesives

4. Understand the method of Preparation of Mortars and Concrete and their ratios for different Construction Works

4.1 State the definition and types of mortar and concrete
4.2 Explain mortar mix ratios and uses in different works
4.3 Explain composition and proportioning of concrete
4.4 Describe batching of materials for mortar and concrete
4.5 Explain mixing of mortar and concrete materials
4.6 Explain transportation and compaction
4.7 Explain surfacing finishing and curing

5. Recognize the Properties and Uses of Metals in Construction Work

5.1 State the types of ferrous and non-ferrous metals
5.2 State the rolled steel sections and their uses in building construction
5.3 State the types of steel used in reinforced cement concrete
5.4 Describe the properties and uses of non-ferrous metals
5.5 State the introduction to alloy steel

6. Know the Selection of Suitable Timber for Construction Work

6.1 Introduction to timber
6.2 Explain the structure of timber and its classification
6.3 State the characteristics of timber
6.4 Describe the seasoning of timber
6.5 State the diseases and decay with remedial measures
6.6 Describe the wood products used in construction industry

7. Know the Selection of Appropriate Paint, Enamels and Varnishes for Construction Work

7.1 Introduction to paints, enamels and varnishes
7.2 Explain different types and uses of paints, enamels and varnishes
7.3 Describe French polish, their types and uses

8. Understand different types of Composite materials, their Benefits and Applications

8.1 Describe the fundamentals of composite materials, matrices, reinforcement (glass fibres, natural fibres, carbon fibres), particulate (sand, talc, coloured chips, recycled glass).
8.2 Describe the types of composite materials (Traditional- Wood, brick, steel, concrete, disc brake pads) Polymers and benefits of composite materials
8.3 Describe the applications of composite materials

9. Understand the Characteristics and Uses of Miscellaneous Materials

9.1 Materials and uses for heat, sound, water and fire proofing
9.2 Explain types, characteristics and uses of glass, fibre, plastic, linoleum, rubber and geosynthetic materials
9.3 Explain types, characteristics and uses of gypsum, ebonite and asbestos

10. **Know the Building Construction its components and process of Building Construction**

10.1 Define Building and state the classification of buildings (agricultural, commercial, residential, Educational, Government, industrial, religious, Military, Transport etc.) with examples
10.2 Various components of building and their function
10.3 Construction process of a frame structure building

11. Understand the Components of Building and their Construction Techniques

11.1 **Suitability and Design and selection of Common Types of Foundations**

11.1.1 Describe function of a building foundation
11.1.2 Describe bearing capacity of soil for foundation
11.1.3 Explain types of shallow and deep foundation and its suitability
11.1.4 State the thumb rule for minimum depth, width and thickness of foundation

11.2 **Understand about Different Masonry Works**

11.2.1 Define the technical terms related to masonry work
11.2.2 Describe brick bonds and their types i.e. English bond, Flemish bond, herring bone bond, zigzag bond, and garden wall bond
11.2.3 Describe the brick masonry work
11.2.4 Explain the different types of stone masonry i.e. ashlar masonry, random rubble
11.2.5 Explain the different types and uses of block masonry i.e. hallow and solid blocks

11.3 **Understand about the floor, selection of different flooring materials for different buildings**

11.3.1 State the function of floors
11.3.2 Definition of floors and state the basic components of floor structure
11.3.3 Explain different types of floors i.e. ground floor, suspended floors and basement floors and describe the types of flooring w.r.t materials i.e. mud, brick, tile, marble, R.C.C etc.
11.3.4 State the factor affecting the choice of materials
11.3.5 Describe the composite floor

11.4 **Understand the Function of Damp Proof Course and Termite proofing in a Building**

11.4.1 State the causes and effects of dampness
11.4.2 Describe the necessity, types and materials used for D.P.C
11.4.3 Explain the methods of preventing dampness in structures

11.5 **Understand the Constructions and Suitability of Various Types of Walls, Arches and Lintels in Construction Work**

11.5.1 Describe the purpose of wall
11.5.2 Explain the classification of walls according to functions and materials
11.5.3 Explain the classification of arches, terminologies, parts and functions
11.5.4 Explain methods of different types arch construction
11.5.5 Describe the types of lintels and construction
11.5.6 State about plinth beam and grade beams

11.6 **Understand the Construction and Methods of Fixation of Common Types of Doors and Windows and ventilators**

11.6.1 Function and parts of doors, windows& ventilators
11.6.2 Explain the types of doors and windows
11.6.3 Describe the fixing of doors, windows and ventilators
11.6.4 Enlist the fittings and fastenings used for door and windows

11.7 **Understand the Methods of Construction of Roofs**

11.7.1 State the definition and functions of roofs
11.7.2 State the classifications of roofs i.e. flat, pitched, shell and domes.
11.7.3 Explain pitched roofs and their types

11.7.4 Flat roof covering materials

11.8 Understand the Finishes Provided Over Masonry, Wood and Metal Work

11.8.1 Finishing of different types of pointing, plastering and concrete surfaces
11.8.2 White washing, distempering and painting on different types of surfaces
11.8.3 Function of wall, floor and ceiling finishes
11.8.4 Graffito & rock wall finishing

CIVIL-153 CIVIL ENGINEERING MATERIALS & BUILDING CONSTRUCTION

LIST OF PRACTICALS **96 HOURS**

1. Brick dimension tolerance, water absorption and efflorescence tests.
2. Compressive strength test for brick, tuff tile and concrete block.
3. **Visit to brick kiln and report submission.**
4. Particle size distribution of fine and coarse aggregates by sieve analysis.
5. Fineness test of cement.
6. Standard consistency test of cement paste.
7. Initial and final setting time test of cement
8. Le-Chatellier's test for soundness of cement.
9. **Visit to a cement factory and report submission.**
10. Determine clay percentage in sand.
11. Determination of bulk density and voids in aggregates.
12. Determination of specific gravity and water absorption of aggregates.
13. **Visit to nearby quarry/crusher and report submission.**
14. Preparation of mortar & concrete and use on some construction work
15. Practice for bonds in brickwork (English and Flemish bond)
16. Practice to construct of small masonry wall with mortar.
17. Practice in laying horizontal & vertical D.P.C.
18. Practice of plastering and pointing.
19. Practice to paint, Emulsion, Weather Sheild, enamelling and varnishing on different surfaces.
20. Practice of tiles fixing with finishing.
21. Demonstration of door/windows fixing.
22. Demonstration of fixing glass panes in door/windows.
23. Demonstration of false ceiling and cladding work.
24. **Visit to under construction project and report submission.**

DAE CIVIL TECHNOLOGY
YEAR 1
CIVIL 103 CIVIL ENGINEERING DRAWING-I

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

LEARNING OUTCOMES:
1. To understand proper use of drawing instruments for the preparation of geometric and multi-view drawings.
2. To apply the techniques of free hand sketching.

COURSE CONTENTS

1. Introduction to Drafting — 2 Hours

1.1 Scope and significance of drafting
1.2 Free hand sketching of plane and solid figures.

2. Engineering Drawing Instruments. — 3 Hours

2.1 Classification of drawing tools and their uses.
2.2 Scales.
2.3 Selection of pencil
2.4 Computer application for drafting.

3. Lettering/Printing. — 2 Hours

3.1 Introduction to lettering.
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 Inscribed and circumscribed figures.
4.4 Terms used in a circle.
4.5 Conical curves, ellipse, parabola, hyperbola and their applications in civil technology

5. Orthographic Projections. — 2 Hours

5.1 Planes andprincipal 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

6. Sectioning & Dimensioning. 4 Hours

6.1 Introduction to sectional views and cutting plan
6.2Introduction to dimensioning of elements.
6.3 Systems of dimensioning.

7. Pictorial Drawing 4 Hours

7.1 Introduction to pictorial drawings.
7.2 Types of pictorial drawing (Axonometric, Oblique, Perspective)
7.3 Isometric axis, arc, angles and scales.
7.4 Introduction to Auxiliary views

8. Building Drawing 9 Hours

8.1 Conventions and terms used for building drawing
8.2 Symbols used for public health &electrical installations.
8.3 Introduction to different plans of building drawing
8.4 Instructions for drawing plan, elevation and cross-section of single and double storey building.
8.5 Instructions to bath and kitchen arrangements.
8.6 Building bye-laws of Govt authorities
8.7 Categories of Government servant's residences
8.8 Submission drawings

9. House Planning 3Hours

9.1 Significance of house planning.
9.2 Site selection and factors affecting it
9.3 Introduction to factors affecting on the planning.

RECOMMENDED/REFERENCE BOOKS:

1. A text book on Basic Civil Engineering Drawing by TEVTA.
2. Z.A Siddiqui, 2011. *Basics of the Engineering Drawing*
3. Parkinson, A.C., 1961. *A First Year Engineering Drawing; Covering the First Year National Certificate Course in Mechanical Engineering*. Pitman.
4. Gurcharan Singh., 2005*Civil Engineering Drawing*. Standard Publishers Distributors.
5. Gupta, B.V.R., 2008. *Engineering Drawing*. IK International Pvt Ltd.
6. Bhatt, N.D., Panchal, V.M. and Ingle, P.R., 2010. *Engineering Drawing*. Charotar Publishing House Pvt. Limited.

CIVIL 103 CIVIL ENGINEERING DRAWING-I
INSTRUCTIONALOBJECTIVES

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 solid 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 arrow head 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.
6.10 Define dimensioning.
6.11 State the need of dimensioning drawings according to accepted standards
6.12 State the dimension and extension line.
6.13 State the length of arrow head.
6.14 Identify the system of placement of dimensions of a given dimensioned drawing.
6.15 Dimension a given drawing using standard notations and desired system of dimensioning.

7. Understand the Techniques of Pictorial Drawings.

7.1 Define pictorial drawing.
7.2 State the types of pictorial drawings and their general uses.
7.3 Sketch isometric axis, angles, scales, arcs and circles.
7.4 Differentiate between the isometric and non-isometric lines.
7.5 Sketch isometric drawing and isometric projection.
7.6 Sketch the isometric projection from the given orthographic drawings.
7.7 Explain the angle of receding axis
7.8 Define Oblique drawing.
7.9 Explain cavalier and cabinet oblique drawings.
7.10 Define perspective drawing.
7.11 Explain the purpose of perspective drawing.
7.12 State the vanishing point.
7.13 State the principles of making perspective views.
7.14 State the parallel and angular (diametric and trimetric) perspective.
7.15 State auxiliary views and auxiliary planes.
7.16 State necessity of auxiliary views.
7.17 State the types of auxiliary views i.e. primary and secondary auxiliary views.
7.18 State the types of auxiliary views due to their location with reference line i.e. symmetrical, unilateral and bilateral auxiliary views.
7.19 State the classes of primary views i.e. front top and profile auxiliary planes and oblique surfaces.
7.20 State the cases of secondary auxiliary views.

8. Understand the Types and Procedures of Building Drawing.

8.1 Define conventional symbols and give its importance.
8.2 Sketch the x-section of wall with flooring and roofing
8.3 Label the parts of given plan.
8.4 State the sizes of rooms for different classes of houses.
8.5 Follow measurements from a given plan.

8.6 Define site plan, detailed plan, layout plan, index plan, elevations & sections.
8.7 Sketch plans elevations and sections of buildings from given line diagrams.
8.8 Explain the procedure for preparing plans, elevations and sections for single storey and double storey buildings.
8.9 State the different fixtures required for bath, kitchen, dining and courtyards.
8.10 Sketch the different fixtures in kitchen and bathrooms at their proper places.

9. Know the Importance and Factors of House Planning.

9.1 Define House planning
9.2 State the necessity of house planning
9.3 State the factors, which govern the selection of site for building
9.4 Define orientation
9.5 State the factors affecting the planning of a house
9.6 State the minimum area of the building services
9.7 State principles of providing building services
9.8 State the inter-relationship of different rooms
9.9 Select materials for building structures
9.10 State the portion of different openings in building at their appropriate places
9.11 Draw sketches of different sizes of plots along with location of commercial area
9.12 State building bylaws of different authorities i.e., CDA, LDA and M.D.A
9.13 State the classes of residential buildings

CIVIL 103 CIVIL ENGINEERING DRAWING-I

192 Hours

LIST OF PRACTICALS

1. Printing/Lettering on graph paper
   i. Block printing in ratio 4:5 &4:7
   ii. Single stroke printing in ratio 4:5 &4:7
   iii. Italic printing; freehand, 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.
3. Freehand proportionate sketching & sketching to scale of lines, triangle, quadrilaterals, polygon and circle.
4. Construction of scales useful for civil engineering.
5. Drawing triangles with inscribed and circum scribed circles, hexagons inside and outside circle, cones, and conic sections (ellipse, parabola, and hyperbola).
6. Sketching three views of V-block and different wooden blocks.
7. Completion of missing views when two views are given.
8. Drawing of full sectional front view and outside top view of the hollow concrete block.
9. Drawing of full sectional front view, side view and top view of the prisms, pyramids of different types.
10. Drawing isometric views of a cube having circular hole in its focus and R.C.C. stairs (First three steps).
12. Perspective drawing of slotted block and different wooden blocks from there given principal views.
13. Draw partial, symmetrical and auxiliary view when top and front views are given, front and side views are given.
16. Draw the following features;
    Symbols used in building work including public health and electrical installation.
17. X-section of wall with foundation, floor and roof details. (9",13-1/2",20cm,30cmThick)
18. Line plan of a single room, two roomed quarter and C-Type (1500 sft plinth area) residence.
19. Detailed plan, elevation and section of;
    a) Single room with verandah.
    b) C-class residence
    c) Double storey building.
20. Foundation/layout plan of;
    a) C-type residence.
    b) A-class residence.(3500sft)

21.Detailed plan of;

a) A&C class bathroom showing internal arrangement.
b) Kitchen with internal fittings.

22.Drawing plan of C-type residence showing public health and water supply connections.

23.Draw layout plan for electrification and circuit diagram for C-type residence

24.Prepare Submission Drawings of a residential building.

DAE CIVIL TECHNOLOGY
YEAR 1

SHOP-131 **ENGINEERING WORKSHOP PRACTICE**

TOTAL CONTACT HOURS:	**96**	**T**	**P**	**C**
Theory:	**0**	**0**	**3**	**1**
Practical:	96			

LEARNING OUTCOME: To develop skills of basic woodwork and wiring tasks in building construction and proper use of tools and their maintenance.

COURSE CONTENTS

48 Hours

A- WOOD WORK

LIST OF PRACTICALS

1. Study safety precautions in wood working shop
2. Practice assembly/disassembly of jack plane and usage of various wood working planes. (tool exercise)
3. Practice Planning and squaring to dimensions (Job1)
4. Identifying and sharpening of wood working tools
5. Sawing Practice (Job2)
6. Wood chiseling (chipping)
7. Making Mortise and Tennon Joint (Job3)
8. Making dado Joint (Job4)
9. Making cross Lap Joint (Job 5)
10. Spirit polishing (preparing wood surface for polishing, staining and lacquering)
11. Boring Process, making holes of different diameters in wood (Job6)
12. Nailing and wood screwing process (Job7)
13. Making middle half cross lap joint (Job8)
14. Making dove tail joint (Job9)
15. Making wood working projects.

48 Hours

B- ELECTRICAL WIRING

LIST OF PRACTICALS

1. To study general safety precautions including PPE's
2. Introduction to single phase wiring accessories, tools and Electrical Instruments

(Ammeter, Voltmeter, Megger etc.) used in wiring.

3. Demonstration of treatment against electric shock.
4. Study causes of fire, types of fire (Class A,B,C, D, E) fire fighting equipment precautions during fire fighting, principle of fire fighting and demonstration of Fire fighting techniques and equipment
5. Ohm's law demonstration.
6. Verification of laws of combination of resistances demonstration.
7. Introduction to types of cables used in electric work.
8. Jointing of low, medium voltage cables and paper cables.
9. Demonstration of various protective devices.
10. Practice to control one lamp with a single way switch and two lamps individually by 1-way switches
11. Practice to control three lamps individually by 3 one way switches & install a fuse.
12. Practice to control one lamp from 2 different places. (Stair case circuit).
13. Practice to control a bell through indicator by push button and prepare Bell-indicator circuit (Hotelling circuit).
14. Practice to control three lamps in series and measure voltage drop across each lamp.
15. To construct a test board.
16. Study Pakistan electricity rules 1973, (25,28,29,32,40,46,49,51,57,58)

RECOMMENDED / REFERENCE BOOKS:

1. Khurmi, R.S. and Gupta, J.K., 2008. A textbook of workshop technology. S. Chand Publishing.
2. Chapman, W., 2019. *Workshop Technology Part 1*. Routledge.

DAE CIVIL TECHNOLOGY
YEAR 1

COMP-121	**COMPUTER APPLICATIONS**			
TOTAL CONTACT HOURS:	**96**	**T**	**P**	**C**
Theory:	0	**0**	**3**	**1**
Practical:	96			

LEARNING OUTCOME: To understand the operations of a computer and its applications such as basic skills on Windows, Microsoft Office, and its application in civil engineering.

RECOMMENDED / REFERENCE BOOKS:

1. Computer Applications for Beginners.
2. Microsoft Word by Dan Gookin Latest Version
3. Excel Made Easy Max Clark 2024
4. Microsoft Power Point by Dan Gookin Latest Version

LIST OF PRACTICALS **96 HOURS**

1. Identify computer hardware devices such as input/output devices
2. Identify computer softwares & their types
3. Identify IOT devices
4. Demonstration of windows interface
5. Practice of windows basic operation such as start, restart, shut down, log on/off, windows help
6. Practice of file/ folder manipulation
7. Use of windows search
8. Practice windows advance setting options
9. Practice of Partitioning & installation of windows
10. Setting up internet connection using internet browser
11. Use of internet browsing
12. Make/Maintain E-Mail address
13. Send/Receive E-Mail
14. Use option of file attachment in E-Mail
15. Explore data downloading options
16. Search teaching & learning Resources (TLRs)
17. Install MS-office package
18. Introduction to MS-Word & its interface
19. Practice file creation in MS-Word and its manipulation
20. Practice basic operations of MS-Word such as clip board, symbols, find/replace, character, paragraph, indentation, bullets & numbering, tables, page setup, spelling &

grammar, synonyms & thesaurus, word art, mail merge etc.

21. Make word document using the operations mentioned above
22. Practice printing documents
23. Introduction to MS-Excel & its interface
24. Practice file creation in MS-Word and its manipulation
25. Study data types, work sheets/work books, Row, Column, Cell
26. Practice basic operations of MS-Excel such as data input, data manipulation, formatting cells, formula application, function/wizard, data sorting, filtering data, table manipulation, creating macro, find/ replace data, merge, split cells, protection of files
27. Practice calculation for geometry, trigonometry & surveying using MS-Excel formulae
28. Practice using "IF" conditions in MS-Excel
29. Prepare charts and graphs using MS-Excel
30. Introduction to MS-Power Point & its interface
31. Practice creating, editing and organising a presentation
32. Practice basic operations of MS-Power point
33. Practice editing and formatting in MS-Power Point
34. Make a presentation using slide show and transition effects
35. Enhancing presentation by adding charts, graphs, tables, smart art, hyperlink and action button
36. Practicing and rehearsing presentation using presenter view using multimedia
37. Practice of printing, collaborating and sharing presentation

DAE CIVIL TECHNOLOGY

YEAR 2

اسلامیات/مطالعہ پاکستان

نصاب سال دوئم

GEN201

ٹی	پی	سی
1	0	1

حصہ اول اسلامیات

حصہ دوئم مطالعہ پاکستان

کل وقت 20 گھنٹے:

موضوعات:

1۔ سورۃ المومنون ایک تا گیارہ آیات کا ترجمہ مع تشریح

2۔ دس منتخب احادیث مع ترجمہ وتشریح

() خیر کم من تعلم القرآن و علمه

() لا ایمان لمن لا امانته له ولا دین لا من لا اعهد له

() و یاکم والظن ان الظن اکرب الحدیث

() من احدث فی امرنا هذا ما لیس منه فهورد

() من حمل علینا السلاح فلیس منا

() انا و کافل الیتیم فی الجنه

() لا ضرور ولا ضرار فی السلام

() کلکم راع و کلکم راع و کلکم مسول عن رعیته

3۔ سیرۃ طیبہ

() مکی زندگی۔ولادت۔بعثت۔ہجرت

() مدنی زندگی۔مواخات۔میثاق مدینہ۔فتح مکہ(اسباب ونتائج)

4۔ حضورﷺ بحیثیت

() خطبہ حجۃ الوداع۔انسانی حقوق کا اعلامیہ/حقوق انسانی پالیسی 2018

() معلم کامل۔سربراہ خاندان

5۔ اسلامی معاشرہ

نظام تعلیم اوراس کے مقاصد۔عدل وانصاف۔امر بالمعروف۔نہی عن المنکر۔انسانی حقوق کا معاشرتی اور معاشی ترقی میں کردار

جہاد۔کسب حلال۔مسجد(اہمیت وفضیلت)

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

حقوق آگاہی رمعلومات تک رسائی

۔ ملازم پیشہ خواتین کا تحفظ

اسلامیات

تدریس مقاصد:

عمومی مقاصد: طالب علم 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

() قرآنی آیات کی تشریح

() 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 نبوی:

عمومی مقاصد:

() احادیث کی روشنی میں اسلامی اخلاقی اقدار (انفرادی واجتماعی) 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

() احادیث کی دی گئی تعلیمات کے مطابق اپنی زندگی گزار سکے

سیرت طیبہ:

() عمومی مقاصد: حضورﷺ کی سیرت طیبہ کے بارے میں جان سکے

خصوصی مقاصد:

() حضورﷺ کی ابتدائی زندگی اختصار کے ساتھ بیان کر سکے

() حضورﷺ کی ہجرت کا واقع بیان کر سکے

() حضورﷺ کی مدنی زندگی اختصار سے بیان کر سکے

() حضورﷺ کی بطور معلم خصوصیات بیان کر سکے

() حضورﷺ کی بطور سربراہ بیان کر سکے

حضورﷺ بحیثیت

() خطبہ حجۃ الوداع۔ انسانی حقوق کا اعلامیہ حقوق انسانی پالیسی 2018 کے بارے جان سکے

اسلامی معاشرہ:

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

خصوصی مقاصد:

() اسلامی معاشرہ کا معنی و مفہوم 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 اور ضرورت بیان کر سکے

() جہاد کے لفظی و اصطلاحی معنی بیان کر سکے

() جہاد کی اہمیت بیان کر سکے

() جہاد اور قتل میں فرق بیان کر سکے

() جہاد کی مختلف اقسام بیان کر سکے

() لفظ مسجد کی تعریف بیان کر سکے

() مسجد کی سابقہ حیثیت کو بحال کرنے کے بارے میں اقدامات کو مان سکے

() انسانی حقوق کی معاشی اور معاشرتی ترقی میں اہمیت اور کردار بیان کر سکے

اسلامی ریاست:

عمومی مقاصد:

() اسلامی ریاست کی خصوصیات 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 ومقاصد بیان کر سکے

() اسلامی ریاست کے قیام کی لیے جدوجہد کر سکے

() حقوق آگاہی رمعلومات تک رسائی کا قانون جان سکے

() ملازمت پیشہ خواتین کے حقوق کا تحفظ جان سکے اور

() معاشرے میں خواتین کے حقوق کا تحفظ یقینی بنائے

نصاب مطالعہ پاکستان

ٹی	پی	سی
1	0	1

کل وقت 12 گھنٹے

سال دوئم

حصہ دوم

موضوعات:

() دوقومی نظریہ
() تحریک پاکستان
() انڈین کانگریس
() مسلم لیگ
() تقسیم بنگال
() میثاق لکھنو
() تحریک خلافت
() سندھو تحریک
() تجاویز دہلی
() نہرو رپورٹ
() قائداعظم کے چودہ نکات
() خطبہ آلہ آباد
() انتخابات 1938 اور انتقال اقتدار
() قرارداد پاکستان

حصہ دوم

مطالعہ پاکستان

تدریس مقاصد:

تحریک پاکستان:

عمومی مقاصد:

() قیام پاکستان کے اسباب وتحریک کو بیان کر سکے

خصوصی مقاصد:

() قومیت کے مفہوم کو بیان کر سکے

() دو قومی نظریہ کی تعریف وتوضیح کر سکے

() دوقومی نظریہ کی اہمیت بیان کر سکے

() ہندوستانی مسلمانوں کی محرومیوں کو بیان کر سکے

() قومی تشخص کو بحال رکھنے کے لیے مسلمانان ہند کی مساعی بیان کر سکے

() آزادی ہند اور قیام پاکستان علامہ اقبال اور قائداعظم کی مساعی بیان کریں

() قیام پاکستان سے مستقبل اسلامی مملکت کے قیام کے لیے مسلم عوام کی کوششوں کو بیان کر سکے

() مسلم لیگ کے قیام پاکستان کے لیے جدو جہد بیان کر سکے

(غیر مسلم طلباء کے لیے)

نصاب اخلاقیات

ٹی	پی	سی
1	0	1

سال دوم

کل وقت 20 گھنٹے

موضوعات:

معاشرتی اقدار بلحاظ ہمسایہ۔قوم۔قومی سطح۔شہری سطح۔صنعتی اداروں کی سطح۔ضروریات۔ورثہ

() حقوق وفرائض
() قوت برداشت
() قوت ارادی
() لگن وجذبہ
() وسیع النظری
() بے غرضی
() انسانی دوستی
() حفاظتی شعور
() پاس آزادی
() کامل آگاہی
() تغیرات کو قبول کرنا
() خودشناسی
() انسانی حقوق کا اعلامیہ/حقوق انسانی پالیسی 2018
() انسانی حقوق کا معاشرتی اور معاشی ترقی میں کردار
() حقوق آگاہی/معلومات تک رسائی۔ملازم پیشہ خواتین کا تحفظ

نصاب اخلاقیات

سال دوم

تدریس مقاصد:

طالب علم اخلاقیات کی اہمیت وضرورت 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 اثرات پیدا کرنے کے طریقے بیان کر سکے

() اعلیٰ اخلاقی اقدار میں سے قوت برداشت۔قوت ارادی۔لگن وجذبہ۔وسیع النظری۔بے غرض۔انسانی دوستی شعور۔پاس آزادی۔کامل آگاہی اور خود شناسی کی اہمیت

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

() انسانی حقوق کا اعلامیہ رحقوق انسانی کی پالیسی 2018 کے بارے میں جان سکے

() انسانی حقوق کا معاشرتی اور معاشی ترقی میں اہمیت اور کردار بیان کر سکے

() حقوق اگاہی رمعلومات تک رسائی کے قانون کو جان سکے

() ملازم پیشہ خواتین کا تحفظ کو اخلاقیات کا حصہ تصور کرے

TTQ 211 TARJAMA TUL QURAN / CIVIC-211

Theory	**32**	**T**	**P**	**C**
Practical	**0**	**1**	**0**	**1**

As per syllabus of BISE from PCTB Book

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

Applied Mathematics Math-212, by Sana-ullah Khan, Syed Tanvir Haider, Zaif-ullah Khan Vol - I, National Book Foundation

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 ofa 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**

		T	P	C
TOTAL CONTACT HOURS:	**32**			
Theory:	32	**1**	**0**	**1**
Practical:	0			

INSTRUCTIONAL OUTCOMES: The student will be able to express their understanding of communication skills in the form of speaking, listening, reading and writing and use it to supplement their technical skills

COURSE CONTENTS

1. Listening Skills — 4 Hours

1.1 Listening comprehension
1.2 Principals for teaching listening comprehension
1.3 How to listening skill be developed

2. Speaking Skills — 6 Hours

2.1 Starting and Ending conversations
2.2 Introducing oneself and others
2.3 Greeting, praises and compliments
2.4 Interviewing skills

3. Reading Skills — 6 Hours

3.1 Skimming
3.2 Scanning
3.3 Guessing
3.4 Intensive reading
3.5 Extensive reading
3.6 How to improve reading skill

4. Writing Skills — 6 Hours

4.1 What is writing
4.2 Guided writing
4.3 Free writing
4.4 Creative writing
4.5 Kinds of writing
4.6 What is effective writing
4.7 The process of writing

5. Report Writing. 10 Hours

5.1 Introduction importance, Types of report.
5.2 General principles of report writing.
5.3 Functional design of report, opening statement outline, main body, specific recommendations.
5.4 Rough draft, submission of report, letter of transmittal.

RECOMMENDED / REFERENCE BOOKS:

38. Communications Skills **: Mathew McKay[2009],** New Harbinger Publications
39. A course in English Communication: **M. Apte**, [2009], PHI Learning, New Delhi.
40. Communication Skills Handbook: **Jane Summers and Brett Smith** [2005], Wiley & Sons
41. Effective Business Communication and Report Writing**: Ata ur Rehman**,[2009], Farrukh & Brothers, Lahore

INSTRUCTIONAL OBJECTIVES

Developing Communication Skills by understanding and applying Listening, Speaking, Reading and Writing Skills for its practical use at the work place

1. Explain and Develop Listening Skills

1.1 Define listening skill
1.2 Demonstrate listening skill

2. Explain and Develop Speaking Skills

2.1 Express 'how to introduce yourself', 'talk about your skills' and 'exhibit interviewing skills' and demonstrate their applications
2.2 Express and demonstrate how to agree, disagree, likes, dislikes, etc)
2.3 Explain how to speak in condensation and demonstrate its use
2.4 Explaining and demonstrate how to report

3. Explain and Develop Reading skills

3.1 Understand about skimming, scanning, guessing, identification and inference and demonstrate their use
3.2 Understand and demonstrate about 'identification of contrasting ideas', 'main and support ideas' and attitude of author/ writer
3.3 Explain and demonstrate use of synonyms and antonyms

4. Explain and Develop Writing Skills

4.1 Understand and demonstrate different types of writing and describing a process
4.2 Explain and demonstrate about writing simple sentences and writing complex sentences
4.3 Developing and demonstration about coherence and cohesion
4.4 Explain about 'beginning of topic' and 'its middle and end' and demonstrate its application
4.5 Explain about 'linking different paragraphs' and demonstrate its use
4.6 Understand how to write business letters and demonstrate its application

5. Report writing

5.1 Understand how to write reports
5.2 Qualities of good reports
5.3 Model reports

YEAR 2

Civil-263

PUBLIC HEALTH ENGINEERING

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

LEARNING OUTCOME: To have a comprehensive understanding about plumbing, municipal water treatment, water distribution, waste water collection and safe disposal.

COURSE CONTENTS

1. Introduction to Public Health Engineering — 2 Hours

1.1 Public health engineering and its significance
1.2 Components of public health engineering
1.3 Role of public health engineer
1.4 Challenges and future directions

4Hours

2. Introduction to Water Supply and Sources

2.1 Introduction and significance of water supply
2.2 Water supply related technical terms
2.3 Surface and sub surface water sources
2.4 Factors governing the selection of site for water intake
2.5 Intakes for surface water collections and supply, type of Intakes

6Hours

3. Quality of Water

3.1 Introduction to pure (potable) and contaminated water
3.2 Impurities in water and their health significance
3.3 Testing of water: Physical, chemical & bacteriological tests
3.4 Description of national and international water quality guidelines/standards

4. Treatment of Drinking Water — 5Hours

4.1 Introduction to treatment of ground and surface water
4.2 Stages of water treatment (sedimentation, coagulation & flocculation, filtration and disinfection)
4.3 Miscellaneous methods of water treatment, aeration, fluoridation, colour, odour and taste removal.
4.4 Membrane technology (Reverse Osmosis, ultrafiltration)
4.5 Explain the disinfection of Water, Necessity and methods of disinfection

4.6 Water softening, purposes and its methods, types of hardness

5. Pumps &Water Pumping 3Hours

5.1 Introduction to pumps, their necessity and exploration of water table
5.2 Kinds of pumps, fundamental principles of pumping.
5.3 Selection of site for pump/tube-well/Turbine and pumping station requirements.

6. Water Distribution System 4Hours

6.1 Introduction to water distribution systems
6.2 Methods of layout of pipes: dead end, grid, ring and radial system.
6.3 Water storage reservoirs, necessity and accessories.
6.4 Appurtenance in distribution system.

7. Water Supply Scheme Design 5Hours

7.1 Description of water demand for various utilities
7.2 Introduction to per capita demand and its variation under different conditions
7.3 Introduction to population forecasting methods
7.4 Maximum water demand and design period
7.5 Design of a water supply scheme

8. Introduction to Water Sanitation 6 Hours

8.1 Importance of sanitation and related technical terms
8.2 Types of Sanitation systems
8.3 Challenges in waste water sanitation

9. Design of Sewer Systems 5Hours

9.1 Types of sewer systems and their suitability
9.2 Quantity of discharge in sewer, dry weather flow, Self-cleansing velocity.
9.3 Variation in quantity of dry weather flow and wet weather flow.
9.4 Quantity of storm water flow-run off, its co-efficient, time of concentration.
9.5 Impervious factor, hydraulic formula for velocity of flow.
9.6 Numerical problems for basic understanding

10. Sewer System Construction 5Hours

10.1 Materials, shape and size of sewer system
10.2 Sewer system construction steps

10.3 Sewer appurtenances and their types
10.4 Sewer appurtenance's location and their functions.
10.5 Construction of Man holes, shallow MH, Deep MH, drop-man hole, inlets, clean out, lamp hole, grease, & oil traps, inverted syphon, trestles & piers.

11. Plumbing Tools 4Hours

11.1 Introduction to plumbing tools and machines
11.2 Different plumbing tools, their use and precautions
11.3 Different plumbing machines their use and precautions

12. Pipes and Pipe Fittings 6Hours

12.1 Introduction to pipes and pipe fittings
12.2 Different types of pipes w.r.t materials and their pipe fittings with brief specifications & use
12.3 Different jointing method of pipes and their fittings
12.4 Plumbing symbols and plumbing fixtures layout of kitchen & bathroom

13. Plumbing Fixtures, Fixture Fittings and Faucets 6 Hours

13.1 Introduction& objectives of Plumbing Fixtures, Fixture Fittings and Faucets
13.2 Bath plumbing fixtures brief description and use
13.3 Kitchen plumbing fixtures brief description and use
13.4 Type of Taps and their functions & use
13.5 Valves & Cocks and their types & use
13.6 Different types of mixers and use
13.7 Traps & their types, Interceptors and Separators and use

14. House Drainage 3 Hours

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

RECOMMENDED / REFERENCE BOOKS:

1. McGhee, T.J. and Steel, E.W., 1991. *Water supply and sewerage* (Vol. 6). New York: McGraw-Hill.
2. Babbitt, H.E., 1928. *Plumbing*. McGraw-Hill Book Company, Incorporated.
3. Rangwala, S.C., 1985. *Fundamentals of water supply and sanitary engineering*. Charotar Publishing House.
4. Kulkarni, G.J. and Kulkarni, G.J., 1971. *Water supply and sanitary*

engineering. Star Book Service..
5. Deshpande R.S., *A text book of sanitary engineering*
6. Sharma., *Public health engineering*
7. Duggal, K.N., 1989. *Elements of public health engineering*. S. Chand Limited.
8. International Plumbing Code **(IPC) 2018**

CIVIL.PHT-203 PUBLIC HEALTH ENGINEERING

INSTRUCTIONAL OBJECTIVES

1. Understand the Introduction, Components, Challenges and Future Directions to Public Health Engineering

1.1 Describe public health engineering and its significance
1.2 Explain components of public health engineering
1.3 State the role of public health engineer
1.4 State the challenges and future directions

2 Understand the Importance and Necessity of Water Supply and Sources of Water with their yields

2.1 Introduction to water supply, significance and state its historical development
2.2 State the water supply related technical terms i.e. hydrological cycle, precipitation, runoff, coefficient of runoff, intensity of rainfall, catchments area, infiltration, evaporation and evapotranspiration, hydraulic gradient and rain water harvesting.
2.3 Describe surface water sources i.e. lakes, streams, rivers and yield from surface sources.
Explain underground/ subsurface sources, springs, wells and its kinds (i.e. tube well), infiltration galleries etc.
2.4 State the factor governing the selection of site for water intake
2.5 Explain Intakes for surface water collections and supply, type of Intakes (according to objective, location, material & shape)

3 Understand the Quality & Tests of Drinking Water

3.1 Introduction to pure (Potable) and contaminated water
3.2 Explain Impurities in water and their health significance
3.3 Describe the testing of water and Physical, chemical &introduction to bacteriological test of water
3.4 Description of national and international water quality guidelines/standards

4. Understand the Methods and Process for Drinking Water Treatment

4.1 State the treatment of ground and surface water
4.2 Describe the stages of water treatment i.e. Screening, sedimentation (types of settling), coagulation, flocculation and filtration

4.3 Explain the miscellaneous methods of water treatment, aeration, fluoridation, colour, odour and taste removal
4.4 State the membrane technology (Reverse Osmosis, ultra filtration)
4.5 Explain the disinfection of Water, Necessity and methods of disinfection
4.6 Describe the water softening, purposes, types of hardness and methods of softening

5. Understand the Different types of Pumps and Principle of Pumping

5.1 Introduction to pumps and state their necessity
5.2 Recognize different kinds of pumps and principle of working
5.3 Explain site selection requirements for pump station of simple pump/tube-well/turbine station

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

6.1 Explain the methods of distribution i.e. gravity, combined, direct pumping, and methods of supply of water intermittent and continuous
6.2 Explain the methods of layout of pipes i.e. dead end, grid, ring and radial system.
6.3 Describe the storage reservoirs i.e. underground and overhead service reservoirs, necessity and accessories.
6.4 Explain the appurtenance in distribution system i.e. State the use of sluice valves, air valves, drains valves, water meter, reflux valve, scour valves.

7. Understand the Calculation of Demand of Water for a Water Supply Scheme Design

7.1 Description of water demand for various utilities i.e. domestic, industrial, institution & commercial and fire demand
7.2 State the introduction to per capita demand and its variation in different conditions
7.3 Describe the introduction to population forecasting methods
7.4 Explain about maximum demand and design period
7.5 Design of a water supply scheme

8. Understand basic facts about Water Sanitation

8.1 Importance of sanitation and technical terms related to sanitation i.e. sewage, sanitary sewage, domestic sewage, industrial sewage, storm or rain sewage, sewerage works, sewage treatment and sewage disposal
8.2 Types of sanitation systems i.e. conservancy system, water carriage system, cesspool system, ecological sanitation system, water less sanitation system, centralised and decentralised system
8.3 Explain the challenges in waste water sanitation

9. Understand the Discharge calculation of sewage for Sewer Design

9.1 State the types of sewers systems i.e. sanitary sewer, storm sewer, combined sewer, lateral sewer, house sewer, sub-main sewer, main or trunk sewer, out fall sewer and relief sewer
9.2 State quantity of discharge in sewer dry weathering flow and self-cleaning velocity.
9.3 Explain the variation in quantity of dry and wet weather flow.
9.4 Quantity of storm water flow and its coefficient, time of concentration
9.5 Impervious factor, hydraulic formula for velocity of flow
9.6 Numerical problem for basic understanding

10. Understand about the Sewer System Construction

10.1 Explain materials, shape and size of sewer system
10.2 Describe sewer system construction steps i.e.
(i)layout (ii)excavation (iii)sheeting and bracing(iv)Dewatering (v)Bedding of sewer line (vi)Laying of sewer pipe(vii)Fixing the gradient of sewer(viii)Jointing the sewer(ix)Testing the sewer line(x)Backfilling the trench
10.3 Explain sewer appurtenances and their types
10.4 State sewer appurtenance's location and their functions.
10.5 Explain construction of Man holes, shallow MH, Deep MH, drop-man hole, inlets, clean out, lamp hole, grease, & oil traps, inverted syphon, trestles & piers

11. Understanding Plumbing Tools and their use

11.1 Introduction to plumbing tools and machines
11.2 Explain different plumbing tools, their use and precautions i.e. hand dies and stocks, pressure test pump, pipe wrench, spanner set, pipe cutters, pipe vice, hacksaw, chisel, files, reamer, screw drivers, hammers, mallet, tap set, measuring tape and other common hand tools
11.3 Explain different plumbing machines their use and precautions i.e. electric drill machine, electric heating dies for PPRC, electric wall chaser and other common machines

12. Understand the Types and Specifications of Pipes and Pipes Fittings.

12.1 Introduction to pipes and pipe fittings
12.2 Explain different types of pipes w.r.t materials (G.I, Copper, PVC and their types, PPRC, HDPE, MDPE, Concrete, C.I and Composite) and their pipe fittings with brief specifications & use
12.3 Describe different jointing method of pipes and their fittings

12.4 Describe Plumbing symbols and plumbing fixtures layout of kitchen & bathroom

13. Understanding Plumbing Fixtures, Fixture Fittings and Faucets

13.1 Introduction & objectives of plumbing fixtures, fixture fittings and faucets
13.2 Explain bath plumbing fixtures brief description and use i.e. water closets, flushing cistern, urinals, wash hand basin, bath tub, rain shower and geyser
13.3 Describe kitchen plumbing fixtures brief description and use i.e. sink with faucet, dishwasher and waste food grinder
13.4 State different type of Taps and their functions & use
13.5 Explain Valves & Cocks and their types & use
13.6 Describe different types of mixers and use
13.7 Explain Traps & their types, Interceptors and Separators and use

14. Understand the Fundamentals and its Requirements of House Drainage

14.1 Describe the house drainage system
14.2 State the aims of buildings drainage and its requirement
14.3 State the shapes and construction of different types of drains & ducts
14.4 State House drains slopes & connection with main sewer
14.5 Compare one and two pipe system of drainage

CIVIL.PHT-203 PUBLIC HEALTH ENGINEERING

LIST OF PRACTICALS **96 HOURS**

1. Layout drawing of training institution's plumbing lab.
2. Determine the alkalinity and acidity of a given water sample
3. Determine the pH value of the given samples of Water
4. Determine the hardness of the given water samples
5. Determine the chloride content of a given water sample
6. Determine the residual chlorine of given water sample
7. Determine the total solids of a given sample of water
8. Determine the turbidity of the given water sample
9. Determine the colour of the given water sample
10. Determine the Odor of the given water sample
11. Determine dissolved oxygen of a given sample
12. Practice for general layout of water supply and sanitary fitting in a house.
13. Practice to understand the hydraulic statement of water supply and

sewerage scheme

14. Demonstration of dead system grid, system, ring system and, radial System.
15. Demonstration on exploring groundwater by resistivity meter.
16. Demonstration on boring for underground water.
17. Demonstration of settling tank, slow sand filter rapid sand filter
18. Demonstration 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
19. Demonstration for excavation of trenches of a small sewer line with proper grade.
20. Demonstration of various plumbing tools and machines.
21. Cutting and threading of G.I. Pipes and connections of PPRC pipes.
22. Demonstration of water supply pipe tests to identify leakage through pressure pump apparatus (Small size Pipe)
23. Demonstration of taking water connection from main pipe line.
24. Practice of Fitting/replacement of water taps.
25. Demonstration on installation of water closet, flushing cistern and pipe.
26. Demonstration on installation of urinal with flushing cistern and waste pipe.
27. Demonstration on installation of wash hand basin (complete).
28. Demonstration on installation of water meter
29. Jointing of pipes (Cast Iron, PPRC, HDPE, uPVC and concrete)
30. **Visit of water treatment plant, and water works and submission of report**
31. **Visit of sewage disposal station and submission of report**

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-204	**CIVIL ENGINEERING SURVEYING-II**			
TOTAL CONTACT HOURS:	**256**	**T**	**P**	**C**
Theory:	64	**2**	**6**	**4**
Practical:	192			

On completion, the student will be able to:

LEARNING OUTCOMES:

1 Understand the fundamental principles of triangulation, traversing and curves.
2 Carry out traverse survey, setting out curves, and layout of structures
3 Understand the significance and use of Total Station and GPS& GIS Systems with mapping through related computer software

COURSE CONTENTS **Hours**

1. Coordinate System 4 Hours

1.1 Introduction to coordinates, types and related technical terms
1.2 Computation of co-ordinates and computation of missing data associated with theodolite-traversing
1.3 Balancing of traverse by different methods
1.4 Preparation of Gale's Traverse Table

2. Total Station 20Hours

2.1 Introduction, types, main parts and accessories of Total Station
2.2 Operating system of Total Station
2.3 Functions and modes of a Total Station
2.4 Setting out parameters:Tilt correction and preparation for observations/ operations
2.5 Measurements of distances, angles, bearings and co-ordinates
2.6 Setting out of horizontal &vertical angles and co-ordinates
2.7 Setting grade, stack out and offset measurement
2.8 Setting out of total station for various measurements
2.9 Measurement of coordinates
2.10 Remote elevation measurement and missing line measurement
2.11 Measurement of area using recorded data
2.12 Evaluation of coordinate data for rectangular building & Simple circular curve
2.13 Managing data through total station
2.14 Putting data in the respective software and its mapping

3. Curves 16Hours

3.1 Definition, types and necessity of curves
3.2 Elements of simple circular curve& their relationship
3.3 Methods of setting out simple circular curves
3.4 Obstacles during setting out simple curve
3.5 Types, necessity and characteristics of transition curves
3.6 Elements of transition curve &their relationship
3.7 Introduction to super elevation and its elements
3.8 Methods of setting out transition curve
3.9 Types and necessity of vertical curves
3.10 Elements of vertical curves and their relationship
3.11 Various steps in setting out combined curves.

4. Setting out /Lay out of construction work 2 Hours

4.1 Methods to set out / lay out of a building
4.2 Approaches for establishing horizontal and vertical control points
4.3 Application of checks upon layout
4.4 Evaluation of coordinate data for lay out
4.5 Procedure for setting out a sewer line

5 Hydrographic Survey. 4 Hours

5.1 Introduction to hydrographic survey
5.2 Technical terms related to hydrographic survey
5.3 Longitudinal & cross section of a small distributary
5.4 Discharge measurement at different sections

6. Global Positioning System (GPS) 8 Hours

6.1 Introduction to GPS & its types
6.2 Functions and modes of GPS
6.3 Setting parameters
6.4 Preparation of GPS for observations
6.5 Differential Global Positioning System (DGPS)
6.6 Introduction to Global Navigation Satellite System(GNSS) and its working

7. Remote Sensing 4 Hours

7.1 Introduction to Remote Sensing
7.2 Types of Remote Sensing: Satellite Imagery and Airborne Imagery
7.3 Techniques for Remote Sensing
7.4 Introduction to Image Analysis and Aerial Camera Systems
7.5 Photographic Scale
7.6 Flying Heights and Altitude
7.7 Aerial Photography Interpretation

8. Geographic Information System (GIS) 6 Hours

8.1 Introduction to the GIS.
8.2 Scope and Components of GIS
8.3 Types, construction and analysis of Data
8.4 Introduction to ArcGIS software

RECOMMENDED / REFERENCE BOOKS:

1. Kavanagh, B.F. and Bird, S.J., 2014. *Surveying: Principles and applications*, Pearson, Inc. USA
2. Clark, D., 1923. *Plane and geodetic surveying for engineers* (Vol. 1). Constable.
3. Kanetkar, T.P., Kanetkar, T.P. and Kulkarni, S.V., 2000. *Surveying and leveling*. A.V.G Publications..
4. Basak, N.N., 1994. *Surveying & Levelling*. McGraw-Hill Education.
5. S. K. Husain, M. S. Nagaraj, 1981, *Textbook of Surveying*, S. Chand.
6. Roy, S.K., 2010. *Fundamentals of surveying*. PHI Learning Pvt. Ltd..
7. **Rasul Manual** (volume I & II) on surveying

CIVIL-204 CIVIL ENGINEERING SURVEYING-II

INSTRUCTIONAL OBJECTIVES

1. Understand the Coordinate System

1.1 Explain coordinate and its types.

1.2 Compute Latitude and departures of line and Calculate coordinates from given field notes.

1.3 Explain errors and mistakes in theodolite traversing and their rectification.

1.4 Explain balancing of traverse by different methods

2. Understand the Total Station and its use

2.1 Identify the total station, its parts functions and modes.

2.2 Describe different operating system of total station

2.3 Identify and describe the accessories of total station and their operation.

2.4 Describe the parameters, setting of total station and its operation.

2.5 Explain the methods of measurement of distances, angles, bearings and co-ordinates by total station.

2.6 Explain the measurement of vertical angle and tilt correction

2.7 Preparation and setting of horizontal and vertical angle Repetition angle measurement.

2.8 Setting out percentage grade and stack-out.

2.9 Explain offset measurement

2.10 Setting and calculation co-ordinate value of occupied station, setting height of instrument & height of reflector

2.11 Define remote elevation measurement, and missing line measurement

2.12 Explain measurement of area, point to point measurement

2.13 Describe how data collected

2.14 Define layout and explain its procedure

2.15 Explain data searching in memory manager mode

2.16 Explain down loading data from total station.

2.17 Putting data in the respective software and mapping thereof.

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

3.1 Define curve and its type with sketch and necessity of curves in surveying

3.2 Explain the designation of curve

3.3 Explain the definition & notation of circular curve and Compute the inter-relation ship

3.4 Calculate the data for setting out simple circular curves by various methods.

3.5 List the steps for setting out of simple circular curves by various methods and describe the procedure for ranging a curve beyond obstacles

3.6 Describe the transition curve, its type, the necessity of transition curves, characteristics, elements, notation of transition curve and their inter relationship

3.7 Explain super elevation and derive formula for super elevation

3.8 Calculate the length of transition curve by various methods and calculate data for setting out a combined curve

3.9 State the types of vertical curve, its necessity of vertical curves

3.10 Explain the elements, notation of vertical curves and their inter-relationship

3.11 Enlist the steps for setting out vertical curves
3.12 Compute the data for setting out vertical curves
3.13 Explain the elements & notations of transition curve
3.14 Enlist the steps for the setting out combined curves

4. Understand the procedure of Setting out of Engineering structures

4.1 Describe Methods of setting out
4.2 Explain Instrument for horizontal and vertical control for set out
4.3 Describe the checks applied to setting out
4.4 Calculations of coordinate data for setting out
4.5 Explain Procedure of setting out a sewer line, building and bridge.
4.6 Describe Verticality of structure for setting out

5. Understand the Principles of Hydrographic Survey

5.1 Define Hydrographic / Bathymetric survey and state its purposes.
5.2 Describe sounding, sounding rod/pole, sounding boat, still water recess, fathometer, velocity rod and current meter
5.3 Explain the methods of taking soundings
5.4 Explain procedure of determining velocity with velocity rod and current meter for determination of discharge of channel.
5.5

6. Global Positioning System (GPS).

6.1 Identify the parts of GPS and describe its types
6.2 Describe the functions and modes of GPS.
6.3 Describe the parameters of GPS.
6.4 Explain the methods of observations for Static, Real Time Kinematic (RTK) and Stop & Go Method and operations of a GPS.
6.5 Describe Differential Global Positioning System (DGPS)
6.6 Define GNSS
6.7 Explain how GNSS works

7. Understand Use of Remote Sensing Techniques

7.1 Define remote sensing
7.2 Describe types of remote sensing: Satellite Imagery and Airborne Imagery
7.3 Explain Techniques for remote sensing
7.4 Explain image analysis techniques
7.5 Describe aerial camera systems including drone based
7.6 Describe photographic scale
7.7 Explain flying heights and altitude
7.8 Explain aerial photography interpretation

8. Understand Use of Geographic Information System (GIS) in Land Survey

8.1 Define GIS
8.2 Describe scope of GIS
8.3 Explain construction of data
8.4 Explain basic analysis of data
8.5 Explain components of GIS
8.6 Explain types of data used in GIS
8.7 Explain user interface and data analysis in ArcGIS

CIVIL-204 CIVIL ENGINEERING SURVEYING-II

LIST OF PRACTICALS **192 Hours**

1. Practice to Compute coordinates
2. Practice to Balance the traverse and compute the area of a closed traverse using theodolite
3. Prepare Gale's traverse table plotting of traverse after adjustment of closing error.
4. Practice to set total station on a point & prepare for measurement
5. Measurement of slope, horizontal and vertical distance susing total station.
6. Practice to measure the coordinates of different points using total station
7. Practice to measure horizontal / vertical angles using total station
8. Practice to stack out different points at various distances on a line.
9. Practice to measure the height of an object with total station by using REM program with and without prism height input
10. Practice to measure the distance between different station points with the help of occupied point (MLM) by using measured data / coordinate data
11. Practice to measure the area of a traverse by direct field observations.
12. Practice to calculate the area from coordinate data file
13. Practice to measure the coordinates of survey points by point to line measurement program
14. 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
15. Demonstration and practice of advance functions of a total station for mapping.
16. Area calculation with the help of total station
17. Determination of storage capacity of a reservoir by total station
18. Setting out horizontal curves in the field by theodolites
19. Setting out horizontal curves in the field by total station
20. Setting out vertical curves in the field
21. Setting out transition curve in the field
22. Setting/Layout of a building by theodolite/total station
23. Measurement of depth by Hydrographic survey of a small channel
24. Measure velocity by Hydrographic survey of a small channel
25. Temporary adjustment & Initialization of double frequency GPS

26. Practice for Static, Real Time Kinematic (RTK) and Stop & Go Method
27. Practice to install ArcGIS software
28. Import data from Total Station/ GPS in ArcGIS software
29. Input attribute data in ArcGIS software
30. Analyze the topography to identify suitable areas for development and potential drainage issues

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-273 CONSTRUCTION TECHNIQUES

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

LEARNING OUTCOMES:

1. To understand the fundamentals of building construction techniques& relevant machinery
2. To be able to reduce the impact of climate change, increase sustainability, efficiency and safety in construction.
3. To focus on integrating sustainable practices and technologies into building projects to reduce carbon emissions and minimize the impact on earth due to climate change.

COURSE CONTENTS

1 Introduction to Sustainable Building Construction 5 Hours

1.1 Sustainable construction and its significance
1.2 Sustainable building construction framework
1.3 Climate change and passive survivability factors
1.4 Sustainable construction progress and challenges
1.5 Introduction to energy management, energy conservation, energy efficiency and its need in construction sector
1.6 Energy efficient design and conservation techniques for construction and operation
1.7 NEECA building rating system harmonized with LEED
1.8 Salient feature of Energy Conservation Building Code (ECBC)-2023

2 Site Layout and Ground Water Control Techniques 5 Hours

2.1 Introduction to site preparation and layout
2.2 Initial checks on drawings
2.3 Factors affecting the site layout
2.4 Site layout of a general construction project
2.5 Ground water control and its methods

3 Termite and Water Proofing of Structures 5 Hours

3.1 Termite and water proofing
3.2 General principal of termite proofing
3.3 Methods and materials used in termite proofing
3.4 Dampness and seepage reasons and their preventive measures
3.5 Water proofing materials and uses
3.6 Waterproofing of different structure

4 Temporary Works 6 Hours

4.1 Introduction to-different types of false works
4.2 Material, components, characteristics, types and removal of form work
4.3 Components and types of scaffolding
4.4 Methods of shoring and underpinning
4.5 Methods and materials for centring of formwork
4.6 Introduction to coffer dam and their types
4.7 Uses of coffer dams and leakage prevention

5 Deep Foundations 5 Hours

5.1 Deep foundations and their types
5.2 Pile foundations, their types and uses
5.3 Caisson foundations, their types and uses
5.4 Well foundations, their types and uses

6 Seismic Resistant Construction 4 Hours

6.1 Introduction to seismic resistant construction
6.2 Internal structure of earth, different seismic zones and tsunami
6.3 Causes and effects of earthquake
6.4 General seismic design parameters
6.5 Methods and materials for seismic resistant construction

7 Multi-Storey Framed Structure Buildings 3 Hours

7.1 Introduction to framed structure building
7.2 Types of framed structure building
7.3 Components of framed structure building
7.4 Advantages of framed structure building construction
7.5 Construction process of multi storey building with basement

8 Vertical Circulation in Buildings 4 Hours

8.1 Introduction to stairs, lifts, elevators, ramps and escalators
8.2 Technical terms and different parts of stairs, lifts, elevators, ramps and escalators
8.3 Types of different stairs and staircases with brief specification
8.4 Different types of elevators and escalators
8.5 Riser and Tread calculation of a simple stair
8.6 Characteristics of ideal stair

9 Acoustics of Buildings 4 Hours

9.1 Introduction to relevant technical terms
9.2 Factors to be considered in an acoustics of buildings
9.3 Sound absorbing materials and their use
9.4 Acoustic control of an auditorium and different types of buildings
9.5 Sound insulation and methods of sound insulation.
9.6 Common acoustical defects and remedies of conference halls

10 Ventilation and Air Conditioning of Buildings 4 Hours

10.1 Introduction
10.2 Properties of air and thermal effects on building parts
10.3 Factors affecting ventilation of building, functional requirements and methods of ventilation
10.4 Thermal impacts on building environment
10.5 Temperature control techniques for a building
10.6 HVAC system for a building

11 Fire Protection of Buildings 4 Hours

11.1 Significance and elements of a Firefighting system for a building
11.2 Fire resisting properties of construction materials
11.3 Impact of fire on different building components and their remedial measures
11.4 Fire-protection of building
11.5 Means of escape in case of fire

12 Causes of Deterioration and Maintenance of Structures 5 Hours

12.1 Introduction
12.2 Classification of building maintenance

12.3 Repair to damaged surface finishing
12.4 Repair to damaged parts of different floors
12.5 Causes and repair of concrete spalling
12.6 Repair / Replacement of door and windows
12.7 Repair to cracks in masonry and concrete structures
12.8 Maintenance of sanitary, water supply and drainage system
12.9 Maintenance of electrical system
12.10 Introduction to renovation / rehabilitation of ~~old~~ structures

13 Construction Machinery and Equipment 3Hours

13.1 Machinery / Equipment used in building construction
13.2 Various types of construction equipment's
13.3 Selection of equipment and cost of equipment

14 Developments in Construction Technology 4 Hours

14.1 Introduction to advanced construction and maintenance techniques
14.2 Mechanised construction method**s**
14.3 Introduction to Internet of Things (IoT) devices and sensors for construction site data collection, monitoring, safety, demolition and material transport
14.4 Introduction to virtual reality (VR) technology in construction

15 Municipal Requirements in Building Planning 3Hours

15.1 Introduction to municipal requirements
15.2 Classification of buildings
15.3 Technical terms related to municipal requirements in building planning
15.4 Introduction to building regulations and bylaws
15.5 Introduction to ECBC 2023 for building design

Recommended / Reference Books:

1. Varghese, P.C., 2016. *Building construction*. PHI Learning Pvt. Ltd..
2. Fleming, E., 2009. *Construction Technology: an illustrated introduction*. John Wiley & Sons.
3. Arora, N.L. and Gupta, B.R., 1988. *Building construction*. Satya Prakashan.
4. Nunnally, S.W. and Nunnally, S.W., 2001. *Construction methods and management* (Vol. 3). Prentice hall.
5. Armpriest, D., Building Construction: Principles, Materials, and Systems; Madan Mehta, Walter Scarborough.
6. Allen, E. and Iano, J., 2019. *Fundamentals of building construction: materials and methods*. John Wiley & Sons.
7. Huntington, W. C.*Building Construction*, John Wiley & Sons.
8. Raj, P.P., 2017. *Building construction materials and techniques*. Pearson Education India.
9. Kibert, C.J., 2016. *Sustainable construction: green building design and delivery*. John Wiley & Sons.
10. **By laws of Development Authorities**i.e. LDA, MDA, FDA, CDA etc.

CIVIL-273 CONSTRUCTION TECHNIQUES

INSTRUCTIONAL OBJECTIVES

1 Understand the sustainable building construction framework

1.1 Sustainable building construction and its dominating future
1.2 State the framework of sustainable building construction i.e. **Phase** (planning, design, development, construction, use and operation, maintenance, modification, deconstruction) **Resources** (land, materials, water, energy and ecosystem) and **Principles**(reduce, reuse, recycle, protect nature, eliminate toxics, life cycle costing and quality)
1.3 Explain climate change and passive survivability factors in the buildings
1.4 Explain stainable construction progress and challenges
1.5 Introduction to energy management, energy conservation, energy efficiency and its need in construction sector
1.6 Explain Energy efficient design and conservation techniques for construction and operation
1.7 State NEECA building rating system harmonized with LEED
1.8 Describe Salient feature of Energy Conservation Building Code (ECBC)-2023

2 Understand the site preparation, layout and ground water control techniques

2.1 Introduction to site preparation and layout
2.2 State the initial checks on drawings
2.3 Explain the factors affecting the site layout
2.4 Explain site layout of general construction project with illustrated example
2.5 Explain the ground water control and its methods i.e. temporary and permanent

3 Understand the water and termite proofing materials and techniques of different structures

3.1 Introduction to water and termite proofing
3.2 State general principal of termite proofing
3.3 Describe the methods and materials of termite proofing
3.4 State the dampness and seepage reasons and their preventive measures
3.5 Explain different water proofing materials and their uses

3.6 State the water proofing of different structures i.e. walls, roofs, water tank and basement

4 Understand the principle of temporary works, their types, components & methods

4.1 Introduction and state different types of false works
4.2 Discuss material, components, characteristics and types of form work
4.3 Describe the components and types of scaffolding
4.4 Explain the methods of shoring and underpinning
4.5 Discuss the methods and materials for centring
4.6 Introduction to coffer dam and explain their types
4.7 State the uses of coffer dams and explain its leakage prevention

5 Understand the concept of deep foundation construction

5.1 Introduction to deep foundations and explain their types
5.2 State pile foundation, explain their types and uses
5.3 Explain the caisson foundations types and uses
5.4 Describe the well foundations, explain their types and uses

6 Understand the basic understanding of seismic resistant construction

6.1 Introduction to seismic resistant construction
6.2 Describe internal structure of earth, tsunami and different seismic zones
6.3 State the causes and effects of earthquake
6.4 Discuss the general parameters of seismic resistant construction
6.5 Explain the methods and materials of construction

7 Understand the techniques of multi-storey framed structure building construction

7.1 Introduction to framed structure building
7.2 Explain the types of framed structure building
7.3 Explain the components of framed structure building
7.4 State the advantages of framed structure building construction
7.5 State the construction process of multistorey building with basement

8 Understand the vertical circulation requirements in the buildings

8.1 Introduction to stairs, lifts, elevators, ramps and escalators
8.2 State the technical terms and different parts of stairs, lifts, elevators, ramps and escalators
8.3 Explain different types stairs and staircases i.e. material, layout, method of construction
8.4 Discuss the different types of elevators and escalators
8.5 Calculation of Riser & tread of a simple stair
8.6 Characteristics of ideal stair

9 Understand the principles and techniques of acoustic control of the building

9.1 Introduction to acoustics and acoustics related technical terms i.e. sound, pitch, loudness, tone, intensity of sound, reflection of sound, reverberation, time of reverberation, transmission of sound and absorption of sound etc.
9.2 Explain the factors to be considered in an acoustics of buildings
9.3 Describe the sound absorbing materials and their use
9.4 Discuss the introduction to acoustic design of an auditorium
9.5 Explain the sound insulation and methods of sound insulation.
9.6 State the common acoustical defects and remedies for good acoustics

10 Understand the principles and methods of ventilation and air conditioning in the buildings

10.1 Introduction to ventilation and air conditioning technical terms i.e. conditioned air, purity of air, humidity, cooling heating and ventilation
10.2 State the properties of air and thermal effects on building parts
10.3 Explain the factors affecting ventilation of building, functional requirements of ventilation and methods of ventilation
10.4 Explain heating of building, transmission of heat and methods of heating
10.5 Explain cooling of building, methods of cooling
10.6 Discuss air conditioning systems and purpose of air filters

11 Understand the principles and techniques of fire protection of the buildings

11.1 Discuss the fire protection, causes and effects of fire
11.2 State the fire resisting properties of construction materials
11.3 Explain impact of fire in different buildings and components of building.
11.4 Explain the structural fire protection

11.5 State the arrangements for fire-protection & extinguishing of building i.e. alarm system, protection of openings, stairs and floors, thick common wall, smoke detectors, fire fighting devices and systems

11.6 Discuss the means of escape in case of fire required for apartment, office building, and public building

12 Understand the maintenance required for structures and causes of deterioration

12.1 State the causes of deterioration and maintenance of structures

12.2 Discuss the classification of building maintenance i.e. annual, special etc. repairs

12.3 Explain repair to damaged surface finishing i.e. plaster, pointing, white wash, distemper and painting

12.4 Discuss the repair to damaged parts of different floors i.e. concrete floor, terrazzo floor, mosaic floor, and timber floors

12.5 State the concrete spalling causes and repair

12.6 Explain the replacement and repair of door and windows parts i.e. glass panes, decayed timber etc.

12.7 Discuss repair to cracks in masonry and concrete structures

12.8 Explain the maintenance of sanitary fixtures, water supply and drainage system

12.9 Discuss the maintenance of electrical system

12.10 State the renovation / rehabilitation of old structures

13 Understand the types and working of construction machinery and equipment

13.1 Introduction to construction machinery and equipment

13.2 Explain various types of construction equipments used in excavation, earth compaction, hauling, hoisting, conveying, pumping, concrete construction, drilling, road making equipment and 3d CNC building printing machine

13.3 Discuss the selection of equipment and cost of equipment

14 Understand the development in construction technology

14.1 Explain advanced construction and maintenance techniques i.e. trenchless construction, shot-creting, retrofitting

14.2 State the mechanised construction methods i.e. precast, tilt up construction and prefabricated or/and modular construction

14.3 Introduction to Internet of Things (IoT) devices and sensors for construction site data collection (drones), Monitoring (temperature, humidity, pressure and vibration sensors) safety, demolition and material transport

14.4 State the introduction to virtual reality (VR) technology in construction

15 Understand the municipal requirements in planning of buildings

15.1 Introduction to municipal requirements

15.2 State the classification of buildings

15.3 Define different technical terms related to municipal requirements in building planning i.e. building line, set back line, covered area, plinth area, floor area and floor area ratio, carpet area, building height, habitable rooms, water closet and balcony

15.4 Brief Introduction to by laws and regulations of different development authorities

15.5 Introduction to ECBC 2023 for building design

CIVIL-273 CONSTRUCTION TECHNIQUES

LIST OF PRACTICALS 96 HOURS

1 Layout of construction lab and demonstration to tools and equipment's used in building construction.
2 Draw a job layout plan for a project showing material, plant and accommodations on site.
3 Site visit of nearest energy efficient building construction site visit.
4 Demonstration of fabrication, erection and removal of various form work.
5 Demonstration to knotting, lashing and erection of common scaffolding.
6 Demonstration on coffer dam, caisson foundation construction and well foundation construction.
7 Water proofing treatment demonstration of any suitable structure.
8 Demonstration of termite proofing treatment.
9 Practice of laying-out of typical stair.
10 Demonstration of acoustic treatment of an auditorium.
11 Demonstration of expansion/construction joints
12 Demonstration to fire resistant construction and fire extinguishing equipment and devices.
13 Demonstration and working of construction equipment and machinery.
14 Demonstration of pile boring and lay out plan (showing machinery location and other details at the site)
15 Demonstration to modular prefabricated construction.
16 Demonstration VR technology for construction.
17 Demonstration of laying of floor having any finishing material.
18 Demonstration of repair & maintenance of old building of the institute
19 Visit to a building equipped with central air conditioning system.
20 Visit to any under construction building project and submission of report.
21 **Visit to a precast concrete factory and submission of report.**

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-283 **QUANTITY SURVEYING**

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

LEARNING OUTCOMES:

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, water supply and sewerage scheme.

COURSE CONTENTS

1. Introduction 4Hours

1.1 Review of area, perimeters and volumes of various plane and solid geometrical figures.
1.2 Estimate and its types.
1.3 Introduction to different types of walls of L, H, U shape and road & canal section.
1.4 Various units of measurement and their conversion. (FPS, MKS and SI Units)

2. Specifications. 4 Hours

2.1 Introduction of Specifications of material Vol I & II Govt. of Pakistan

3. Building Estimates. ***12 Hours***

3.1 Rough cost estimate of Buildings on basis of plinth area rate notification C&W department GOP.
3.2 P.W.Ds, MES and English method of writing measurement in MB.
3.3 Methods of detailed ***Estimate.***
3.4 To workout quantities of various types of wall shape/sections.
3.5 Rules for deduction in different ***items of*** work.
3.6 Instructions on working out quantities and Abstract of quantities of various items of work of a single storey building (building portion only).
3.7 Study of schedule of rates and preparation of abstract of cost for all item of work of a single storey building (building portion only).
3.8 Annual and special repair estimates for building maintenance.

4. Earth Work 8 Hours

4.1 Units of measurement/payment, methods of calculation & cuttings of X-sections
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 re-modelling).

5. Road Estimates. 6 Hours

5.1 Types of road & their structures along with ***technical*** terms
5.2 Prepare BOQ of different type of original and repair work.
5.3 Instruction regarding complete estimate of bituminous road, cement concrete road. (for original & repair works)

6. Rate Analysis. 10 Hours

6.1 Definition & prerequisite for analysis of rates
6.2 Introduction to chaps/rate analysis of MRS items of work.
6.3 Instruction on Market rates, (Materials, labour, carriage and equipment) (PWD, MES Rate Schedules)
6.4 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.

6.5 Material statement for various items of building work.

7. Water Supply and Sewerage Schemes. 10 Hours

7.1 Prepare estimate for water supply and sewerage (Internal and External)
7.2 Rough cost estimate for water supply and sewerage schemes.
7.3 Prepare hydraulic statement for a sewerage scheme comprising of 10 manholes.
7.4 Prepare hydraulic statement for a water supply scheme for 1000 ft. length in five parts

8. Valuation of Property. 10 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, accessed value; potential value, year purchase, Monopoly value, annuity, gross income, net income, outgoing, price variation etc.
8.4 Depreciation of buildings-methods of calculating depreciation.
8.5 Depreciation of Machinery-methods of calculating depreciation.
8.6 Calculation of standard rent of buildings on capital %age basis method
8.7 Introduction to international standards of valuation (IVS2022)
1-Valuation Methodology
2-Valuation approaches
3- Reinstatement value
4-Replacement value
5-Fair Market Value
6-Forced Sale Value

RECOMMENDED / REFERENCE BOOKS:

1. Dutta, B.N. and Dutta, S., 1991. *Estimating and Costing in Civil Engineering: Theory and Practice: Including Specifications and Valuation*. UBS.
2. Aziz, M.A., 1967. *A Textbook of Estimating and Costing*. Zoberi Publisher.
3. Holm, L. and Schaufelberger, J.E., 2021. *Construction cost estimating*. Routledge.
4. Seeley, I.H. and Winfield, R., 1999. *Building quantities explained*. Bloomsbury Publishing.
5. Seeley, I.H. and Winfield, R., 1999. *Building quantities explained*. Bloomsbury Publishing.
6. *Construction Cost Estimates by US Army Corps of Engineer (UFC)*
7. Standard Methods of Measurement (Released by PEC Body)
8. Rasul Manual No.4 on Estimating.

CIVIL-283 QUANTITY SURVEYING

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 State the units FPS, MKS and SI.
1.3 Convert the units.
1.4 Describe the importance of estimates.
1.5 State the measurement linear, square, cubic.
1.6 State the type of estimate.

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

2.1 Discuss the detailed specifications of important items of works by the help of specifications book VOL I&II GOP.

3. Understand Principles Involved in Preparation of Building Estimates.

3.1 Prepare rough cost estimate of a building from given line plan or covered area.
3.2 Distinguish between P.W.D and English method of recording measurements.
3.3 List the all items of works for a residential building (only building position except public health and electrification installation).
3.4 Determine quantities of all items of works for straight; D,F,H,T,U shaped walls and circular walls.
3.5 Workout quantities of all items of works for a single storey building (building portion only) from given drawings.
3.6 Prepare bill of quantities and abstract of cost with the help of composite schedule of rates.
3.7 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 Methods).
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 Brief introduction to chaps/rate analysis of MRS items of work.
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 by using input rates.

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 of water supply scheme of 1000Rft.

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, depreciation and price variation.
8.3 Determine the depreciation of a building by straight line method, constant percentage method and sinking fund method.
8.4 Determine the depreciation of machinery.
8.5 Determine the value of a building by rental method, valuation based on profit and depreciation method.
8.6 Determine rent for government and private building
8.7 Brief introduction to international standard of valuation (IVS-2022)

CIVIL-283 QUANTITY SURVEYING

LIST OF PRACTICALS **96 HOURS**

1. Preparation of rough cost estimates of buildings.(Using different types of units) and Writing specifications/Description of various items.
2. Taking out measurements of a straight wall, T, L, H, U, shaped walls and circular walls.
3. Complete estimate of a single storey building. (Except Public Health Installations & Electric Installations)
4. Preparation of annual repair/special repair estimates. (Building and Roads)
5. Working out earth work of earthen embankment of given design and data.
6. Working out earth work of road in plain areas.
7. Working out earth work of road in hilly areas.
8. Working out earth work of irrigation channel.
9. Complete estimate of arterial roads (bituminous and concrete road).
10. Preparation of material statements of Brick work, foundation concrete, RCC, Cement plaster, DPC, Cement pointing, whitewashing of building works.
11. 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 plaster of ratios, cement pointing, white washing.
12. Preparation of rough cost estimate of water supply scheme 1000 ft length comprising of rising main and 5 branches including analysis of rates for works and preparation of hydraulic statement.
13. Calculation of present market value of an existing building by standard rent method and depreciation method.
14. Calculation of standard rent of government buildings

CIVIL TECHNOLOGY
YEAR 2

CIVIL-292 **CIVIL ENGINEERING DRAWING-II**

TOTAL CONTACT HOURS:	**192**	**T**	**P**	**C**
Theory:	00	**0**	**6**	**2**
Practical:	192			

LEARNING OUTCOMES: To understand the use of Auto CAD & REVIT softwares and its applications in civil engineering drawing.

COURSE CONTENTS

RECOMMENDED / REFERENCE BOOKS:

1. French, T.E. and Vierck, C.J., 1993. Engineering drawing and graphic technology.
2. Yarwood, A., 2010. *Introduction to AutoCAD 2010*. Routledge**.**
3. Omura, G. and Benton, B.C., 2017. *Mastering AutoCAD 2018 and AutoCAD LT 2018*. John Wiley & Sons.
4. Palm, B.S., 2020. *Introduction to AutoCAD 2020: 2D and 3D design*. Routledge.
5. Read, P., Vandezande, J. and Krygiel, E., 2012. *Mastering Autodesk Revit Architecture 2013*. John Wiley & Sons.
6. Hamad, M., 2023. *Revit 2018 Architecture*. Walter de Gruyter GmbH & Co KG.
7. Stine, D.J., 2023. *Residential Design Using Autodesk Revit 2024*. Sdc Publications.

CIVIL-292 CIVIL ENGINEERING DRAWING-II

LIST OF PRACTICALS	**HOURS 192**
1 Practice of Installation of Auto CAD software	
2 Practice of applying drafting setting (units, limits, snap, auto on / off)	
3 Practice of various 2D commands i.e. Line, trim, offset, extend etc	
4 Practice of using layer option	
5 Practice of using dimensioning & text option	
6 Practice Integration of Total Station with AutoCAD & MS Excel.	
7 Practice of preparing plan, elevation & section two roomed quarter.	
8 Practice of layout setting and printing of CAD drawing	
9 Practice of drawing of framed structure building (detailed plan, elevation, steel reinforcement and sections) and setting layouts for plotting.	
10 Draw architectural and **structural** drawing for a double storey RCC framed structure building (key plan, layout plan, detailed plan, elevations, sections, structural drawing of building components) using AutoCAD.	

11 Draw structural drawing of raft foundation, grillage foundation, well foundation using AutoCAD.
12 Draw plan and section of staircases (dog legged, spiral) using AutoCAD.
13 Draw detailed drawing of steel trussed roof shed (60’ x 40’) using AutoCAD.
14 Draw detailed plan, sections and elevation doors(panelled, flush, wire gauzed) using AutoCAD
15 Draw detailed sections for conglomerate floor and roof treatment using AutoCAD.
16 Drawings of road structures and their plotting.
17 Practice of using commands of REVIT
18 Draw 3D architectural plan of a residential building using REVIT.
19 Practice of rendering of architectural plan of a residential building in REVIT

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL.EM 263	**ENGINEERING MECHANICS**			
TOTAL CONTACT HOURS:	**160**	**T**	**P**	**C**
Theory:	64	**2**	**3**	**3**
Practical:	96			

LEARNING OUTCOME: To understand and analyse the strength and behaviour of engineering materials & elementary structural members.

COURSE CONTENTS

1 Introduction 2 Hours

1.1 Introduction to engineering mechanics and its types
1.2 Fundamental concepts of mechanics
1.3 Units of measurements and different systems of units
1.4 Significance of mechanics

2 Centre Of Gravity (C.G) 4 Hours

2.1 Introduction to centre of gravity
2.2 Methods for determining C.G of different sections

3 Moment of Area 6 Hours

3.1 Introduction to moment of area & moment of inertia
3.2 Moment of Inertia of different geometrical figures.
3.3 Perpendicular and parallel axes theorems.

4 Shear Force and Bending Moment. 9 Hours

4.1 Introduction to different types of beams, supports and loads.
4.2 Determination of support reactions for different types of statically determinate beams
4.3 Introduction to shear force and bending moment.
4.4 Determination of S.F. & B.M. for beams under point loads, U.D.L. and combined loadings.
4.5 Drawing the shear force diagram (SFD) and bending moment diagram (BMD)
4.6 Determination of maximum and minimum shear force and bending moments for the beams and their locations and point of zero shear and point of contraflexure.
4.7 Determination of point of zero shear and point of contraflexure

5 **Simple Stresses and Strains** 5 Hours

5.1 Introduction to different mechanical properties of material
5.2 Introduction and types of stress& strain
5.3 Description of stress-strain curve for tension test of steel
5.4 Description of different types of moduli
5.5 Brinell & Rockwell Hardness test

6 Stresses In Beams 6 Hours

6.1 Introduction and practical significance of different types of stresses in beams
6.2 Description of simple bending and flexural formula
6.3 Shear and bending stress distribution in beams of rectangular and I-sections.

6 Hours

7 Deflection in Beams

7.1 Introduction and significance of deflection
7.2 Various methods for evaluating deflection in beams.
7.3 Introduction to maximum deflection in beams under different load and support conditions

8 Column. 6 Hours

8.1 Introduction to different types of columns, end conditions and relevant terms
8.2 Failure patterns of columns
8.3 Euler's. formula and Rankine's formula
8.4 Use of Euler's and Rankine's formulae in calculating capacity of columns

9 Fundamentals of Steel Structures 4 Hours

9.1 Introduction and significance of Steel Structures
9.2 Merits and demerits of Steel Construction
9.3 Types of Structural Steel and Grades
9.4 Hot Rolled and cold worked steel
9.5 Built-up Sections

10 Riveted and Welded Joints. 5 Hours

10.1 Introduction to riveted & welded joints and related terms
10.2 Design and failure of riveted& welded joints along with strength, efficiency, pitch and dimension

11 Trusses 6 Hours

11.1 Introduction to truss, types and parts.
11.2 Description of methods for truss analysis.

12 Retaining wall 5 Hours

12.1 Introduction and description of terms used.

12.2 Pressures on retaining wall and stresses at base (toe and heel) Rankine's formula and application.
12.3 Stress distribution diagram.
12.4 Conditions of stability of retaining wall.
12.5 Checking stability of retaining wall.
12.6 Numerical problems

RECOMMENDED / REFERENCE BOOKS:

1 Nash, W.A. and Potter, M.C., 1977. Strength of Materials, Schaum's Outline Series. *New York, NY*.

2 Andrew Pytel, Ferdinand Leon Singer, 1987, *Strength of Materials,* Harper & Row

3 Khurmi, R.S. and Khurmi, N., 2019. *A textbook of strength of materials*. S. Chand Publishing.

4 F. Warnik, *Mechanics of Solids*

5 Schneider, *Elementary Structural Analysis*

6 Ryder, G.H. and Ryder, G.H., 1969. Material Testing and Experimental Methods. *Strength of Materials*, pp.320-336.

7 Junnarkar, S.B. and Shah, H.J., 2005. *Mechanics of structures*. Charotar Publishing House.

8 Megson, T.H.G., 1987. Strength of materials for civil engineers.

9 ZA Siddiqi, MA Chaudhry, 2nd Edition, *Steel Structures*

10 Engr. Zia ul Haq, 2012, *Mechanics of structures,* Said Book Depot.

CIVIL.EM 263 ENGINEERING MECHANICS

INSTRUCTIONAL OBJECTIVES

1 Introduction

1.1 State Engineering mechanics, its branches and historical development
1.2 Describe Fundamental concepts of mechanics
1.3 Explain units of measurements and international systems of units
1.4 Explain the applications of mechanics

2 Understand the Concept and Computation of Centre of Gravity

2.1 Define and explain the terms: centre of gravity, Centroid, first moment of area, reference axes, centroidal axes and symmetrical axes.
2.2 Describe the methods of finding centre of gravity by geometrical consideration and method of moments
2.3 Explain the steps for the calculation of centroid of composite sections
2.4 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.

3 Understand the Concept of Moment of Area and its Determination

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

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

4.1 Define beam, support and load and state their types
4.2 State difference between statically determinate & indeterminate structures. and calculate reactions for different types of statically determinate beams i.e. simply supported, overhanging and cantilever beams under various loading conditions (Point loads, U.D.L & Combined loading)
4.3 Explain shear force & Bending Moment in beams and their significance.
4.4 Calculate shear forces and Bending Moments at various sections of different

types of beams, under different loading conditions (Point loads-U.D. L & Combined loadings).

4.5 Draw shear force and Bending Moment diagrams of beams i.e. simply supported beam, over hanging beam & cantilever beam

4.6 To Calculate of maximum and minimum shear force and bending moments for the beams and their locations and point of zero shear and point of contraflexure.

4.7 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 Behaviour of Materials under Simple Stress.

5.1 Define and explain the terms stress, and its types (tensile, compressive and shear)
Define and explain strain, its types (tensile, compressive, shear, linear, lateral and volumetric) and poison's ratio.

5.2 Define and explain Hook's Law.

5.3 State different moduli i.e. modulus of elasticity, modulus of rigidity and bulk modulus.

5.4 Explain mechanical properties i.e. Elasticity, Plasticity Hardness Tension, compression, hardness, Toughness, Brittleness, ductility, Resilience, Flexural.

5.5 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.

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 and equation.

6.3 Explain Bending stress distribution across rectangular section.

6.4 Solve problems on theory of simple bending.

6.5 State formula for shear stress and shear stress distribution across rectangular, circular & I-sections of beam.

6.6 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.

7.4.1 . For cantilever beam.

7.4.1.1 Point load at free and.U.D.L on full span.
7.4.1.2 U.D.L covering a part of span from fixed end
7.4.1.3combination of above loads

7.4.2 For simply supported beam.

7.4.2.1 Point load at mid span.
7.4.2.2 U.D.L on whole span.
7.4.2.3 Combination of above loads.

7.5 Solve problems of beam deflection by moment area method for above beams and loading conditions.

8 Understand the Behaviours 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 theoretical fundamental concepts of Steel Structures

9.1 State the types of steel structures
9.2 Describe the merits and demerits of steel construction
9.3 State the types of structural steels
9.4 Describe and sketch the hot rolled structural shapes
9.5 Describe and sketch the cold formed shapes
9.6 Describe and sketch the built-up sections and clading

10 Understand the Behaviour of Riveted and Welded Joints.

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, welded joint and their comparison
10.3 Explain failure strength and efficiency of riveted joints.
10.4 Calculate the strength, efficiency, pitch etc. of riveted joints.
10.5 Calculate strength & dimensions of fillet welded joints only. (strength and

dimension)

11 Understand the Effect of Loads on Statically Determinate Truss.

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

12 Understand Stability and Stresses Developed in Retaining Walls.

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

CIVIL-263R ENGINEERING MECHANICS

LIST OF PRACTICAL 96 HOURS

1. Find the center of gravity of regular and irregular lamina.
2. Demonstration of centroid for composite sections
3. Find the M.O.I of a fly wheel
4. Verify the proportional relationship of moment of inertia and mass
5. 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.
6. Find tensile strength of a mild steel specimen plotting and interpretation of stress strain curve.
7. Determination of yield strength, ultimate strength, rupture strength and percentage elongation of mild steel bar
8. Draw S.F.D. and B.M.D in case of simply supported beams under various loading conditions.
9. Find the weight of a given body by using principal of moments
10. Draw S.F.D & B.M.D of cantilever beams under various loading conditions.
11. Determine the Rockwell Hardness Number of a metal specimens.
12. Determine the buckling loads of slender columns of different lengths and end condition
13. 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.
14. Set a roof truss and find forces in its members

DAE CIVIL TECHNOLOGY
YEAR 2

CIVIL-212 **HEALTH, SAFETY & ENVIRONMENT**

TOTAL CONTACT HOURS:	**64**	**T**	**P**	**C**
Theory:	64	**2**	**0**	**2**
Practical:	00			

LEARNING OUTCOMES:

1. To understand the need of environmental technology including pollution effects and their remedies
2. To understand the safety practices in civil engineering works, health hazards, site dangers and human health protection.

COURSE CONTENTS

1. Waste Water Pollution 8 Hours

1.1 Introduction to waste water and sources
1.2 Physical and chemical characteristics of sewage
1.3 Sewage and its microbiology
1.4 Biological oxygen demand (BOD) and Chemical oxygen demand (COD
1.5 Tests on Sewage (physical, chemical, biological)

2. Treatment of Waste Water 7 Hours

2.1 Introduction to stages of treatment system
2.2 Sludge treatment
2.3 Disposal System

3. Air Pollution 4 Hours

3.1 Introduction to air pollutants and its sources
3.2 Methods for detection and measurement of air pollution
3.3 Common air pollutants, their sources and pathological effects on human being

4. Noise Pollution 4 Hours

4.1 Introduction to noise pollution and its sources
4.2 Measurements of intensity of sound
4.3 Effects of noise on people's lives
4.4 Control of noise pollution

5. Solid waste pollution 6 Hours

5.1 Introduction to solid waste pollution and its sources
5.2 Classification of solid wastes
5.3 Disposal systems of solid wastes
5.4 Control of land Pollution

6. Industrial waste pollution **7** Hours

6.1 Introduction to industrial waste pollution and its sources
6.2 Remedial measures against industrial waste pollution

7 Fire Hazards **8** Hours

7.1 Introduction to fire hazards and its causes
7.2 Control and prevention of fire hazards
7.3 Fire fighting systems
7.4 Operations and practices of equipment for fire extinguishing

8 Safety 10 Hours

8.1 Introduction to accidents and safety practices in construction industry
8.2 Safety Precautionary Measures related to following:
8.2.1 Scaffolding, Formwork, and Ladder.
8.2.2 Drilling & Blasting.
8.2.3 Demolition.
8.2.4 Hot bituminous works.
8.2.5 Fire hazards in building.
8.2.6 Excavation and Dewatering
8.3 Industrial ventilation and exhaust system.
8.4 Industrial noise and its control.

9 Natural Hazards (Earth Quakes, Slides, Etc) 4 Hours

9.1 Introduction, causes and effects of natural hazards
9.2 Remedial measures

10 Environmental Impact Assessment 6 Hours

10.1 Introduction, objectives and principles of EIA
10.2 Risk Assessment
10.3 Integration of risk assessment with EIA
10.4 Assessment Process of EIA

RECOMMENDED / REFERENCE BOOKS:

1. McGhee, T.J. and Steel, E.W., 1991. *Water supply and sewerage* (Vol. 6). New York: McGraw-Hill.
2. Armstrong, P.T., 1980. *Fundamentals of construction safety*
3. Sinnott, R., 1985. *Safety and security in building design*.
4. Deshpande R.S., *A text book of sanitary engineering*
5. Rangwala, S.C., 1985. *Fundamentals of water supply and sanitary engineering*. Charotar Publishing House.
6. Rathi, A.K.A., 2021. *Handbook of environmental impact assessment: Concepts and practice*. Cambridge Scholars Publishing.
7. **Labour Compensation Act 1923.**
8. **Safety Practices and Procedures : NISTE**

CIVIL-212 HEALTH, SAFETY & ENVIRONMENT

INSTRUCTIONAL OBJECTIVES

1. Understand Waste Water 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
1.4 State Physical characteristics of sewage.
1.5 State Solid determination
1.6 Explain Chemical characteristics of sewage
1.7 Explain Microbiology of sewage
1.8 Explain Biological oxygen demand (BOD)
1.9 Explain Chemical oxygen demand (COD)
1.10 Explain Tests for Sewage (physical, chemical, biological)

2. Understand the treatment of waste water

2.1 Explain Preliminary treatment system
2.2 Explain Primary treatment system
2.3 Explain Secondary treatment system
2.4 Explain Sludge treatment
2.5 Explain Disposal

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 noise pollution

4.1 Define noise pollution
4.2 State sources, of noise pollution
4.3 Explain intensity of sound and its effects
4.4 Explain Control of noise pollution

5. Understand the concept of solid waste Pollution

5.1 Define solid waste Pollution
5.2 State sources and classification of solid wastes
5.3 Explain disposal of solid wastes
5.4 Define land pollution
5.5 State soil pollutants and its influence
5.6 Explain control of land pollution

6. Understand the concept of industrial waste pollution with reference to industry

6.1 State main industries (Paper and card, fertilizer, dairy, petro chemical, tannery industry)
6.2 State pollutants and its types
6.3 State Sources of pollutants
6.4 Explain effects of pollutants
6.5 Explain remedial measures

7. Understand Fire Hazards and Health Hazards

7.1 Define Hazards.
7.2 State Fire Hazards.
7.3 State Health Hazards.
7.4 Causes of Fire
7.5 Explain methods to prevent from fire.
7.6 State control of Hazards.
7.7 Explain Fire Control System
7.8 Explain types of Equipment / Tools
7.9 Explain Operations and Practices

8. Understand the Safety Protocols in Construction Industry.

8.1 State Accidents
8.2 Explain causes of Accidents.
8.3 Explain Effects of Accidents.
8.4 Explain Remedial measures.
8.5 Introduction of safety measures
8.6 Explain Accidents in construction industry
8.7 Explain Causes of accidents
8.8 Explain Effects of accidents
8.9 Explain safety Precautionary Measures for
10.5.1 Scaffolding, Formwork, and Ladder.
10.5.2 Drilling & Blasting.
10.5.3 Demolition.
10.5.4 Hot bituminous works.
10.5.5 Fire hazards in building.
10.5.6 De-watering
10.5.7 Excavation and Timbering
10.5.8 Shuttering and its precautions
10.5.9 Steel, Wooden and Fiber Shuttering
8.10 Explain Industrial ventilation, exhaust systems.
8.11 Explain Industrial noise and its control.

9. Understand the Natural Hazards (Earth Quakes, Slides, etc)

9.1 Introduction to natural hazards
9.2 Causes
9.3 Effects

9.4 Remedial measures

10. Understand Environmental Impact Assessment

10.1 Describe Environmental Impact Assessment
10.2 Explain objectives of EIA
10.3 Explain principles of EIA
10.4 Explain risk Assessment
10.5 Explain integration of risk assessment into EIA
10.6 Explain environmental Impact Assessment: Process

DAE CIVIL TECHNOLOGY
YEAR 3

اسلامیات/مطالعہ پاکستان

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GEN 301

کل وقت 20 گھنٹے

نصاب سال سوئم

حصہ اول اسلامیات

حصہ دوئم مطالعہ پاکستان

موضوعات:

1۔ قرآن مجید:

سورۃ الفاتحہ، آیت الکرسی، سورۃ البقرہ کی آخری آیات از امن الرسول ﷺ تا آخر اور سورۃ اخلاق مع ترجمہ وتشریح

2۔ دس منتخب احادیث کا ترجمہ (تشریح)

() بنی الا سلام علی خمس شهادت انا الا اله الا لمر اقلم الصلوته و ایتا الزکوة و حج البیت و صوم رمضان

() الدین النصیحته

() المنشاء موتمن

() للمومن علی المومن سنت خصال یعود ماذا مرض و تژهده اذا مات و یحیبه اذا دعا

() لیسلم علیه اذا لقیه و لیشمته اذا عطس و فصیحله اذا غاب او شهد

() لا تخن من خانک

() لا یدخل الجنته قاتع

() ان الله حرم علیکم عقوق المهات و اضاعته المال

() لیسر اولا تعسر اولا تنفر

() ذاق طعم الایمان من مرضی بالله و با الا سلام دینابمجمدنبیا

() افضل الذکر لا اله الا الله

3۔ حقوق وفرائض:

حصول تعلیم بطور فرض، والدین اور اولاد کے حقوق وفرائض، ہمسایہ کے حقوق، بچوں کے حقوق، عورتوں کے حقوق، بزرگ شہریوں کے حقوق، مخنث افراد کے حقوق۔

4۔ اسلام کی اخلاقی اقدار:

صبر واستقلال، عفو ودرگزر، ایفائے عہد، اخوت، ایثار وقربانی۔

سال سوئم

حصہ اول اسلامیات

تدریس مقاصد

قرآن حکیم:

عمومی مقاصد: 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، آیت لکرسی، سورۃ بقرہ کی آخری آیات ازمن الرسول سے اور سورۃ اخلاق کا ترجمہ وتشریح 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 ہوگی

() عبادات 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

() تمام 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 امسانی بساط میں ہے

() کفر کو اللہ کی مدد کے بغیر شکست نہیں دی جا سکتی

() اللہ ایک ہے

() اللہ کسی کا محتاج نہیں نہ اسکا کوئی شریک ہے

منتخب احادیث:

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

خصوصی مقاصد:

() احادیث کا ترجمہ بیان کر سکے

() احادیث کی تشریح کر سکے

() معاشرتی اور انفرادی زندگی میں احادیث سے رہنمائی حاصل کر سکے

حقوق وفرائض:

عمومی مقاصد:

() اسلامی معاشرے کا ایک اچھا فرد بن سکے

خصوصی مقاصد:

() والدین کے حقوق وفرائض بیان کر سکے

() ہمسائیوں کے حقوق بیان کر سکے

() بچوں کے حقوق بیان کر سکے

() عورتوں کے حقوق کی پاسداری کر سکے

() بزرگ شہریوں کے حقوق کا خیال رکھ سکے

() مخنث حضرات کے حقوق جان سکے اور ان کے حقوق کی پاسداری کر کے انہیں معاشرے کا ایک مفید فرد بنایا جا سکے

() اسلام میں حقوق وفرائض کی آگاہی کی صورت میں اپنے اندر خدمت خلق کا جذبہ پیدا کر سکے

اسلامی اقدار:

عمومی مقاصد:

() طالب علم جان سکے گا کہ تعلیم کا مقصد حسن اخلاق سے متصف ہونا ہے

خصوصی مقاصد:

() اخلاق کے معنی ومفہوم کو بیان کر سکے

() اسلام میں حسن واخلاق کی اہمیت بیان کر سکے

() قرآن وسنت کی روشنی میں صبر واستقلال کی اہمیت بیان کر سکے

() ایفائے عہد کی اہمیت بیان کر سکے

() اخوت کے معنی ومفہوم 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 301

مطالعہ پاکستان

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کل وقت 12 گھنٹے

حصہ دوئم

موضوعات:

- () قیام پاکستان
- () باؤنڈری کمیشن
- () ریڈکلف ایوارڈ
- () تقسیم بنگال
- () تقسیم پنجاب
- () مسئلہ مہاجرین
- () ریاست کا الحاق
- () ریاست جموں کشمیر
- () نہری پانی کا تنازعہ
- () قرارداد پاکستان
- () علماء کے بائیس نکات
- () 1956-1962-اور 1973 کے دساتیر کی اسلامی/انسانی حقوق کی دفعات (8 تا 28)۔
- () اقلیتوں کے حقوق۔ دیگر محروم طبقات کے حقوق
- () پاکستان کا محل وقوع اور اسکی جغرافیائی اہمیت۔ GSP+ کا تعارف اور عملی طریقہ کار
- () 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 مقاصد:

() باؤنڈری کمیشن تشکیل اور اس کے فرائض بیان کر سکے

() ریڈکلف اور اس کے ایوارڈ کے بارے 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 بارے میں تفصیل بیان کر سکے

() ریاست جموں کشمیر کے بارے میں بیان کر سکے

() نہری پانی کے تنازعہ کو بیان کر سکے

() قرارداد مقاصد کی تفصیلات بیان کر سکے

() 22 علماء کے متفقہ اسلامی نکات بیان کر سکے

() 1973 کے آئین میں انسانی حقوق کی دفعات (8-28)۔اقلیتوں کے حقوق اور دیگر محروم طبقات کے حقوق کے بارے میں جان 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 اور GSP+ کے تعارف اور عملی طریقہ کار بیان کر سکے

() پاکستان میں قدرتی وسائل (تیل، گیس، کوئلہ) کے بارے میں بیان کر سکے

غیر مسلم طلباء کے لیے

GEN301

نصاب اخلاقیات

سال سوئم

ٹی	پی	سی
1	0	1

کل وقت 20 گھنٹے

موضوعات:

() احساس ذمہ داری
() مثبت ذہن
() عدل وانصاف
() قومی خدمت کا جذبہ
() ذکر ونظر کی پاکیزگی
() احترام آدمیت
() شائستگی
() عفوودرگذر
() بردباری
() خوداتحصاری
() اثر ونفوذ
() جامعیت
() اپنی ذات کی معرفت (بذریعہ ہم عمر طلباء، اساتذہ، اہم شخصیات)
() بچوں کے حقوق
() عورتوں کے حقوق
() بزرگ شہریوں کے حقوق
() مخنث حضرات کے حقوق

غیر مسلم طلباء کے لیے
نصاب اخلاقیات (سال سوئم)

تدریس مقاصد:

عمومی مقاصد:

() ملکی ترقی کے لیے اعلیٰ اوصاف کے ساتھ بہتر طور پر ملک وملت کی خدمت کر سکے

خصوصی مقاصد: طالب علم اس قابل ہو سکے 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 وانصاف 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

() بچوں کے حقوق بیان کر سکے

() عورتوں کے حقوق کی پاسداری کر سکے

() بزرگ شہریوں کے حقوق کا خیال رکھ سکے

() مخنث حضرات کے حقوق جان سکے اور ان کے حقوق کی پاسداری کر کے انہیں معاشرے کا ایک مفید فرد بنایا جا سکے

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-313 **ADVANCED QUANTITY SURVEYING**

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

LEARNING OUTCOMES: To understand :

2. Estimation of frame structure buildings.
3. Application of software in estimation (MS EXCEL, AutoCAD Civil 3D)

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 calculation of quantity of structural steel work, 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 5 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 (polygonal with flat slab and Circular with segmental top slabs)
2.5 Instructions on calculation of quantities of different items of work for steel plate Girder Bridge.
2.6 Estimation of single span plate girder steel bridge 40’ span

3 Application of Software

MS EXCEL 5 Hours

3.1 Instructions regarding use of MS EXCEL software.
3.2 Prepare detailed estimate for framed structure building in MS EXCEL.
3.3 Prepare detailed estimate for water tanks in MS EXCEL.
3.4 Prepare detailed estimate for Bridge in MS EXCEL.
3.5 Prepare detailed estimate for Building Services in MS EXCEL.
3.6 Prepare detailed estimate for Tube well and Persian well in MS EXCEL.
3.7 Prepare hydraulic statement of water supply and sewerage schemes in MS EXCEL.
3.8 Earthwork calculations, Bituminous Road, Rate analysis, materials statement in MS EXCEL.

AutoCAD Civil 3D 8 Hours

3.9 Loading and unloading of AutoCAD Civil 3D.
3.10 Interface and Workspaces of AutoCAD Civil 3D,
3.11 Tool space, panorama, Templates, Settings, and Styles
3.12 AutoCAD Civil 3D Projects, Sharing Data, Using Data Shortcuts for Project Management
3.13 Create and edit parcels and print parcel reports
3.14 Create points and point groups and work with survey figures
3.15 Create, edit, view, and analyze surfaces
3.16 Create and edit alignments
3.17 Create data shortcuts
3.18 Create sites, profiles, and cross-sections
3.19 Create assemblies, corridors, and intersections
3.20 Create grading solutions
3.21 Create gravity fed and pressure pipe networks
3.22 Perform quantity take off and volume calculations
3.23 Use plan production tools to create plan and profile sheets
3.24 Steps in designing a project in AutoCAD Civil 3D.
3.25 Design of a road project for 1 km length as per data collected from the civil engineering project.

4 Complete Project Cycle 8Hours

4.1 Authority/ Directive of scheme
4.2 Feasibility report.
4.3 Rough cost Estimate
4.4 Preparation of PC-1
4.5 Administrative approval
4.6 Details estimate/Technical Sanction
4.7 DNIT (Draft notice invitation of tender) As per PPRA rule
4.8 Work award to the lowest bidder.
4.9 Monitoring (PC-3)
4.10 Handing Over/Taking over of Project
4.11 Completion report (PC-4)
4.12 PC-5

RECOMMENDED / REFERENCE BOOKS:

1. Dutta, B.N. and Dutta, S., 1991. *Estimating and Costing in Civil Engineering: Theory and Practice: Including Specifications and Valuation*. UBS.
2. Kohli, R.C., 2012. *A Textbook of Estimating and Costing (Civil)*. S. Chand Publishing.
3. K. Upadhyay, 2009, *Civil Estimating & Costing*, S.K. Kataria & Sons
4. G.S. Bridge., *Estimating and Costing*
5. Rangwala., 2020, *Estimating, Costing and Valuation*, Charotar Publishing House. AutoCAD Civil 3D Tutorials
6. MS Excel and AutoCAD Civil 3D Help reference

CIVIL-313 ADVANCED QUANTITY SURVEYING

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. including 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 Enlist different works for R. C. C. Over Head and Under Ground Water (, polygonal with flat and Circular with segmental top slabs)
2.5 Know procedure on Calculation of quantities of different items of work for 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 Softwares Used for Estimation and Planning

3.1 Instructions for application of formulae for estimation of civil engineering structures in tabulated form in MS EXCEL
3.2 Explain purpose of AutoCAD Civil 3D software in project designing
3.3 State interface of AutoCAD Civil 3D
3.4 State Tool space, panorama, Templates, Settings, and Styles
3.5 Explain AutoCAD Civil 3D Projects, Sharing Data, Using Data Shortcuts for Project Management
3.6 Describe how to Create and edit parcels and print parcel reports
3.7 Describe how to Create points and point groups and work with survey figures
3.8 Describe how to Create, edit, view, and analyze surfaces
3.9 Describe how to Create and edit alignments
3.10 Describe how to Create data shortcuts
3.11 Describe how to Create sites, profiles, and cross-sections
3.12 Describe how to Create assemblies, corridors, and intersections
3.13 Describe how to Create grading solutions
3.14 Describe how to Create gravity fed and pressure pipe networks
3.15 Describe how to Perform quantity take-off and volume calculations
3.16 Describe how to Use plan production tools to create plan and profile sheets

3.17 State Use of Tools and Commands for project designing
3.18 Prepare a road project for 1000 m length.

4. Complete Project Cycle.

4.1 Define Authority/ Directive of scheme
4.2 Explain preparation of Feasibility report.
4.3 Explain preparation Rough cost Estimate
4.4 Explain Preparation of PC-1
4.5 Describe Administrative approval procedure
4.6 Describe detailed estimate/Technical Sanction
4.7 Describe DNIT (Draft notice invitation of tender) As per PPRA rule
4.8 Describe Work award to the lowest bidder.
4.9 Explain Monitoring (PC-3)
4.10 Describe handing Over/Taking over of Project
4.11 Explain Completion report (PC-4) & PC-5

CIVIL-313 ADVANCED QUANTITY SURVEYING

LIST OF PRACTICALS

192 HOURS

1. Complete estimate of a small two storey R. C. C. frame structure building (of given drawing) including bar scheduling and abstract of cost.
2. Complete estimate of steel roof shed 60’ x 40’.
3. Complete estimate of brick masonry 8’ span segmental arched culvert.
4. Complete estimate of R. C. C. Bridge (high level Three Spans Bridge) including bar scheduling and abstract of cost.
5. Complete estimate of R. C. C. underground water tanks and overhead water tank.
6. Complete estimate of single span plate girder steel bridge 20’ span
7. Use of MS EXCEL software in estimation (Prepare detailed estimate for framed structure building, water tanks, Bridge, Building Services, Tube well and Persian well, hydraulic statement of water supply and sewerage schemes, Earthwork calculations, Bituminous Road, Rate analysis, materials statement in MS EXCEL.
8. Use of Autodesk Civil 3D software for Design of a road project for 1 km length as per data collected from the civil engineering project.
9. Preparation of detailed drawings and estimate of a project along with external and internal services of completed scheme. (Project will be selected by the instructor and assigned to students in groups)

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-304 CONSTRUCTION PROJECT PLANNING & MANAGEMENT

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

LEARNING OUTCOME: The student will be able to:

1. Understand the project management-life cycle, scheduling and implementation stages by using different approaches and software.

COURSE CONTENTS

1	**Introduction.**	4Hours
1.1	Introduction to Project Management.	
1.2	Construction stages	
1.3	Types of civil engineering projects.	
1.4	Classification of works	
1.5	Construction team	
1.6	Project Management Life Cycle	
2.	**Organization Structure**	4 Hours
2.1	Types of organizations in civil engineering works	
2.2	Organizational structure of engineering departments	
3.	**Preliminary Planning.**	4 Hours
3.1	Introduction to preliminary planning and feasibility study.	
3.2	Data collection and preparation of project feasibility report.	
4.	**Construction Planning.**	10 Hours
4.1	Introduction to construction planning	
4.2	Cost estimation of project based on schedule of rates	
4.3	Procurement of labour, material and equipment.	
4.4	Construction activities.	
4.5	Planning by bar chart/time and progress chart Gantt Chart	
4.6	Project planning using CPM technique	
4.7	Review of network and crash planning	
4.8	Preparation of work progress charts.	
5.	**Planning and Management of Construction Machinery**	6 Hours
5.1	Review of characteristics, operations and safety of different 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

6. Planning Scheduling & Monitoring with Primavera P6 10 Hours

6.1Navigation: Introduction to Primavera P6, Understanding the benefits of true Enterprise Project Management systems, Logging In, Understanding the Views and Layouts, Customizing Layouts.

6.2 Enterprise Project Structure: Understanding the Enterprise Project Structure, Modifying the EPS

6.3Project Creation: Preparing and Creating a new project

6.4The Work Breakdown Structure: Defining and modifying a Work Breakdown Structure

6.5Adding Activities: Describing an Activity and its attributes, Working with Activity Types, Adding Activities, Understanding Duration Types, Importing Activities, Assigning Activity Codes, Adding Activity Steps

6.6Relationships and Constraints: Relationship Types, Creating Relationships, Performing a Forward and Backward Pass, Apply a Constraint to an Activity, Critical Path Method, Modifying the Project Duration

6.7Formatting Project Data: Formatting overview, b. Grouping, c. Sorting, d. Filtering

6.8 Roles and Resources: Describing Roles and Resources, Assigning Roles to an Activity, Assign Rates on Roles, Assigning Resources, Displaying the Resource Usage Profile, Analyzing Resource Assignments

6.9Analysis, Risks and Issues: Analysis overview, Adjusting the Project Schedule, Analysing Resource Availability, Entering Risks, Entering Issues, Using Thresholds to monitor Issues

6.10Baselines: Baselines overview, Creating a Baseline Plan, Display Baseline Bars on the Gantt Chart, Setting up a Baseline view

6.11Project Execution: Project execution overview, Status update methods, Progressing activity status, Progressing activities using steps, Rescheduling the Project, Summarizing Projects, Working with Reflections, Monitoring Issues using Thresholds

6.12Reporting: Reporting overview, Describing Reporting Methods, Running a Schedule Report, Creating a report with the Report Wizard

7. Inspection and Quality Control 6 Hours

7.1 Importance & Duties of inspection officers in civil engineering project

7.2 Site order book

7.3 Quality control and quality assurance of a construction project

8 Tendering 6 Hours

8.1 Pre-requisites for tendering as per concerned authority

8.2 Invitation of tenders

8.3 Prequalification of Bid.

8.4 Tender document

8.5 Submission of tenders/bids-instruction to bidders.

8.6 Earnest money, security deposit.
8.7 Tender evaluation
8.8 Award and commencement of work & possession of site.
8.9 Mobilization advance, secured advance and retention money.
8.10 Conditions of contract agreement-penalty, Liquidated damages, time of completion, Extension of time, termination of contract, Arbitration Delays.
8.11 Variation order
8.12 Introduction to FIDIC

9. Methods of Execution of Works 4 Hours

8.1 Departmental execution of works
8.2 Introduction to Contract
8.3 Difference of work order and contract
8.4 Merits and limitations of each contract system

10 Work Records and Payment 6 Hours

10.1 Introduction to Measurement Book (MB)
10.2 Preparation of Muster-roll
10.3 Terms used in billing
10.4 Preparations of bills
10.5 Mode of payment

11 Stores 4 Hours

11.1 Classification of stores and stock
11.2 Terms used in stock, tools and plants (T&P)
11.3 Principles of storing materials and T&P
11.4 Indenting of materials

RECOMMENDED / REFERENCE BOOKS:

1. Prof. V.N. Vazirani and Prof. S.P. Chandola, 2011, *Construction Management and Accounts*.
2. Dutta, B.N. and Dutta, S., 1991. *Estimating and Costing in Civil Engineering: Theory and Practice: Including Specifications and Valuation*. UBS.
3. Rasul Manual on P.W. Accounting
4. Manual on Project Scheduling, Transportation Department, California
5. P6 Professional Use Guide "ORACLE"
6. Primavera Manual P6

CIVIL-304 CONSTRUCTION PROJECT PLANNING & MANAGEMENT

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 various construction projects i.e. planning stage, designing stage, tendering stage and execution stage.
1.3 State the types of civil engineering projects
1.7 State the classification of works-original, major, minor & petty work, annual repair and special repair works.
1.4 Explain the scope of duties & responsibilities of construction team in a construction project
1.5 Explain the importance and role of each member of construction team
1.6 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 the organizations i.e. line staff, direct and functional organization
2.2 List the engineering departments of government
2.3 Introduction to organizational chart of Public and Private Sector Departments.
2.4 Introduction of duties of different officers of works departments
2.5 Introduction to powers of sanction of various officers of works departments

3. Understand Various Aspects of Preliminary Planning

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

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

4.1 State the introduction to construction planning
4.2 Explain the procedure of cost estimation according to schedule of rates
4.3 State the need for material, equipments and Labour schedule
4.4 Explain methods of procurement of Labour, materials and equipments

4.5 State the objectives of scheduling
4.6 State the Break down the constructions work in to activities
4.7 Explain the procedure of making constructions schedule i.e. sequencing and time computation of each activity
4.8 Prepare bar chart and explain its limitation
4.9 Explain the advantages of project planning by network analysis (only with critical path method)
4.10 Plan and draw CPM network for a construction project
4.11 Calculate net work time, critical path, free float and total float
4.12 Draw progress charts for a construction project

5. Understand the Methodologies behind Planning and Management of Construction Machinery

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 Planning Scheduling & Monitoring with Primavera P6

6.1 Describe Navigation: Introduction to Primavera P6, Understanding the benefits of true Enterprise Project Management systems, Logging In, Understanding the Views and Layouts, Customizing Layouts.
6.2 Describe Enterprise Project Structure Understanding the Enterprise Project Structure, Modifying the EPS
6.3 Describe Project Creation i.e. Preparing and Creating a new project
6.4 Explain Work Breakdown Structure and to Define and modify a Work Breakdown Structure
6.5 Explain procedure of Adding Activities :Describing an Activity and its attributes, Working with Activity Types, Adding Activities, Understanding Duration Types, Importing Activities, Assigning Activity Codes, Adding Activity Steps
6.6 Describe different Relationships and Constraints: Relationship Types, Create Relationships, Perform a Forward and Backward Pass, Apply a Constraint to an Activity, Critical Path Method, Modify the Project Duration
6.7 Describe process of Formatting Project Data: **i.e.** Format Group, Sort, & Filter
6.8 Describe the different Roles and Resources for a project, Assign Roles to an Activity, Assign Rates on Roles, Assign Resources, Display the Resource Usage Profile, Analyze Resource Assignments
6.9 Describe the procedure of Analysis, Risks and Issues. Adjust the Project Schedule, Analyze Resource Availability, Enter Risks, Enter Issues, Use Thresholds to monitor Issues
6.10 Describe the procedure of creating of Baselines Plan, Display Baseline Bars on

the Gantt Chart, Set up a Baseline view

6.11 Explain the procedure of Project Execution. Describe Status update methods, Describe Progressing activity status, Describe Progressing activities using steps, Explain the procedure of Rescheduling the Project and Summarizing Projects, Work with Reflections, Monitor Issues using Thresholds

6.12 Describing Reporting Methods, Run a Schedule Report, Create a report with the Report Wizard

7. Understand the Principles of Inspection and Quality Control

7.1 Explain the need/importance for inspection of works as per contractual documents
7.2 List the duties of various inspecting officials
7.3 Explain the duties of sub-engineer regarding works, store and account
7.4 Explain the use of site order book and principles of supervision
7.5 Explain necessity and steps involved in quality control
7.6 State the necessity for sampling and testing of materials
7.7 List the points to be considered in enforcing specifications

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 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.
8.3 Distinguish between work order and contract
8.4 List the merits and limitations of each contracting system

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 award and commencement of work and possession of site
9.11 Explain mobilization advance, secured advance and retention money
9.12 Explain the conditions of contract such as penalty, Arbitration, Time of completions and Extension of time

9.13 Explain the variation order
9.14 Introduction to FIDIC

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

10.1 State the importance of measurement book
10.2 Explain standard measurement book, rules to be followed in recording measurements, preparation of abstract of payment in measurement book, irregularities in M.B.
10.3 State preparation of Muster-roll, daily labour report, casual labour.
10.4 Explain terms like Hand receipt, imprest, recoverable payment, competent authority, controlling officer, Disbursing officer, Divisional officer, cogence of work, deposit work, supervision charges, suspense account, market rates, storage rate and charges, major head, minor head, sub head, Detailed head
10.5 State the types of bills to be used-, running bills, final bills, deductions to be made from bills checking of bills, value engineering, cost accounting (interim payment certificate)
10.6 Explain the mode of payment to contractors- vouchers, first and final bill, advance payment, interim payment, final payment, secured advance payment, bill forms, Hand receipt, imprest, recoverable payments.

11. **Understand Store Management**

11.1 Explain need for store in a project
11.2 State the classification of stores- stock, tools and plants, Road metal and materials charged direct to the work.
11.3 State the classification of the items in general stock
11.5 Explain the terms used in stock i.e. sub-heads of stock receipts and issuance of stock items, stock account, Register of stock receipts and issuance, shortages and surpluses of stock, monthly stock account, material at site account, road metal account.
11.6 Explain the terms used for Tools and plants like sub heads of tools and plants, Issuance and receipts of T & P, T & P account, verification of tools and plants (Shortage and surplus).
11.7 Explain principles of storing materials, Location of T & P, protection of stores, store room record, bin card, ordering procedure of store.
11.8 Explain the procedure of indenting of materials like instruction for preparation of indents, specifications, and supply procedures in works departments

CIVIL-304 CONSTRUCTION PROJECT PLANNING & MANAGEMENT

LIST OF PRACTICALS **192 HOURS**

CONSTRUCTION PROJECTS PLANNING & MANAGEMENT

1- Prepare feasibility report and project documents (detailed estimate, specifications. Tender process, approvals, award of work, execution and closure of work).
2- Planning for the project using tools like CPM.

Note: Assign any one of the following projects for each group of students, distributing all the projects in a single class and complete the contents cited above.

1. A residential building

2. A water supply scheme of a small housing society

3. A sewerage scheme of a small housing society

4. A road project

PRIMAVERA SOFTWARE PROJECT

1. Loading and unloading Primavera Software.
2 Recognition of Menu and Toolbars
3 Add Project by Defining EPS, OBS, WBS, Addition of activities and codes, defining Roles and Assign Resources to activities
4 Create relationships, and run schedule.
Preparing Primavera P6 project including all stages as narrated in theory component.
5 Add a Project to the Project Structure
6 Create a Work Breakdown Structure
7 Add Activities
8 Add Codes to Activities
9 Create Relationships
10 Schedule a Project
11 Add Constraints
12 Organize Activities
13 Assign Resources and Costs
14 Analyse Resource/Cost Usage
15 Status the Project
16 Mitigate the Schedule
17 Analyse the Updated Project

DAE CIVIL TECHNOLOGY
YEAR 3

MGM-341 **ENTREPRENEURSHIP**

TOTAL CONTACT HOURS:	**32**	**T**	**P**	**C**
Theory:	32	**1**	**0**	**1**
Practical:	0			

LEARNING OUTCOMES:

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- Understanding the concept and elements of small business enterprise.
2- Apply the techniques for generating business ideas as well as for identifying and assessing business opportunities.
3- Understand the procedures required for establishing an enterprise.
4- Understand the procedures for assessing market and for selecting location for a small business.
5- Understand the importance of financial record keeping in a small business.
6- Develop business plan and evaluate it in real market situation.
7- Apply the concepts of Chemical / Pharmaceutical Engineering on planning, designing and layout of related technical projects.

COURSE CONTENTS

1- Entrepreneurship and Management 4Hours

1.1 The concept of entrepreneurship
1.2 Terminology used in entrepreneurship
1.3 Classification of business; difference between social and commercial business
1.4 Reasons for Entrepreneurship; importance in society, self employment, benefits & limitation, Importance of relations/links
1.5 Entrepreneurial motivation; setting goals and risk assessment.
1.6 Small enterprises; elements, ideas, motivation, resources, business plan etc.

2- Entrepreneurship and innovation 3 Hours

2.1 Creativity and innovation; creativity potential, techniques for developing creative abilities
2.2 Business ideas; resources of business ideas, collective thinking and creative thinking,
2.3 Risk involved in innovation
2.4 Identifying and assessing business opportunities

3- Entrepreneurs 5 Hours

3.1 Entrepreneurial characteristics
3.2 Assessment of entrepreneurial potential; assessment of individuals
3.3 Entrepreneurial Leadership: abilities for a successful businessman
3.4 Self discipline; check list for attaining self discipline
3.5 Decision making skills; steps for decision making, rating of decision making skills
3.6 Principles of negotiation; resolving business issues through negotiation

4- Establishment of An Enterprise 8 Hours

4.1 Market; Five 'W' of market, competitors, assessment of market size & demand
4.2 Business location; importance, selection of site
4.3 Legal forms of business; Proprietorship, advantages &disadvantages
4.4 Costing of product; direct and indirect cost

5- Management of an Enterprise 8 Hours

5.1 Hiring and managing people; hiring procedures, term & condition of services and Job description etc.
5.2 Managing sales & supplies; characteristics of successful sales personals, importance of advertisement, life cycle of product, selection of supplies, work order, delivery & payment etc.

6- Business Plan 4 Hours

6.1 Purpose of business plan
6.2 Components of business plan; outline, process of writing business plan
6.3 Analysis of business plan: feasibility; breakeven point, evaluating problem in starting business
6.4 Standard business plan

RECOMMENDED / REFERENCE BOOKS:

1 Dewhurst, J. eds., 1996. *Small business and entrepreneurship*. London: Macmillan.
2 Drucker, P. and Maciariello, J., 2014. *Innovation and entrepreneurship*. Routledge.
3 Miner, J.B., 1996. *The 4 routes to entrepreneurial success*. Berrett-Koehler Publishers.
4 Singh, P.N., 1986. *Developing entrepreneurship for economic growth*. Vikas.
5 Knowing About Business (KAB), ILO

MGM-341 ENTREPRENEURSHIP

INSTRUCTIONAL OBJECTIVES

1- Understand the concept and elements of Entrepreneurship

1.1 Define entrepreneurship
1.2 Explain the concept of entrepreneurship
1.3 Explain the various types of enterprise that exist in the community
1.4 Identify and interpret the terms and elements involved in the concept of enterprise
1.5 Appreciate that the advancement of individual and society in general when entrepreneurship is adopted
1.6 Explain various motivational factors that entrepreneurs possess and utilize.
1.7 Exhibit the skills needed to assess and evaluate a risk
1.8 Describe the outline of small enterprise

2- Understand the techniques for generating business ideas as well as for identifying and assessing business opportunities

2.1 Describe the creativity and innovation
2.2 Apply the techniques for developing creative abilities
2.3 Explain the resources of business idea
2.4 Explain the collective and creative thinking
2.5 Explain how to generate a business idea
2.6 Appreciate the importance of, and posses techniques for identifying and assessing business opportunities.

3- Understand personal characteristics needed to be a successful entrepreneur

3.1 Identify the various entrepreneurial characteristics
3.2 Access personal potential for becoming future entrepreneurs.
3.3 Identify leadership qualities which are essential to the success of entrepreneurs
3.4 Identify self- management skills and how they are important to be enterprising
3.5 Apply a rational approach to make personal and business decisions
3.6 Explain the steps for decision making and rating of decision making skills
3.7 Apply the rules of negotiation for resolving business issues

4- Understand the procedures required for establishing an enterprise

4.1 Describe the market & marketing
4.2 Differentiate between sellers and buyers' market
4.3 Describe the five 'w' of market
4.4 Explain the procedure for assessing the market size and demand
4.5 Explain the major factors to be considered when selecting a location for a

business

4.6 Describe the basic types of business ownership and the limitation of each

4.7 Explain the computation of initial and working capital needed to start an enterprise

4.8 Identify the advantages and disadvantages of using various sources of capital to start an enterprise

4.9 Explain the component of cost of product

5- Understand the various techniques that affect the management of an enterprise.

5.1 Describe the hiring method/Procedures

5.2 Describe the term & conditions of services and job description for various employments

5.3 Describe the characteristics of successful sales personals

5.4 Describe the life cycle of product

5.5 Identify the various ways of selecting suppliers,

5.6 Explain the inventory management of stock, raw material and finished goods etc.

5.7 Appreciate the importance of financial record keeping in a small business

5.8 Explain techniques to keep cost as low as possible

6- Apply the entrepreneurship knowledge for development of business plan for a small business and evaluate in a real market situation.

6.1 Appreciate the importance of business plan

6.2 Explain the process of writing a business plan

6.3 Develop feasibility for a business idea

6.4 Realize the problem that may be encountered when starting a small business/Enterprise

6.5 Develop a business plan for a small business on the standard format

6.6 Evaluate the business plan in a real market satiation

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-324 HYDRAULICS AND IRRIGATION ENGINEERING

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

LEARNING OUTCOMES:

The student will be able to:

1. Achieve knowledge about the principles involved in hydraulics & irrigation engineering.
2. Apply the fundamental principles of hydraulics to civil engineering projects.
3. Understand principles of irrigation engineering & irrigation system of Pakistan.

COURSE CONTENTS

PART-A

1. Introduction and Properties of Fluids 3 Hours

1.1 Introduction to the Hydraulics, Fluid Mechanics and historical development of Hydraulics
1.2 Physical characteristics and properties of fluids
1.3 Basic level numerical problems (mass density, specific weight, specific volume and specific gravity only)

2. Fluid Pressure and its Measurement 4 Hours

2.1 Fluid pressure, pressure/intensity of pressure, pressure head and Pascal's law and its applications
2.2 Atmospheric pressure, Gauge pressure, Absolute pressure
2.3 Measurement of fluid pressure, tube gauges to measure pressure i.e. Piezometer tube and Manometer
2.4 Mechanical gauges i.e. Bourdon and dead weight calibrator
2.5 Basic level numerical problems related to Piezometer tube and Manometer

3. Hydrostatics 6 Hours

3.1 Introduction
3.2 Pressure on immersed surface
3.3 Total pressure on a horizontal, vertical immersed surface, and inclined immersed surface
3.4 Centre of pressure, resultant pressure and centre of pressure of immersed surfaces
3.5 Basic level numerical problems related to pressure, pressure on immersed surface, centre of pressure

4. Floating Bodies Equilibrium 4 Hours

4.1 Buoyancy & floatation, buoyant force, centre of buoyancy
4.2 Metacentre, metacentric height
4.3 Conditions of equilibrium of a floating body
4.4 Basic level numerical problems

5. Hydro kinematic 4 Hours

5.1 Introduction
5.2 Discharge-equation of continuity of a liquid flow
5.3 Types of flows, Types of flow lines, path lines and stream line, flow net ,types of flow in a pipe
5.4 Basic level numerical problems

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
6.6 Basic level numerical problems

7. Flow through Simple 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
7.6 Basic level numerical problems

8. Flow through Orifices (Measurement of Discharge) 3 Hours

8.1 Introduction
8.2 Types of orifices
8.3 Jet of water, vena contracta
8.4 Hydraulic coefficients
8.5 Discharge through a large rectangular orifice
8.6 Mouth pieces
8.7 Basic level numerical problems

9. Flow over Notches 4 Hours

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

10. Flow over Weir 5 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 Basic level 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 Basic level Numerical problems

PART-B

12. Introduction of Irrigation 3 Hours

12.1 Definition, necessity and impact of Irrigation on human environment
12.2 Historical Background of Irrigation
12.3 Benefits of Irrigation and ill effects of Irrigation
12.4 Types of Irrigation
12.5 Sources of irrigation water
12.6 Rain water harvesting

13. Irrigation System in Pakistan 5 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 Crops and crop seasons
14.4 Definitions of Some Common Important Terms
14.5 Factors Affecting Duty and Methods of Improving Duty
14.6 Relation between Duty (D), Base Period (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. Introduction to Hydro Power Engineering 3 Hours

16.1 Introduction to water resources for hydropower engineering
16.2 Functional requirements of hydropower projects
16.3 Components of hydroelectric project

17. Water Reservoirs 6 Hours

17.1 Introduction and significance of different reservoirs
17.2 Site Selection of Reservoir
17.3 Classification of Dams
17.4 Construction details of different types of dams.
17.5 Causes of failure of different types of dams and their remedial measures.
17.6 Seepage Control in Earth Dam.
17.7 Raising of dams, necessity and methodology.

18. Weirs & Barrages 3 Hours

18.1 Introduction to weir & barrage
18.2 Site selection of weir & barrage
18.3 Components of weir & barrage
18.4 Flow over weirs

19. Regulating and Silt Controlling Works 3 Hours

19.1 Brief Description
19.2 Types of head regulators & silt controlling works

20. Canals and Canal Falls 5 Hours

20.1 Irrigation Canals and their types
20.2 Components of canal Section

20.3 Classifications & alignment of Canal
20.4 Necessity and types of Lining
20.5 Merits & Demerits of Lined and unlined channel
20.6 Introduction to basic requirements and types of Canal Fall
20.7 Site selection for canal falls

21. Cross Drainage Works 3 Hours

21.1 Introduction to different types of cross drainage works

22. Water Distribution Works 5 Hours

22.1 Introduction to and essential requirements of different types of outlets
22.2 Design & Characteristics of various outlet

23. Water Logging & Salinity. 2 Hours

23.1 Introduction to Water logging & salinity
23.2 Causes and prevention of water logging and salinity
23.3 Methods of reclamation of soil

24. River Training Works and Maintenance of Canals 5 Hours

24.1 Introduction to different river training works
24.2 Up-keeping and maintenance of canals
24.3 Breaches in canals
24.4 Worling of Silting tanks and their classes
24.5 Introduction to different types of berms

RECOMMENDED / REFERENCE BOOKS:

1 Khurmi, R.S. and Khurmi, N., 1987. *Hydraulics, Fluid Mechanics and Hydraulic Machines*. S. Chand Publishing.
2 Iqbal Ali, 1975, *Irrigation Engineering*, Oxford University Press
3 Iqbal Ali, 2001, *Irrigation and Hydraulic Structures*, Laser Enterprises Karachi
4 Sharma, R.K. and Sharma, T.K., 2008. *Irrigation Engineering (including hydrology)*. S. Chand Publishing.
5 Lewitt, E.H., 1958. Hydraulics and fluid mechanics: a text-book covering the syllabuses of the B. Sc.(Eng.), ICE, and I. Mech. E. examinations in this subject.
6 Das, M.M. and Saikia, M.D., 2009. *Irrigation and water power engineering*. PHI Learning Pvt. Ltd..
7 Punmia, B.C., Lal, P.B.B., Jain, A.K. and Jain, A.K., 2009. *Irrigation and*

water power engineering. Laxmi Publications, Ltd..
8 Priyani, V.B., 1975. The fundamental principles of irrigation and water power. *(No Title)*.

CIVIL-324 HYDRAULICS AND IRRIGATION ENGINEERING

INSTRUCTIONAL OBJECTIVES

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

1.1 Introduction, development, scope and significance of Hydraulics in civil engineering.
1.2 Describe Physical characteristics and properties of fluids i.e. mass density, specific weight, specific volume, specific gravity, surface tension, viscosity, capillary action, compressibility, cohesion, and adhesion (definition with daily life example and formula)
1.3 Basic level numerical problems (mass density, specific weight, specific volume and specific gravity only)

2. Understand Fluid Pressure and its Measurement.

2.1 State fluid pressure, pressure/intensity of pressure, pressure head and Pascal's law and its applications
2.2 Describe Atmospheric pressure, Gauge pressure, Absolute pressure
2.3 Explain Measurement of fluid pressure, tube gauges to measure pressure i.e. Piezometer tube and Manometer
2.4 State Mechanical gauges i.e. Bourdon and dead weight calibrator
2.5 Basic level numerical problems related to Piezometer tube and 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 Calculate the total pressure and centre of pressure on a horizontal vertical and inclined 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 centre of buoyancy.
4.2 Explain metacentre and metacentric height.
4.3 State the kinds of equilibrium of a floating body.
4.4 Basic level numerical problems

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.
5.5 Basic problem for understanding

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 and total energy.
6.4 Explain Bernoulli's theorem with its formula, limitations
6.5 Practical application of Bernoulli's theorem i.e., venturi meter & pipit tube.
6.6 Basic problem for understanding

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 Explain with sketches the hydraulic gradient and total energy line under different conditions.
7.6 Basic problem for understanding

8. Understand the Function and Flow Through Orifices.

8.1 Introduction to orifice
8.2 State types of orifices
8.3 State the technical terms i.e. jet of water, vena contracta, co-efficient of discharge and velocity of approach.
8.4 Explain hydraulic coefficients
8.5 Explain discharge through orifices
8.6 Differentiate between orifice and mouth piece.
8.7 Basic problem for understanding

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 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 Basic level Numerical problems

PART B

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

12.1 Definition, necessity and impact of Irrigation on human environment
12.2 State historical Background of Irrigation
12.3 Explain benefits of Irrigation and ill effects of Irrigation
12.4 Explain different types of Irrigation
12.5 State sources of irrigation water
12.6 Rainwater harvesting

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

13.1 Describe with map the irrigation network 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 Brief description
14.2 State the factors affecting water requirement
14.3 Explain different crops and crops seasons
14.4 Define the technical terms crop period, base period. Kharif Rabi ratio, core watering, cash crop, crop rotation, delta.

14.5 Factors affecting the duty and methods of improving duty
14.6 State the relation between duty(D), Base period (B) 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 Trickler irrigation method.

16. Understand Hydro Power Project

16.1 Introduction and types of water power development
16.2 Explain the assessment of water power development
16.3 State the components of hydroelectric scheme

17. Understand Water Reservoirs

17.1 Introduction and significance of different reservoirs
17.2 Describe the site Selection of Reservoir
17.3 State the classification of Dams
17.4 Explain the construction details of different types of dams.
17.5 State the causes of failure of different types of dams and their remedial measures.
17.6 Explain Seepage Control in Earth Dam.
17.7 Explain raising of dams, necessity and methodology.

18. Understand Features and Function of Weir/Barrages.

18.1 Introduction to weir and barrage
18.2 site selection of weir and barrage
18.3 Describe the components weir and barrages
18.4 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.
Describe with sketches the silt controlling works i.e. silt ejector, silt vanes, silt excluder and skimming platform.

20. Understand the Basic Ideas About Canals and Canal Fall.

20.1 State the irrigation canals and their types
20.2 Explain with sketches, components of a canal section
20.3 State classification and alignment of canals
20.4 Explain the necessity and types of lining

20.5 State merits and demerits of lined and unlined channels.
20.6 Introduction to canal fall and state the basic requirement & types of canal fall
20.7 Explain the site selection of canal falls

21. Understand the Basic of Idea Cross Drainage Works.

21.1 Introduction to different types of cross drainage works

22. Understand the Basic Idea of Distribution Works.

22.1 Introduction and essential requirements of different types of outlets
22.2 Design and characteristics of various outlets

23. Understand Water Logging & Salinity causes and remedial measures.

23.1 Introduction to water logging and salinity
23.2 State the causes and prevention measure of water logging and salinity
23.3 Explain Methods of reclamation of soil.

24. Understand the Types of River Training Works and Maintenance of Canals.

24.1 Introduction to different river training works
24.2 Explain Up-keep and maintenance of canals
24.3 State Breaches in canals i.e. courses, preventive measures and methods of closing.
24.4 Working of silting tanks and their classes
24.5 Introduction to different types of berms

CIVIL-324 HYDRAULICS AND IRRIGATION ENGINEERING

LIST OF PRACTICALS **96 HOURS**

1. Layout of hydraulics lab
2. Find the properties of fluids in Lab
   a. Specific weight of glycerine and mineral oil
   b. Viscosity of glycerine and mineral oil
   c. Capillary rise of water in tubes
3. Demonstration on pressure gauges
4. Determination of discharge through a pipe with Pitot tube.
5. Determination of hydrostatic force on a plane surface
6. Find Hydrostatics pressure and centre of pressure of vertically immersed surface.
7. Find the Metacentric height of a floating body in Lab.

8. Determination of coefficient of discharge using Venturimeter
9. Finding the velocity-by-velocity rod and by current meter.
10. To find the co-efficient of discharge through a rectangular notch.
11. Determination of pipe flow losses in pipes
12. Determination of hydraulic characteristics of various orifices
13. Draw a skeleton map of Pakistan showing rivers, main and link canal, Head works and barrages
14. Draw a plan showing general lay out of river training and protection works.
15. Draw typical cross-sections of a weir floors
16. Draw a plan showing the general layout of head works of a perennial canal
17. Draw the alignment of a canal, distributor minors and water courses on contour map
18. Determination of duty, delta and discharge of any crop
19. Draw the typical X-sections of channels
20. Draw the plan and section of a silt ejector
21. Draw the plane and L-section of a masonry flume
22. Demonstration and drawings of an Aqueduct crossing
23. Demonstration on A.P.M outlet and pipe outlet
24. Demonstration on various canal falls
25. Demonstration on discharge measurement
26. Draw the plan of a multipurpose irrigation project
27. Demonstration on lining in for irrigation channels
28. Draw typical cross section of dams
29. **Visit to nearest irrigation structure**

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-333 **TRANSPORTATION ENGINEERING**

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

LEARNING OUTCOME: To understand the fundamentals of various forms of transportation engineering involving highways, airports, runways, railways, bridges, docks and harbours.

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 in 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.
2.5. Socio economics effect.

3. Highway Geometric Design 4 Hours

3.1. Elements of geometrical design of road-Kerb, shoulder, footpath, driveway, right of way, bay of road, road margins.
3.2. Sight distance- types and factors.
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 Construction.** 5 Hours

4.1. Introduction.
4.2. Types of roads.
4.3. Components of roads.

4.4. Types of surfacing earth, gravel,
4.5. Types of Earth (embankment), sub base, ABC / WBM, Asphalt.
4.6. Comparison of premix concrete road (Flexible), PCC and RCC pavements along joints in concrete pavements
4.7. Breast wall, protection wall

5. **Road Drainage.** 2 Hours

5.1. Introduction & Importance of highway drainage.
5.2. Surface drainage
5.3. Sub-surface drainage.
5.4. Drainage of slopes and erosion control.
5.5. Catch water drain in hilly area.
5.6. Cross drainage structures

6. **Traffic Engineering.** 2 Hours

6.1. Scope of traffic engineering.
6.2. Traffic density surveys.
6.3. Road accidents causes vs prevention.
6.4. Pedestrian bridge, subway crossing
6.5. Traffic island, Refuge Island, pedestrian crossing.
6.6. Types of road signs
6.7. Characteristics of signs.
6.8. Road signals, types and purposes.

7. **Intersections.** 2 Hours

7.1. Road junction and its types.
7.2. Design consideration for provision of junctions.
7.3. Factors affecting the layout of junctions.
7.4. Provision of junctions of single & dual carriageway sites, parking spaces.
7.5. Introduction to underpasses, flyovers.
7.6. Introduction to motor ways and motorway intersections.

8. **Punjab Mass Transit Authority (PMA)** 1 Hours

8.1. Introduction.
8.2. Metro bus system
8.3. Orange line metro train
8.4. Advantages.
8.5. Factors effecting alignment
8.6. Construction details.
8.7. Integrated route system for metro services.

9. **Road Maintenance.** 2 Hours

9.1. Resurfacing (R&M).
9.2. Defects in roads- Corrugations, Ruts, pot holes, etc.
9.3. Remedies of road defects- Removal of existing surface, resurfacing, patch repair
9.4. Causes of defects of concrete roads and repair of concrete roads
9.5. Recycling of used materials

10. **Road Construction Machinery** 4 Hours

10.1. For earth work (Rollers, bulldozers, grader, excavator, dumpers, water bowser, dragline, trencher, shovels).
10.2. For asphalt (plant, paver, pneumatic tyre roller, tandem roller, boomer, air compressor).
10.3. For concrete road(concrete batching plants, transit mixture, loader etc

11. **Air Ports and Runways** 4 Hours

11.1. Important technical terms
11.2. Factors affecting site selection and layout of an airport.
11.3. Classification of air ports.
11.4. Runway pavement, its types and typical cross section
11.5. Patterns of runway
11.6. Drainage systems of an airport
11.7. Repair of runway.
11.8. Layout of air port buildings
11.9. Lighting of airport.
11.10. Security and ICT equipment's

12. **Role of Railways in Development of a Country.** 2 Hours
12.1. Introduction
12.2. Railway system in Pakistan
12.3. Comparison between Rail & Road transport
12.4. Metro Rail system

13. **Permanent Way.** 6 Hours
13.1. Definition
13.2. Requirements of permanent way
13.3. Components of permanent way, functions and types of ballasts and sleepers
13.4. Gauge, its types
13.5. Factors governing adoption of a particular gauge
13.6. Rails-types Rail joints (including fastening-fish plates, bolts, spikes, chair and bearing plates)
13.7. Railway carriage wheel, conning of wheels
13.8. Requirement of good rail joint and ballast.
13.9. Creep
13.10. Cause of creep

13.11. Methods of correction of creep

14. **Points & Crossing.** 4 Hours

14.1. Introduction and Purpose
14.2. Sleepers for point & crossing (through & inter laced sleepers)
14.3. Switches-shapes, length of stock & tongue rails, heal clearance, switch angle, through switches
14.4. Types of crossing
14.5. Crossing angle & number
14.6. Station yards and their layout.

15. **Signals.** 3 Hours

15.1. Purpose & types
15.2. Classification of signals according to function & location
15.3. Signalling-objects
15.4. Inter locking, principles & requirements
15.5. Methods of inter-locking

16. **Tunnels.** 3 Hours

16.1. Necessity of tunnels Necessity of underground space and trenchless technology.
16.2. Types of tunnels.
16.3. Introduction to blasting technique.
16.4. Tunnel rehabilitation.
16.5. Methods of excavation

17. **Docks Harbours.** 4 Hours

17.1. Definition of harbours
17.2. Classification of harbours
17.3. Requirement of a commercial harbour its location & size
17.4. Tidal waves break water & their classification
17.5. Wharves, quay walls & jetties, piers
17.6. Classification of docks.
17.7. Beach erosion & protection
17.8. Locks & lock gates

18. **Dredging.** 2 Hours

18.1. Definition
18.2. Necessity of dredging
18.3. Types of dredging devices

18.4. Methods of dredging
18.5. Disposal of dredged material

19. **Navigational Aids.** 2 Hours

19.1. Define: Navigation aids
19.2. Types of signals-light house, beacons, light ship & buoy

20. Introduction to Development of Bridges 3 Hours
20.1. Definition of terms related to bridge engineering
20.2. Structural parts of bridges
20.3. Factors affecting the development of bridges

21. Types of bridges and culverts 3 Hours
21.1. Permanent bridges
21.2. Temporary bridges
21.3. Culverts

22. Maintenance of Bridge 2 Hours
22.1. Permanent bridges Brief description of general maintenance
22.2. Temporary bridges Brief description of maintenance of steel, masonry, R.C.C. bridges
22.3. Culverts Brief description of maintenance of causeways.
22.4. Introduction of modern techniques e.g., epoxies etc

RECOMMENDED / REFERENCE BOOKS:

1. Ahuja, T.D. and Birdi, G.S., 2012. *Roads, Railways, Bridges and Tunnels Engineering*. Standard Book House.
2. Rangwala, S.C., Rangwala, S.C., Rangwala, K.S. and Rangwala, P.S., 2007. *Principles of railway engineering*. Charotar Book Stall.
3. Quddus, S.A., 1989. Operational safety of rail transport in Pakistan.
4. Agor, R., 1990. Railway Track Engineering. *Khanna Publicaions, Delhi, India*.
5. Singh, G., Highway Engineering‟ 5rd edition Standard Publishers Distributers. *New Delhi*.
6. O'Flaherty, C.A., 2001. *Highways*. CRC Press.
7. Wright, P.H. and Dixon, K., 2004. Highway engineering.
8. Tsinker, G.P. ed., 2004. *Port engineering: planning, construction, maintenance, and security*. John Wiley & Sons.
9. Singh, G., Highway Engineering‟ 5rd edition Standard Publishers Distributers. *New Delhi*.
10. Sehgal, S.B. and Bhanot, K.L., 1966. Highway engineering and airports.

CIVIL-333 TRANSPORTATION ENGINEERING

INSTRUCTIONAL OBJECTIVES

1. Understand Highway Development Planning.

1.1 Explain the necessity, importance and modes of transportation.
1.2 State historical development of roads with special reference to Pakistan.
1.3 Describe the terms road, highway, carriage way, dual carriage way etc.

2. Understand Road Alignment.

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.
2.5 Explain socio economic effects of alignment

3. Understand Highway Geometric Design

3.1 Define the terms Kerb, Shoulder, Footpath, Drive way, Right of way, Bay of roads, road margins.
3.2 Explain sight distance, stopping and over taking sight distance.
3.3 Explain the factors affecting sight distance
3.4 Define super elevation and state its necessity
3.5 Describe method of introduction super elevation.
3.6 Explain methods of introducing super elevation.
3.7 Derive formula for super-elevation.
3.8 Explain widening at curves.

4. Understand the Road Construction.

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 types Earth (embankment), sub base, ABC / WBM, Asphalt.
4.5 State Comparison of premix concrete road (Flexible), PCC and RCC pavements along joints in concrete pavements

4.6 Describe the necessity and function of breast wall, protection wall with sketches.

5. Understand the Drainage of Roads

5.1 Introduction of highway drainage
5.2 State the necessity and importance of highway drainage.
5.3 Describe with sketch surface drainage.
5.4 Describe with sketch sub-surface drainage.
5.5 State drainage of slopes and erosion control.
5.6 State catch water drain in hilly area.
5.7 Describe with sketches cross design structures, lips, culverts, bridge

6. Understand the Causes and Prevention of Accidents, Road Signs and Signals., Traffic Islands and Pedestrian Crossings.

6.1 State scope of traffic engineering.
6.2 Describe traffic density surveys and use.
6.3 State accidents and their causes.
6.4 State method of prevention of accidents.
6.5 Describe with sketches Pedestrian bridge, subway crossing
6.6 Describe with sketches traffic island refuge Island and pedestrian crossing.
6.7 Describe with sketches different types of road sign.
6.8 Describe the purpose of road signals and their types.
6.9 Explain the characteristics of road sign

7. Understand the Purpose of Intersections and Road Junctions

7.1 Define road junction and describe with sketches types of road junctions.
7.2 State design consideration for provision of junctions.
7.3 Describe the Factors influencing the layout of junctions, roundabouts.
7.4 Describe the provision of junctions for single & dual carriageway sites, parking spaces.
7.5 Explain structure of underpasses, flyovers.
7.6 Describe structure of motor ways and motorway intersections.

8. Understand the Purpose of Punjab Mass Transit Authority (PMA)

8.1 Introduction of PMA
8.2 Describe the salient features of Metro bus system
8.3 Describe the salient features of Orange line metro train
8.4 State advantages of Metro bus system and Orange line metro train
8.5 Describe the Factors influencing the alignment/ layout of Metro systems.
8.6 Describe the construction detail of Metro systems.
8.7 Describe the integrated route system Metro bus services.

9. Understand the Maintenance of Roads

9.1 Explain defects liable to occur in road- corrugations, ruts, pot holes etc.
9.2 Explain the remedial measures for defects- scraping of existing layers, patch repair, replacing with reinforced layers, resurfacing etc.
9.3 Describe the causes of defects in concrete roadside pot holes, corrugations and ruts.
9.4 Describe the repair of defects of concrete road.
9.5 Describe recycling procedure for road used materials

10. Understand the Function of Different Types of Machinery used in Road Construction.

10.1 Describe Construction Machinery For earth work (Rollers, bulldozers , grader, excavator, dumpers, water bowser, dragline, trencher, shovels).
10.2 Describe Construction Machinery For asphalt (plant,paver, pneumatic tyre roller, tandem roller, boomer, air compressor).
10.3 Describe Construction Machinery For concrete road(concrete batching plants, transit mixture, loader etc

11. Understand the Layout and Components of an Airport and Runway.

11.1 Explain the terms, landing strip, approach zone, run way length, taxiway, apron, etc.
11.2 . Explain factors effecting site selection of airports- geographical, administrative, political and economic etc.
11.3 Describe considerations for selection of airport and state the classification of an airport Sketch the general layout of various types of airport e.g. civil aviation, defence
11.4 Describe the run way pavements, its types draw typical cross section.
11.5 Sketch different patterns of run way.
11.6 Explain the drainage systems of an air port.
11.7 Describe the routine and special repairs of run way.
11.8 Sketch the layout of air port buildings.
11.9 Describe the lighting of an airport.
11.10 Describe Security and ICT equipments

12. Understand the Importance of Railway.

12.1 State the advantages of railway.
12.2 State salient features of railway system in Pakistan.
12.3 Compare rail and road transport.
12.4 Explain the metro rail system.

13. Understand the Functions of the Permanent Way.

13.1 Define permanent way.
13.2 State the requirements of permanent way.
13.3 Explain the components of permanent way, their functions and types (formation, ballast and sleepers).
13.4 Explain gauge and its types
13.5 Explain factors governing adoption of a particular gauge
13.6 Explain the different types of rails, rail joints, rail fittings and accessories.
13.7 Explain carriage wheel and conning of wheels.
13.8 State the requirement of good rail joint and ballast.
13.9 Explain modern methods of laying railway track.
13.10 Define creep
13.11 Explain the causes of creep.
13.12 State the methods of correction of creep.

14. Understand the Arrangements of Points and Crossing for Safe Running of Trains.

14.1 State the purpose of points and crossing.
14.2 Describe with sketches the sleepers for point and crossing (through and interlaced sleepers).
14.3 Explain the terms switches, shapes, length of stock and tongue rails, heal clearance, switch angle, through switches.
14.4 State the types of crossing.
14.5 Explain the terms crossing angle and number.
14.6 Explain station yards and sketch their layout.

15. Understand the Arrangements of Signals for Safe Running of Trains.

15.1 State the purpose and types of signals.
15.2 State the classification of signals according to function and location.
15.3 Explain signaling and its objects.
15.4 Describe with sketches the inter locking its principles and requirements.
15.5 Explain the methods of inter locking.

16. Understand Alignment and Construction of Tunnels.

16.1 State Necessity of tunnels Necessity of underground space and trenchless technology.
16.2 State Types of tunnels.
16.3 State Introduction to blasting technique.
16.4 State Tunnel rehabilitation.
16.5 Explain Methods of excavation

17. Understand the Idea behind Docks and Harbours.

17.1 Define harbours.

17.2 State the classification of harbours and list out harbours of Pakistan..
17.3 Explain the requirement of a commercial harbour, its location and size.
17.4 Explain the terms tidal waves, break water and their classification.
17.5 Explain terms: Wharves, quay walls, jetties, piers, and moorings.
17.6 State the classification of docks.
17.7 Explain beach erosion and its protection
17.8 State the terms locks and lock gates.

18. Understand the Purpose of Dredging.

18.1 Define dredging
18.2 State the necessity of dredging.
18.3 Explain the types of dredging devices.
18.4 Explain methods of dredging.
18.5 Explain disposal of dredging material.

19. Understand Fundamentals of Navigation Aids.

19.1 Describe navigation aids.
19.2 Explain types of signals, light house, beacons, light ship and buoys.

20. Understand Introduction To Development Bridges

20.1 Definition of terms related to Bridge Engineering
20.2 Explain structural parts of a Bridge
20.3 Explain factors Affecting the Development of Bridges

21. Understand Types of Bridges and Culverts

21.1 Explain permanent bridges
21.2 Explain temporary bridges (wooden, suspended, floating and moveable)
21.3 Define Culvert and causeway
21.4 Explain the difference between culvert and causeway
21.5 Explain Types of culverts (pipe, box, arch and slab)
21.6 Explain Types of causeway

22. Maintenance of Bridge

22.1 Brief description of general maintenance
22.2 Brief description of maintenance of steel, masonry, R.C.C. bridges
22.3 Brief description of maintenance of causeways.
22.4 Introduction of modern techniques e.g. epoxies etc.

CIVIL-333 TRANSPORTATION ENGINEERING

LIST OF PRACTICALS 96 HOURS

1 Drawing skeleton plan/map of Pakistan showing major roads.
2 Demarcation of road alignment on a given contour map.
3 Drawing typical cross-section of National and Provincial Highway.
4 Measurement of Stone metal at site and marking main quarries on Pakistan map.
5 Drawing typical cross-section of hill roads.
6 Sketching of subsurface drainage.
7 Visit to a road project under construction.
8 Ductility test for bitumen
9 Softening point test for bitumen (ring and ball apparatus)
10 Marshal stability test for bituminous mixture
11 Viscosity determination for cutback or emulsion
12 Flash and fire test for bitumen / cutback
13 Quantitative extraction of bitumen from bituminous paving
14 Penetration (consistency) of bituminous material
15 Los Angles Abrasion test
16 Sketching various road junctions, traffic and refuge islands.
17 Sketching various types of traffic signs.
18 Visit to motorway intersection, Metro bus system / Rail system
19 Preparation of general layout plan of an airport showing typical cross-section of run way.
20 Sketches of various airport patterns.
21 Visit to a nearby railway station and tracks, observation of parts drawing plan & cross section of permanent way
22 Drawing of the connection of rails to sleepers
23 Drawing of broad gauge track in cutting & filling
24 Drawing of various types of rails and chairs.
25 Sketching various types of signals. (common, semaphore, light disc and dwarf signals)
26 Drawing sections of breakwater.
27 Drawing layout of typical harbour and outline the important structures.
28 Sketching jetties and pier, lock gates, quay, draggers
29 Sketching a typical light house, floating signal (beacon, buoys, mooring buoys)

DAE CIVIL TECHNOLOGY
YEAR 3
CIVIL-374 CONCRETE TECHNOLOGY & R. C. C. DESIGN

TOTAL CONTACT HOURS:	**192**	**T**	**P**	**C**
THEORY:	**96**	**3**	**3**	**4**
PRACTICAL:	96			

LEARNING OUTCOME: To establish an understanding about the structural concrete properties and learn the practices used in R.C.C design globally.

Course Contents

PART-A

1 Introduction to Concrete 6 Hours

1.1 Introduction to concrete and its development
1.2 Concrete as a structural material
1.3 Advantages and limitations of concrete
1.4 Materials types and their properties for making concrete
1.5 Additives and admixtures for concrete

2 Properties of Concrete 9 Hours

2.1 Properties of fresh concrete
2.2 Workability and factors influencing the properties of concrete
2.3 Tests on fresh concrete
2.4 Measurement of workability and recommended slump values for different concrete works
2.5 Properties of hardened concrete
2.6 Factors affecting the properties of hardened concrete
2.7 Destructive and non-destructive tests on hardened concrete
2.8 Mix design method as per ACI codes

3 Concreting Operations 9Hours

3.1 Introduction and enlist the concreting operations
3.2 Procurement and storing of concrete materials
3.3 Batching of materials and batching methods
3.4 Structure and working of the batching plant
3.5 Mixing of concrete, mixing methods and types of mixers
3.6 Formwork for concrete
3.7 Transportation of concrete and methods of transportation
3.8 Placing of concrete, compaction methods and their precautions
3.9 Finishing types of concrete surface

3.10 Objective, methods and duration of curing the concrete
3.11 Joints in concrete, types, construction, positions, joint fillers, joint treatments

4 Concreting Under Special Conditions 3 Hours

4.1 Effects of temperature on concrete
4.2 Recommended precautions and practice for hot weather concreting
4.3 Recommended precautions and practice for cold weather concreting
4.4 Under water concreting method and precautions

5 Special Concretes 3 Hours

5.1 Light weight concrete, classifications properties, uses
5.2 Normal weight concrete
5.3 High strength concrete
5.4 High performance concrete
5.5 Mass concrete.
5.6 Ready mixed concrete
5.7 Cellular concrete
5.8 Self-consolidated concrete
5.9 Fibre reinforced concrete
5.10 Pervious concrete
5.11 Geopolymer concrete
5.12 Antibacterial concrete
5.13 Roller compacted Concrete

6 Pre-Stressed Concrete 6 Hours

6.1 Introduction to pre-stressing and related technical terms
6.2 Historical development of pre-stressing
6.3 Advantages and disadvantages of pre-stressed concrete
6.4 Classification of pre-stressing
6.5 Pre-tensioning systems and devices
6.6 Post-tensioning systems and devices
6.7 Materials for pre-stressed concrete

7 Steel Reinforcement for Concrete Structures 3 Hours

7.1 Introduction to steel reinforcement
7.2 Different types of steel reinforcement and their properties
7.3 Storing, cleaning, bending, fixing, placing and binding/welding of steel reinforcement

PART-B

8 Introduction to R. C. C. Analysis & Design 6 Hours

8.1 Introduction to R.C.C structures
8.2 Advantages and disadvantages of R. C. C. structures
8.3 Different types of loads for R. C. C. design
8.4 Design codes and specifications
8.5 Safety provision of the ACI codes
8.6 Methods of design
8.7 Review of bending moment and shear force in beams and their coefficients

9 Design of Rectangular R.C.C Beam (Tension reinforcement only) 8 Hours

9.1 Method of design (Ultimate Strength Design), behaviour of reinforced simply supported concrete beam under load
9.2 Whitney's equivalent stress distribution diagram and formula
9.3 Balanced, under reinforced and over reinforced section
9.4 Practical design considerations
9.5 R. C. C beam design for moment (tension reinforcement only) rectangular section, code provisions, steps in design of R.C.C of simply supported, cantilever, over hanging beam
9.6 Basic level problem solving of beam design

10 Design of Doubly Reinforced Beam 8 Hours

10.1 Definition, necessity and use and limitations
10.2 Elements and assumption related to design, design steps
10.3 Design of simply supported doubly reinforced beam basic level problems

11 Shear Reinforcement Design in Beam

11.1 Shear stresses in beam 6 Hours
11.2 Types of shear reinforcements
11.3 Overview of horizontal shear diagonal tension, bent up bars, spacing of stirrups
11.4 Design formulae and code provisions
11.5 Shear design of rectangular beam problems related to (i) basic bent up shear reinforcement (ii) with normal weight concrete and stirrups perpendicular to the member axis

12 Design of One-Way and Two-Way Slab 8 Hours

12.1 Definition, one way and two-way slab
12.2 Design steps, formulae code provisions and assumptions

12.3 Design of simply supported, overhanging one way slab in different situation
12.4 Loads, bending moment coefficients and its use
12.5 Design single span two-way slab by coefficients method

13 Introduction to Bond, Anchorage and Development Length 6 Hours

13.1 Introduction to bond strength and development length
13.2 Bond between concrete and reinforcement, bond stresses and checking of bond stresses in beam
13.3 Introduction to anchorage of tension bars by hook and standard hook as per ACI codes
13.4 Development length ACI design procedure for tension bars
13.5 Basic level design problem related to bond stresses and development length for tension bars

14 Design of Axially Loaded Columns and Footings 6 Hours

14.1 Introduction to columns and their classification
14.2 Design formulae and code provisions column and footing
14.3 Types of footings
14.4 Basic level design problem of isolated column with small eccentricity and their footing (rectangular)

15 Design of Simple Stair Case 3 Hours

15.1 Types, spanning horizontally and spanning longitudinally
15.2 Loads, design elements procedure
15.3 Design of stair spanning horizontal and longitudinally

16 Introduction to ETABS 6 Hours

16.1 Introduction to the ETBAS and ETBAS screen
16.2 Overview of templates, defaults, time saving options and basic process
16.3 Basic structural model making process
16.4 Overview of analysis, design, detailing, display results, generate results
16.5 Application of ETABS in structural and earthquake engineering

Recommended / Reference Books:

1. Siddiqi, Z.A., 2020. *Concrete Structures, Part-I*. Zahid Ahmad Siddiqi.
2. Siddiqi, Z.A., 2012. *Concrete Structures Part-II* (Vol. 2). Zahid Ahmad Siddiqi.
3. Nilson, A.,. *Design of concrete structures* (No. 15th Edition). Mc

Graw Hill Education
4. Krishna, R.N., 2007. *Reinforced Concrete Design: Principles And Practice*. New Age International.
5. Hassoun, M.N. and Al-Manaseer, A., 2020. *Structural concrete: theory and design*. John wiley & sons.
6. Li, Z., Zhou, X., Ma, H. and Hou, D., 2022. *Advanced concrete technology*. John Wiley & Sons.
7. Wang, C.K. and Salmon, C.G., 1979. *Reinforced concrete design*.
8. Neville, A.M. and Brooks, J.J., 2010. *Concrete technology* (2nd Edition). Edition Prentice Hall Pearson
9. Vanakudre, S.B. and Yaligar, A.A., 2018. *Prestressed Concrete*. KHANNA PUBLISHING HOUSE.
10. Sengupta, A.K. and Menon, D., 2012. Prestressed concrete structures. *E Learning course. nptel. iitm. ac. in*.
11. Syed, E.U. and Manzoor, K.M., 2022. Analysis and design of buildings using Revit and ETABS software. *Materials Today: Proceedings*, *65*, pp.1478-1485.
12. **ACI Design Codes** and ASCE, ASTM, AREA etc. Specifications

CIVIL-374 CONCRETE TECHNOLOGY & R. C. C. DESIGN

INSTRUCTIONAL OBJECTIVES

1. Understand the properties of Cement and other ingredients of Concrete

1.1 Introduction and describe the development of concrete
1.2 Describe concrete as structural material
1.3 State the advantages and limitations of concrete
1.4 State the concrete making materials, their types& properties i.e. (i) Various properties of cement and types (i.e. initial and final setting time, soundness, compression strength and tensile strength etc.)
(ii)Properties of aggregates &classification according to nature of formation, size, shape i.e. fine aggregates (Fineness, impurities), bulking of sand and coarse aggregates (Flakiness, elongation, Bulk density and impact value)
(iii)Explain the function of water in concrete and effects of excess impurities on the strength of concrete
1.5 Differentiate between Additives and Admixtures

2. Understand the factor influencing concrete properties

2.1 State the properties of fresh concrete i.e. segregation, blending, workability, false set and flash set etc.
2.2 State different factors affecting the workability of concrete

2.3 State the relationship between hydrations of cement and water content, state the water cement ratio and its effects on strength of hardened concrete

2.4 Describe the different tests for the measurement of workability, i.e. slump, compacting factor and vee-bee etc. and 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

2.7 Describe destructive test of the concrete i.e. compressive strength (cube and cylinder strength), tensile strength (split cylinder test), flexural strength test (beam test), shear strength test and bond strength test of concrete
Describe non-destructive tests (rebound hammer, PUNDIT test, Ultrasonic pulse test, Rebar detector Test)

2.8 State the ACI method of mix design

3. Understand The Methods of Batching, Mixing, Transporting, Placing, Compacting, Finishing, Jointing and Curing on Given Jobs

3.1 Introduction and enlist the concreting operations

3.2 Discuss the procurement and storing of concrete materials

3.3 Describe method of batching i.e. by volume and by weight

3.4 Structure and working of the batching method

3.5 Discuss the mixing of concrete, mixing methods and types of concrete mixers

3.6 Explain the form work for concrete

3.7 Explain the transportation of concrete and various methods of transportation

3.8 Explain the method of placing steel and method of placing concrete

3.9 Explain the various types of concrete surface

3.10 Describe the objective, methods and duration of curing the concrete

3.11 Explain the joints in concrete, types, construction & position ,joint fillers and joint treatment

4. Understand Practices for Concreting Under Special Conditions

4.1 Explain the effects of temperature on concrete

4.2 State the recommended precautions and practice for hot weather concreting

4.3 State the recommended precautions and practice for cold weather

concreting

4.4 Explain under water concreting methods and precautions

5. Understand Light Weight Concrete, High Strength Concretes Mass Concrete Ready Mixed Concretes etc.

5.1 State the types of light weight aggregates, its properties and uses of light weight concretes
5.2 State importance and uses of normal weight
5.3 State importance and high strength concrete
5.4 State importance and high performance concrete
5.5 Explain the special techniques involved in mass concreting
5.6 Explain necessity and manufacturing of ready mixed concrete
5.7 Explain Cellular Concrete
5.8 Explain Self-consolidated Concrete
5.9 Describe Fibre Reinforced Concrete
5.10 Explain Pervious Concrete
5.11 Explain Geopolymer Concrete
5.12 Explain Antibacterial Concrete
5.13 Explain Roller compacted Concrete any other advanced

6. Know About Principles of Pre-stressed Concrete

6.1 Introduction to pre-stressing and state the technical terms
6.2 Describe the historical development of pre-stressing
6.3 Explain the advantages and disadvantages of pre-stressed concrete
6.4 State the classification of pre-stressing i.e. source of prestressing force, external and internal prestressing, pre and post tensioning, linear and circular prestressing, full/limited/partial prestressing and uniaxial/biaxial/multiaxial prestressing
6.5 State pre-tensioning systems and devices
6.6 State post-tensioning systems and devices
6.7 Describe the materials for pre-stressed concrete

7. Understand Types of steel Reinforcement and Procedures of Laying Steel Reinforcement

7.1 Introduction to steel reinforcement
7.2 Explain different types of steel reinforcement and their properties i.e. according to shape, grades & strength, material chemical composition, stress, coating and use
7.3 State standards for storing, straightening, cutting, bending, placing and binding/welding of steel reinforcement

8. Understand Basic Concepts to Design an R. C. C. Member

8.1 Introduction to R.C.C structures
8.2 Explain the advantages and disadvantages of R. C. C. structures
8.3 Describe different types of loads for R. C. C. design i.e. live loads, dead loads, wind load, snow load, rain load and seismic load etc.
8.4 State the design codes and specifications i.e. ACI codes, AASHTO, ASTM, AREA, ASCE etc.
8.5 Discuss the safety provision of the ACI codes i.e. load factors and strength reduction factors
8.6 Explain the different design methods i.e. allowable stress design, strength design or LRFD and plastic design.
Explain the methods of design i.e. service load method/working stress design (WSD)/allowable stress design (ASD), ultimate strength design (USD) /limit-state design method and plastic design method
8.7 Review of bending moment and shear force in beams and their coefficients

9. Understand the Flexural Formula and Design of Simple R. C. C. Beam (Tension Reinforcement Only)

9.1 Explain the method of design (Ultimate Strength Design), behaviour of reinforced simply supported concrete beam under load
9.2 State the Whitney's equivalent stress distribution diagram and formula
9.3 Discuss balanced, under reinforced and over reinforced section
9.4 Review practical design considerations
9.5 Explain R. C. C beam design for moment (tension reinforcement only) rectangular section, code provisions, steps in design of R.C.C of simply supported, cantilever and over hanging beam
9.6 Solve basic level problems related to beam design

10. Understand Principles Involved in the Design of Doubly Reinforced Beam

10.1 Definition , necessity , use, limitations and methods
10.2 Explain elements and assumption related to design of doubly reinforced beam, also state steps and formulae for design as ACI codes.
10.3 Solve the simply supported doubly reinforced beam basic level design problems

11. Understand Shear Reinforcement Design in Beams

10.1 Explain the shear stresses in beams i.e. horizontal shear, diagonal tension and compression
10.2 Explain the types of shear reinforcements i.e. stirrups, bent up

bars, combination of stirrups & bent bars
10.3 Overview of horizontal shear diagonal tension, bent up bars, spacing of stirrups
10.4 State the design formulae and code provisions
10.5 Solve the shear of rectangular beam design problems related to (i) basic bent up shear reinforcement (ii) with normal weight concrete and stirrups perpendicular to the member axis

12. Understand the Procedure Involved in the Design of One-way and two way Slab

12.1 Distinguish between on way and two-way slab and state the loads taken into account for design of slab
12.2 State the steps and formulae for designs of one-way slab
12.3 Design of simply supported, overhanging one way slab design problems in different situation
12.4 Loads, bending moment coefficients and its use
12.5 Design single span two-way slab by coefficient method

13. Understand Procedure Involved in the Design of Bond, Anchorage and Development Length

13.1 Introduction to bond strength and development length
13.2 Explain the bond between concrete and reinforcement, bond stresses and checking of bond stresses in beam
13.3 State the anchorage of tension bars by hook and standard hook as per ACI codes
13.4 Explain the development length ACI design procedure for tension bars
13.5 Solve basic level design problem related to bond stresses and development length for tension bars

14. Understand The Procedure Involved in the Design of Axially Loaded Column and Simple Column Footings

14.1 Introduction to columns and state their classification
14.2 State the design formulae and code provisions column and footing
14.3 Explain the types of footings
14.4 Solve the basic level design problem of isolated column with small eccentricity and their footing(rectangular)

15. Understand the Procedure Involved in the Design of Stairs

15.1 Types, spanning horizontally and spanning longitudinally
15.2 Loads, design elements procedure
15.3 Design of a stair Spanning horizontally and longitudinally

16. Understand the use and Application of ETABS software

16.1 Introduction to the ETBAS software and ETBAS screen
16.2 Overview of templates, defaults, time saving options and basic process
16.3 Basic structural model making process i.e. structural objects, assign/change the properties and load cases and applications of codes and specifications
16.4 Overview of analysis, design, detailing, display results, generate results
16.5 Explain the application of ETABS in structural and earthquake engineering

CIVIL-374 CONCRETE TECHNOLOGY & R. C. C. DESIGN

LIST OF PRACTICALS

96 HOURS

1. Test for workability of concrete by slump cone and compacting factor apparatus.
2. Preparation of concrete cubes and cylinders vibrated and hand compacted, hand and machine mixed and with different w/c ratio.
3. Determination of compression strength of concrete using cubes and cylinders, compare the results
4. Preparation of standard size beams for flexural strength of concrete
5. Modules of rupture test, (breaking of beam prepared in above practical
6. Split cylinder test for tensile strength of R. C. C. concrete Design.
7. Non-destructive test by rebound hammer, Rebar Detector test NDT for steel reinforcement in R. C. C. structures like bridge, Water tank, framed structures e.g. buildings OHR etc.
8. Solve problems on bending moment and shear force in beams
9. Design and drawing of simple rectangular R. C. C. beam with U. D.L.
10. Design and drawing of simply supported and overhanging one way slab
11. Design and drawing shear force reinforcements for a rectangular beam and check for bond
12. Design of cantilever beam and lintels.
13. Design and drawing of doubly reinforced beams along with shear reinforcement and check for bond.
14. Design and drawing of R. C. C. column with isolated footing
15. Design and drawing of stair case
16. Installation of ETABS software and practice basics
17. Three storey simple residential building structural analysis
18. Three storey simple residential building structural design

DAE CIVIL TECHNOLOGY
YEAR 3

CIVIL-393 SOIL MECHANICS & FOUNDATION ENGINEERING

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

LEARNING OUTCOME:

The students will able to

1 Understand the physical properties and behaviour of soil masses subjected to various types of loads.

COURSE CONTENTS

1. Introduction 5 Hours

1.1 Soil, Types of soil and their formation
1.2 Soil mechanics, soil engineering and its significance
1.3 Three phase diagram of soil
1.4 Physical properties of soil
1.5 Various terminologies related to soil and their interrelationships
1.6 Numerical problems

2. Soil Classification. 5 Hours

2.1 Classification of soils
2.2 Particle size analysis
Soil Classification
a) Particle size analysis.
1. Sieve Analysis.
2. Hydrometer Analysis.
2.3 Systems of soil classification:
(i) particle size classification,
(ii)Textural classification,
(iii) AASHTO classification,
(iv)Unified soil classification system
2.4 Gradation of Soil

3. Soil Plasticity 5Hours

3.1 Introduction to cohesive and non-cohesive soil
3.2 Consistency of soil
3.3 Description of Atterberg's Limits.
3.4 Different Indices (Plasticity index, liquidity index, consistency index etc)

3.5 Methods of determination of Atterberg's Limits for given soil sample.

4. Soil Exploration 6 Hours

4.1 Introduction & scope of soil exploration
4.2 Boring & sampling methods for soil exploration
4.3 Sample disturbance
4.4 Soil exploration report

5. Soil Compaction & Consolidation 5 Hours

5.1 Compaction, consolidation and their objectives
5.2 Principles of compaction
5.3 Compaction Effort or Energy
5.4 Standard proctor test and modified proctor test
5.5 Field compaction tests: Sand Replacement Test, Core Cutter method
5.6 Methods of field compaction
5.7 Factors affecting field compaction
5.8 Consolidation test (Odometer Test)

6. Soil Permeability 7 Hours

6.1 Introduction to permeability and factors affecting it
6.2 Difference between seepage and permeability
6.3 Laboratory permeability tests (Constant & Falling methods)
6.4 Darcy's Law and its validity
6.5 Field permeability tests
6.6 Numerical problems on permeability.

7. Shear Strength of Soils. 6 Hours

7.1 Introduction to shear strength of soils.
7.2 Coulomb's Law for shear strength of soil.
7.3 Laboratory measurement of shear strength
7.4 Introduction to Triaxial compression test
7.5 Unconfined compression test.
7.6 Factors affecting shear strength of soil

8. Stability of Slopes. 5 Hours

8.1 Types, failure of slopes and necessity of slope stability
8.2 Causes of slopes failure
8.3 Remedial measures to avoid slope failures.

9. Bearing Capacity of Soils. 6 Hours

9.1 Introduction to bearing capacity of soil.

9.2 Sample collection of Soil
9.3 Factors affecting bearing capacity.
9.4 Standard Penetration Test (SPT)
9.5 California Bearing Ratio test (CBR)
9.6 Plate Load test

10. Shallow & Deep Foundations 7 Hours

10.1 Introduction to shallow and deep foundations and their purposes
10.2 Types of shallow and deep foundations
10.3 Types of pile foundation, failure and their remedial measures

11. Earth Pressure and Stability of Retaining Walls 7 Hours

11.1 Introduction to different types of Earth Pressure
11.2 Types, significance of retaining walls
11.3 Failure of retaining walls and its remedial measures
11.4 Stress changes in soil near retaining walls
11.5 Calculation of earth pressure-drained and undrained loading

RECOMMENDED / REFERENCE BOOKS:

1. Jumikis, A.R., 2003. *Soil mechanics*. McGraw-Hill.
2. Smith, I., 2021. *Smith's elements of soil mechanics*. John Wiley & Sons.
3. Punmia, B. and Jain, A.K., 2005. *Soil mechanics and foundations*. Firewall Media.
4. Raj, P.P., 2007. *Soil mechanics & foundation engineering*. Pearson Education India.
5. Arora, K.R., 2008. *Soil mechanics and foundation engineering (geotechnical engineering): In SI units*. Standard publishers
6. Punmia, B. and Jain, A.K., 2005. *Soil mechanics and foundations*. Firewall Media.
7. Das, B.M. and Sobhan, K., 2014. Geotechnical engineering. *Cengage, Stamford, CT, USA.*
8. A Akbar, *Soil Mechanics*

CIVIL-393 SOIL MECHANICS & FOUNDATION ENGINEERING

INSTRUCTIONAL OBJECTIVES

1. Understand the Preliminary Definitions and Relationships.

1.1 State Objectives of soil mechanics
1.2 Explain Soil structure and its group
1.3 Define the terms, solids, voids, voids-ratio, porosity, degree of saturation, percentage air voids and moisture contents.
1.4 Define specific gravity and various densities of soil.
1.5 Derive the various relationships

2. Understand the Classification Systems of Soil.

2.1 State classification of soil and its necessity.
2.2 Explain Particle size classification system, Textural classification system, AASHTO soil classification system, Unified soil classification system
2.3 Explain well graded, uniformly graded soil, poorly graded soil ,Effective grain size, coefficient of uniformity, coefficient of curvature
2.4Explain 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 different Indices(Plasticity index ,liquidity index, consistency index etc
3.5 Explain the methods of determination of Atterberg limits.

4. Understand Soil Exploration Techniques

4.1 State the introduction, purpose planning for soil exploration
4.2 Explain boring methods used for soil exploration by using hand augers, rotary drilling, wash boring & percussion drilling
4.3 Explain sampling methods such as sampling by standard split spoon, thin wall tube & piston sampler
4.4 Brief discussion about sample disturbance also define disturbed and undisturbed samples
4.5 Explain preparation of soil exploration report

5. Understand the Compaction Tests (Field and Lab).

5.1 State term compaction its significance and necessity.

5.2 Discuss the principles of compaction
5.3 Compare between compaction and consolidation.
5.4 Describe Compaction Effort or Energy.
5.5 List the procedure of standard proctor test and modified compaction test.
5.6 List the procedure of field compaction tests, core cutter method and sand replacement method, Rubber balloon method, Nuclear density meter
5.7 State the factors affecting compaction.

6. Understand the Methods Of Determining the Permeability of Soil.

6.1 Define permeability.
6.2 Describe factors affecting permeability.
6.3 State the Darcy's law of permeability and its validity
6.4 Explain the method of determining the permeability of soil in the Lab
6.5 Explain the methods of determining the permeability of soil in the field.

7. Know the Shear Strength of Soil.

7.1 State the term shear strength of soil & its significance.
7.2 State Coloumb's law for shear strength of soil.
7.3 State and explain the shear box test
7.4 State and explain Triaxial compression test and present the results by Mohr's circle
7.5 Apply the equations of simple two dimensional stress systems to solve problems encountered in soil mechanics.
7.6 Verify results obtained in 6.5 above using Mohr's circle of stress graphical method.
7.7 Explain the unconfined compression test.
7.8 Describe the factors affecting shear strength of soil.
7.9 Differentiate between cohesive and non-cohesive soils.

8. Understand the Need of Stability of Slope.

8.1 State the necessity, types and failure of slope.
8.2 Explain causes of failure of slopes
8.3 State the factors contributing to slope failure.
8.4 Explain the remedial measure to avoid slope failure.

9. Understand the Bearing Capacity of Soil.

9.1 Define bearing capacity, ultimate bearing capacity and safe bearing capacity of soil.
9.2 State the factors affecting bearing capacity of soil.
9.3 Explain the method for finding bearing capacity of soil by standard penetration test.
9.4 Explain the California Bearing Ratio (CBR) method for finding bearing

capacity of soil.

10. Understand the basics of Shallow & Deep Foundations

10.1 Definition of terms related to Shallow Foundations
10.2 Explain structural parts of a shallow foundations
10.3 Explain factors Affecting the Development of foundations and its settlement
10.4 Explain types of pile foundations
10.5 Explain components parts and type (resistance, shaft friction and capacity of pile groups)

11. Understand theory of Earth Pressure and stability of retaining walls

11.1 Define retaining walls
11.2 Explain the different failure if retaining walls
11.3 Explain stress changes in soil near retaining walls
11.4 Explain overall earth pressure

CIVIL-393 SOIL MECHANICS & FOUNDATION ENGINEERING

LIST OF PRACTICALS

96 HOURS

1. Determination of moisture content in a given soil sample by
   1.1 Speedy moisture content apparatus
   1.2 Oven dried 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 and preparation of gradation curve.
4. Hydrometer Analysis
5. Soil classification by AASHTO and USCS systems
6. Atterberg's (Liquid, Plastic & Shrinkage) Limit determination
7. Performing standard and modified Proctor test.
8. Finding field density by

ii) Core cutter method

iii) Sand replacement method

9. Consolidation test (Odometer)
10. Soil exploration and sample collection(preparation of Bore hole log)
11. Permeability test and problems related to Permeability
12. Direct shear test for determining shear strength of soil in the laboratory
13. Performing standard penetration test and finding bearing capacity of the soil
14. California bearing ratio (CBR) test for finding bearing capacity for soil
15. Unconfined Compression Strength (UCS) Test.
16. Unconsolidated Undrained (UU) Test. Consolidated Undrained (CU) Test. Consolidated Drained (CD) Test.

MINIMUM QUALIFICATIONS OF TEACHERS / INSTRUCTORS

For Technical Subjects

i) B.Sc./BE / B-Sc.Tech./B-Tech. (Hons.) degree in Engineering (Civil / Construction) with minimum of 2 years Industrial/ Teaching experience in the related field

ii) M.Sc./Ph.D degree in disciplines related to Civil, (Structure or Hydraulics or any relevant topics relevant to Civil/ Construction)

iii) DAE in Civil Tech./ DAE Civil with specialization in Quantity Surveying with minimum of 5- years Industrial/ Teaching experience in the related field

iv) BE / B-Tech./ DAE in Mechanical or Mechanical related specialization technology for subject of " Workshop Practice"

For Subjects pertaining to Humanities / Related Studies /Management / IT

i) MA degree in English/ Islamiat / Pst. with 2 years of teaching experience

ii) M.Sc. degree in IT / Computer Sciences or BE in Computer Engineering/ Sciences with 2-years of teaching experience

iii) M.Sc. degree in Mathematics with 2-years of teaching experience

iv) M.Sc. degree in Physics / Chemistry with 2-years of teaching experience

v) MBA/ MBE-con./ BBA (Hons.) degree with 2-years of teaching experience

Areas of Employability & job Occupations

After completing a polytechnic diploma in civil engineering, numerous opportunities are available across various sectors. Here are some potential pathways:

Employment Opportunities

- **Construction Companies:** Work as a site engineer, project assistant, or supervisor, overseeing construction activities.
- **Government Departments:** Positions in public works departments, urban development, and other government agencies.
- **Consultancy Firms:** Opportunities in design, planning, and project management.
- **Real Estate Development:** Roles in project management, quality control, and site supervision.
- **Infrastructure Development:** Work with organizations focusing on roads, bridges, and other infrastructure projects.

Areas:-

- Rainwater harvesting system
- Estimation
- Gas and Oil plants
- Construction of pipelines
- Construction of tunnels
- Surveying
- Water mains
- Preparation of civil drawings
- Power generation firms
- Construction of buildings
- Construction of dams
- Construction of sewage systems
- Construction of bridges
- Construction of Metro rails

Job Occupations:-

Junior Civil Engineers, Asstt. Construction Engineers, Environment Technicians, Site Surveyors, Construction Supervisors, Overseers, Surveyors, Qty. Surveyors and Structural Engineers in leading public and private sector companies.