

Curriculum for DAE (Civil Technology)

CURRENT SCHEME OF STUDIES

FIRST YEAR				
Course Code	Title	Th.	Pr.	Cr.
Gen-111	Islamiat/Pak Studies	1	0	1
Eng-112	English	2	0	2
Math-113	Applied Mathematics -1	3	0	3
Phy-122	Applied Physics	1	3	2
Ch-112	Applied Chemistry	1	3	2
Shop-162	Workshop Practice	0	6	2
CT-114	Surveying -1	2	6	4
CT-123	Construction -1	2	3	3
CT-133	Civil Drafting – 1	1	6	3
	Total	13	27	22

SECOND YEAR				
Course Code	Title	Th.	Pr.	Cr.
Gen-211	Islamiat/Pak Studies	1	0	1
Math-212	Applied Mathematics -2	2	0	2
Comp-122	Computer Application	1	3	2
CT-212	Public Health Engineering - 1	1	3	2
CT-224	Surveying II	2	6	4
CT-233	Construction - II	2	3	3
CT-243	Civil Drafting - II	1	6	3
CT-253	Mechanics of Structures	2	3	3
CT-262	Quality Surveying - 1	1	3	2
	Total	13	27	22

THIRD YEAR				
Course Code	Title	Th.	Pr.	Cr.
Gen-311	Islamiat/Pak Studies	1	0	1
CT-312	Project Management	2	0	2
CT-322	Quantity Surveying – II	0	6	2
CT-323	Public Health Engineering - II	2	3	3
CT-344	Hydraulics and Irrigation	3	3	4
CT-353	Railway, Docks, Harbours and Bridges	2	3	3
CT-364	Concrete Technology & RCC Design	3	3	4
CT-373	Soil Mechanics, Highways and Airports	2	3	3
CT-384	Civil Engineering Project	0	3	1
	Total	15	24	23

REVISED SCHEME OF STUDIES

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

SECOND YEAR				
Code	Subject Name	T	P	C
Gen 211	Islamiat/Pakistan Studies	1	0	1
Math 212	Applied Mathematics-II	2	0	2
Gen 221	Communication Skills & Report Writing	1	0	1
CT 212	Public Health Technology	2	3	3
CT 224	Advanced Surveying	2	6	4
CT 233	Building Construction	2	3	3
CT 244	Civil Engineering Drawing & Auto CAD	2	6	4
CT 253	Mechanics of Structures	2	3	3
CT 262	Quantity Surveying	1	3	2
	Total	15	24	23

THIRD YEAR				
Code	Subject Name	T	P	C
Gen 311	Islamiat & Pakistan Studies	1	0	1
CT 312	Project Management	2	0	2
CT 323	Advanced Quantity Surveying	1	6	3
CT 332	Environmental Technology	2	0	2
CT 344	Hydraulics & Irrigation	3	3	4
CT 353	Transportation Engineering	2	3	3
CT 363	Concrete Technology and RCC Design	2	3	3
CT 371	Occupational Health & Safety Environment	1	0	1
CT 383	Soil Mechanics & Bridge Engineering	2	3	3
CT 392	Civil Engineering Project	0	6	2
	Total	16	24	24

DAE CIVIL TECHNOLOGY

YEAR 1

اسلامیات / مطالعہ پاکستان

نی	پی	سی	GEN III	حصہ اول اسلامیات
1	0	1		حصہ دوم مطالعہ پاکستان
کل وقت: 20 گھنٹے			سال اول	موضوعات حصہ اول اسلامیات
				کتاب و سنت

(ا) قرآن مجید

- 1- تعارف قرآن مجید 2- نزول قرآن 3- کئی و معنی 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 اللہ جمیعاً ولا تفرقوا
 - 1.3 ولا یجر منکم شیطان قوم علی ان لا تعدلوا
 - 1.4 ان اللہ یمرکم ان تودوا الامانات الی اهلها
 - 1.5 ان اللہ یمر بالعدل والاحسان
 - 1.6 ان الصلواتہ تنہی عن الفحشاء وامنکر
 - 1.7 لقد کان لکم فی رسول اللہ سوة حسنتہ
 - 1.8 ان اکبر مکم عند اللہ اتقاکم
 - 1.9 وما آتاکم الرسول فخرزوا وما نہی عنہوا نتهوا
 - 1.10 ولوفوا بالعہد
 - 1.11 وما شر وہن بالمعروف
 - 1.12 یمحق اللہ الربو ویربب الصمات
 - 1.13 واصبر علی ما الصابک
 - 1.14 وقولوا لا سدیدنا
 - 1.15 ان الدین عند اللہ السلام
- (ب) سنت
 - 1- سنت کی اہمیت
 - 2- دس منتخب احادیث مع ترجمہ و تشریح

- 1- اعمالاً اعمال بالنیات
- 2- اہمیت لایتم مکارم الاخلاق
- 3- لایوم من احدکم حق یحب الاخیرہ ما یحب لنفسہ
- 4- لعلم من سلب المسلمون من سم المسلمون من لسانہ ویدہ
- 5- فی امنت باللہ سلم استقم
- 6- حیر کم خیر کم لا الہ
- 7- سباب المسلم فسوق وقتالہ کفر
- 8- الحور من احوال المؤمن
- 9- کأن المسلم عسی المسلم حیر لہ یمعہ ووالہ وفرقہ
- 10- ایۃ المنافق ثلاث اذا حدیث کذب واثاوت من خان واثاوت فینا خالف

دین اسلام

2.1 اسلام کے بنیادی ستھد 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

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

حصہ اول
حصہ اسلامیات

مذہبی مقاصد

۱- قرآن مجید

- عمومی مقصد: طالب علم یہ سمجھنے کے قابل ہو کہ اسلام کی تعلیمت کا اصل سرچشمہ قرآن مجید ہے
خصوصی مقصد: طالب علم اس قابل ہو جائے گا کہ
- ۱۰ قرآن مجید کی تعریف کر سکے گا
 - ۱۱ قرآن مجید کے نزول کی صورت بیان کر سکے
 - ۱۲ قرآن مجید کی آئی روایتی سورتوں کی پہچان کر سکے
 - ۱۳ 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
- ۱۴ قرآنی آیات کا ترجمہ و تشریح کر سکے
 - ۱۵ قرآنی تعلیمت کی روشنی میں اپنی اور معاشرتی اصلاح کر سکے

۲- سنت

- عمومی مقصد: طالب علم سنت نبوی کی اہمیت اور ضرورت کو اچھی طرح سمجھنے کے قابل ہو جائے گا
خصوصی مقصد:
- ۱۶ سنت کی تعریف بیان کر سکے
 - ۱۷ سنت کی اہمیت و ضرورت کی وضاحت کر سکے
 - ۱۸ سنت کی روشنی میں امور حسنہ پر عمل کر سکے
- ۳- منتخب احادیث پر عمل

- عمومی مقصد: احادیث کی روشنی میں اخلاقی اقدار سے سمجھنے حاصل کر سکے
خصوصی مقصد: احادیث کا ترجمہ و تشریح کر سکے
رسول اللہ ﷺ کے اقوال و سنت کا پرچار، کاغذہ مدعا ہو سکے

دین اسلام
عمومی مقاصد: دین اسلامی کے بنیادی مقاصد اور عبادت کے بارے میں جان سیکھ کر 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
عبادت (غماز، روزہ، حج، زکوٰۃ) کے فوری احکامات اور نسلی زندگی پر ان کی اثرات بیان کر سکے
اسلامی مقاصد و عبادت کے مطابق اپنی زندگی ڈھل کر ایک اچھا مسلمان بن سکے

اغیر مسلم طلباء کے لئے

GEN III

نصاب اختلاقیات میں کول

حصہ دوم: علاقہ پاکستان

نئی نئی
1 0 3
کل وقت - 20 گھنٹے

موضوعات

اختلاقیات کی تعریف اور اہمیت
اختلاقیات کا معیار (آٹون، عقل، العین، توبہ)

مندرجہ ذیل اطلاق کی وضاحت

☆ دولت داری

☆ وقت داری

☆ نظم و ضبط

☆ راست گوئی

☆ سیر و استغلاب

☆ حوصلہ مندی

☆ وقت کی پابندی

☆ سفاکی

☆ اعتدال

☆ باہمی احترام

☆ مصلحت

نصاب اخلاقیات (سولہ لائن)

تدریسی مقاصد

- عمومی مقاصد: اعلیٰ اخلاق کی وجہ سے کل ترقی میں کل ترقی تدریسی مقاصد کو سمجھنے
- خصوصی مقاصد: طالب اس علم سے ایسا چلے ہو گا کہ
- ۱۶ موضوعات کا مطلب بیان کر سکے
 - ۱۷ عملی زندگی سے مثالوں کی نشاندہی کر سکے
 - ۱۸ اپنی شخصیت اور معاشرے پر موضوعات کے مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے
 - ۱۹ مروت داری کی اہمیت بیان کر سکے
 - ۲۰ وفا داری کی اہمیت بیان کر سکے
 - ۲۱ لکھم و ضبط کی فلاحیت بیان کر سکے
 - ۲۲ صدق بیان کی ضرورت بیان کر سکے
 - ۲۳ حوصلہ مندی کے فوائد بیان کر سکے
 - ۲۴ وقت کی پابندی کے فوائد بیان کر سکے
 - ۲۵ صفائی اور باہمی اختیار سے حسن کلر کوگی کو بیان کر سکے
 - ۲۶ مصلحت کے فوائد بیان کر سکے

حصہ دوم	نصاب: سہ ماہی (Gen II)	کل وقت 12 گھنٹے
	موضوعات	
12	حریت، فخر، سہماں قوم میں آزادی، فکری، تاریخی، مساعروں میں سیاسی آزادی کی اہمیت، عوام ضرورت - ذاتی، جہلی، غلامی کے تعلقات	
13	نظریہ پاکستان	
14	قیام پاکستان کی اساس (ذہنی اسرار) قیام پاکستان کی فرض، اہمیت، نظریہ پاکستان کی وضاحت۔ نظریہ پاکستان اور عوام	
15	آپنی اور قائد اعظم کے ارشادات کی روشنی میں نظریہ پاکستان کا تاریخی پسو	
16	سہ ماہی قاسم کی آواز، مجدد تلف مہنی اور شاہ ولی اللہ کی تبلیغی خدمات سید احمد شہید کی تحریک مجاہدین	
17	شعاعی تحریکین	
	پہلی گزیرہ - نوبت اسلام آباد - (پریزنگ - مدرسہ لاطام - (شہزادہ) اسلام آباد کلچر ایسوسی ایشن، حملتہ اسلام آباد)	

مطالعہ پاکستان (حصہ دوم)
تدریس کا مقصد
حریت فکر:

- عمومی مقصد
- طالب علم یہ جان لے کہ اسلام میں اور مسلمان قوم میں آزادی فکر کی کیا اہمیت ہے
- خصوصی مقاصد
- ۱۶۴ حریت فکر کا معنی و مفہوم بیان کر سکے
- ۱۶۵ آزادی فکر کی اہمیت بیان کر سکے
- ۱۶۶ خصوصاً "اسلام میں آزادی" اعداد و اسائن کی اہمیت بیان کر سکے
- ۱۶۷ ذہنی غلامی کے قومی سطح پر نقصانات کے بیان کر سکے
- ۱۶۸ ہمسائی غلامی قومی سطح پر نقصانات بیان کر سکے
- نظریہ پاکستان
- عمومی مقصد:
- نظریہ پاکستان (ذہن اسلام) سے پوری طرح واقفیت ہو جائے
- خصوصی مقاصد:
- ۱۶۹ نظریہ کی تعریف بیان کر سکے اور اس کی وضاحت کر سکے
- ۱۷۰ نظریہ پاکستان کی تعریف کر سکے اور اس کا مفہوم بیان کر سکے
- ۱۷۱ علامہ اقبال اور قائد اعظم کے فرمودات کی روشنی میں نظریہ پاکستان بیان کر سکے
- نظریہ پاکستان کا تاریخی پسو
- عمومی مقصد
- ۱۷۲ نظریہ پاکستان کے تاریخی پسو سے واقفیت حاصل کر سکے
- خصوصی مقاصد:
- ۱۷۳ شہرین قاسم کے بارے میں بیان کر سکے

- ۶۱: محمد بن قاسم کے ہندوستان پر حملہ کی وجہ بیان کر سکتے
- ۶۲: محمد بن قاسم کے ہندوستان پر حملہ کے اثرات بیان کر سکتے
- ۶۳: بیان کر سکتے کہ ہندوستان میں ہندو مسلم دو قومی نظریہ کا نکتہ آغاز کیا ہے
- ۶۴: مہدولف ٹائی کی طس خدمات بیان کر سکتے
- ۶۵: شلاونی اللہ کی طس خدمات بیان کر سکتے
- ۶۶: مہدولف ٹائی اور شلاونی اللہ نے جو تبلیغ دین اور مسلمانوں میں بھائی بھائی شعور پیدا کیا اسے بیان کر سکتے
- علمی تحریکیں**
- ۶۷: علم میں متعدد
- ۶۸: برصغیر کی علمی تحریکوں سے آگاہی حاصل کر سکتے
- ۶۹: خصوصاً مہدولف
- ۷۰: علی گڑھ - دیوبند - تحریک العلماء خدمت الاسلام، اسلامیہ کالج - اہل حقیت اسلام نے تعلیم کے ذریعہ سیاسی شعور مسلمانوں میں پیدا کیا اسے بیان کر سکتے
- ۷۱: آفریدی ہند کے فلسفہ میں تحریک مہدولف کی خدمات بیان کر سکتے

DAE CIVIL TECHNOLOGY

YEAR 1

ENG-112

ENGLISH

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

AIM: On completion, the student will have the technical understanding of the English language in the context of a working environment. The student will also 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. Prose/Text	18 Hours
1.1 First six essays of Intermediate English Book-II.	
2. Grammar	18 Hours
2.1 Sentence structure	
2.2 Tenses (correct use of verb/tense)	
2.3 Parts of speech	
2.4 Active and Passive(change of voice)	
2.5 Words often confused.	
Phrases and Clauses (Nouns, Adjective and adverb clauses),	
Transformation of sentences and Synthesis of sentences,	
3. Composition	12 Hours
3.1 Business letters	
3.2 Applications for job, character certificate and grant of scholarship	
3.3 Different types of writing	
3.4 Writing simple and complex sentences and Paragraphs	
4. Translation	16 Hours
4.1 Translation from Urdu into English for foreign students: A paragraph or a dialogue.	

RECOMMENDED / REFERENCE BOOKS:

1. Intermediate English Book II :
2. Gul Technical English : **Rehan Gul**
3. Simple Essays: **H. Martin**, [2008], S. Chand & Co New Delhi
4. 123 Common Essays: **M. Zaman & N. Akhtar** [2008], Rabia Book House, Lahore.
5. The Elements of International English Style: **E. H. Wiess** [2009],_PHI Learning, New Delhi.
6. High School English Grammar & Composition: **Wren & Martin** [2009], S. Chand & Company Ltd.

INSTRUCTIONAL OBJECTIVES

1. Describe and Demonstrate Better Reading, Comprehension and Vocabulary.

- 1.1 Describe and narrate in simple English.
- 1.2 Identify the author and the essay.
- 1.3 Write summaries of the textual essays.
- 1.4 Carry out essay writing using topics from the following:
 1. Knowledge is power
 2. Well begun is half done
 3. Cleanliness
 4. Libraries
 5. Honesty
 6. Moral Education
 7. Knowledge of English
 8. Choice of Books'
 9. Newspaper Reading
 10. Right use of Time
 11. Discipline
 12. Aims in Life
 13. Manual Training
 14. The power of words
 15. The Sporting Spirit
 16. Good Manners
 17. Method of Working
 18. Sanitation
 19. The duties of a Citizen

20. What would I like to be
21. My hostel life
22. Importance of Technical Education
23. Role of Skills Development
24. If I were the Principal of a School
25. If I were the Minister of Education
26. An ideal student
27. An ideal teacher
28. Are scientific inventions making us happier
29. Atoms for Peace
30. Education
31. Education for Modernization
32. Energy Crisis
33. Environmental Pollution
34. Information System today
35. Scientific Education
36. Social Evils- Causes and Eradication
37. Status of women in Islam
38. Technology creates more problems than it can solve
39. Television- Its advantages and Disadvantages
40. Wonders of Electricity

1.5 Identify facts and ideas.

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

2.1 Converse fluently.

2.2 Express ideas clearly.

3. Apply Grammatical Rules to Writing and Speaking.

3.1 Describe sentence structure.

3.1.1 Identify kinds of sentences.

3.2 Use correct verb/tense in sentences.

3.2.1 Identify the tense of a sentence.

3.3 Narrate direct speech in indirect form.

3.4 Distinguish between confusing words.

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4. **Apply Concepts of Composition Writing to Practical Situations.**
 - 4.1 Write letters to communicate messages in the business world (inquiry, placing orders, complaints etc.).
 - 4.1.1 Identify parts of a business letter.
 - 4.1.2 Describe the qualities of a good business letter.
 - 4.2 Write applications for job opportunities, grant of character certificate and grant of scholarship.
 - 4.2.1 Describe the structure of application.
 - 4.2.2 Design and compose Curriculum Vitae (C.V.), Bio-data or Resume separately.
 - 4.3 Write essays pertaining to Technical Education, Science and our life, Computer, Environmental Pollution, and Duties of a student and Life of a Technician.
 - 4.3.1 Identify major kinds of essay
 5. **Apply Rules of Translation.**
 - 5.1 Convert sentences from Urdu to English.
 - 5.2 Translate a passage of Urdu into English making appropriate substitution of words.
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**DAE CIVIL TECHNOLOGY
YEAR 1**

**MATHS-
113**

APPLIED MATHEMATICS-I

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

AIM: On completion, the student will be able to solve problems of Algebra, Trigonometry, Vectors, Mensuration, etc , thereby developing skills, mathematical attitudes and logical perception in aid of civil engineering work

COURSE CONTENTS

- | | |
|--|-----------------|
| 1. Sets and Numbers. | 3 Hours |
| 1.1 Sets and subsets. | |
| 1.2 Product of sets. | |
| 1.3 Intervals. | |
| 1.4 Real and complex numbers. | |
| 1.5 Problems | |
| 2. Quadratic Equations. | 8 Hours |
| 2.1 Standard form. | |
| 2.2 Methods of solving quadratic equations. | |
| 2.3 Nature of roots of quadratic equations. | |
| 2.4 Relation between roots and coefficients. | |
| 2.5 Formation of quadratic equations. | |
| 2.6 Problems. | |
| 3. Matrices and Determinants. | 10 Hours |
| 3.1 Definition of matrix. | |
| 3.2 Some important matrices. | |
| 3.3 Algebra of matrices. | |
| 3.4 Determinants and their properties. | |
| 3.5 Singular and non-singular matrices. | |
| 3.6 Adjoint and inverse of a matrix. | |
| 3.7 Solution of linear equations. | |
| 3.8 Problems. | |

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- 4. Sequences and Series.** 12 Hours
- 4.1 Arithmetic sequence.
 - 4.2 Arithmetic means.
 - 4.3 Arithmetic series and its sums.
 - 4.4 Geometric sequence.
 - 4.5 Geometric means.
 - 4.6 Geometric series and its sums.
 - 4.7 Infinite Geometric series and its sums.
 - 4.8 Problems.
- 5. Binomial Theorem.** 6 Hours
- 5.1 Factorials.
 - 5.2 Statement of Binomial Theorem.
 - 5.3 General term.
 - 5.4 Binomial series.
 - 5.5 Problems.
- 6. Trigonometric Functions.** 9 Hours
- 6.1 Angles.
 - 6.2 Measurements of angles in different quadrants.
 - 6.3 Degree and radian measurements.
 - 6.4 Trigonometric functions.
 - 6.5 Signs of trigonometric functions.
 - 6.6 Graphical representation of trigonometric functions (Sine, Cos, Tan)
 - 6.7 Fundamental identities.
 - 6.8 Problems.
- 7. Trigonometric Identities.** 6 Hours
- 7.1 Fundamental law and deductions.
 - 7.2 Sum and difference formulae.
 - 7.3 Double angle identities.
 - 7.4 Half angle identities.
 - 7.5 Conversion of sum or difference to products.
 - 7.6 Problems.
-

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- 8. Solution of Triangles.** 6 Hours
- 8.1 Solution of oblique triangles.
 - 8.2 The law of sines.
 - 8.3 The law of cosines.
 - 8.4 Solution of right triangles.
 - 8.5 Measurement of heights and distances.
 - 8.6 Problems.
- 9. Vectors.** 6 Hours
- 9.1 Scalars & vectors.
 - 9.2 Addition and subtraction.
 - 9.3 The unit vectors i, j, k .
 - 9.4 Direction cosines.
 - 9.5 Scalar product of two vectors.
 - 9.6 Vector product of two vectors.
 - 9.7 Problems
- 10. Mensuration of Prisms and Cylinders.** 12 Hours
- 10.1 Introduction and review of formulae of plane figures.
 - 10.2 Definitions.
 - 10.3 Types of prisms and cylinders.
 - 10.4 Formulae for surfaces and volumes.
 - 10.5 Problems.
- 11. Mensuration of Pyramids and Cones and their Frusta.** 12 Hours
- 11.1 Definitions.
 - 11.2 Types of pyramids, cones and frusta.
 - 11.3 Formulae for surfaces and volumes.
 - 11.4 Problems.
- 12. Mensuration of Spheres.** 6 Hours
- 12.1 Definitions.
 - 12.2 Surface area of sphere.
 - 12.3 Volume of a sphere.
 - 12.4 Problems
-

RECOMMENDED / REFERENCE BOOKS:

1. Introduction to Engineering Mathematics: Vol I. **H. K. Das**, [2009], S. Chand & Co New Delhi.
2. Introduction to Engineering Mathematics: Vol II. **H. K. Das**, [2009], S. Chand & Co New Delhi
3. Engineering Mathematics: **A. S. Sharma H. K. Das**, [2009], Discovery Publishing House, New Delhi.
4. Elementary Mathematics: **Heng Hwa Heng** [2001], Longman.
5. Technical Mathematics : **Ghulam Yasin**
6. Technical Mathematics: **Ilyas Bhatti**
7. Technical Mathematics: **Zafar Iqbal**

INSTRUCTIONAL OBJECTIVES

1. Understand about Sets and Numbers.

- 1.1 Define sets and subsets.
- 1.2 Explain product of sets.
- 1.3 Define intervals.
- 1.4 Understand real and complex numbers.
- 1.5 Solve problems

2. Define Quadratic Equations.

- 2.1 Understand standard form.
- 2.2 Understand methods of solving quadratic equations.
- 2.3 Understand nature of roots of a quadratic equation.
- 2.4 Define relation between roots and coefficients.
- 2.5 Understand formation of quadratic equations.
- 2.6 Solve problems.

3. Understand Matrices and Determinants.

- 3.1 Understand definition of matrix.
- 3.2 Explain some important matrices.
- 3.3 Define algebra of matrices.
- 3.4 Explain determinants and their properties.
- 3.5 Explain singular and non-singular matrices.
- 3.6 Explain adjoint and inverse of a matrix.
- 3.7 Explain solution of linear equations.
- 3.8 Solve problems.

4. Understand Sequences and Series.

- 4.1 Define and explain arithmetic sequence.
- 4.2 Define and explain arithmetic means.
- 4.3 Define and explain arithmetic series and its sums.
- 4.4 Define and explain geometric sequence.
- 4.5 Define and explain geometric means.
- 4.6 Define and explain geometric series and its sums.
- 4.7 Define and explain infinite geometric series and its sums.
- 4.8 Solve problems.

5. Understand Binomial Theorem.

- 5.1 Define and explain factorials.
- 5.2 Define and explain Statement of binomial theorem.
- 5.3 Explain general term.
- 5.4 Explain binomial series.
- 5.5 Solve problems.

6. Understand Trigonometric Functions.

- 6.1 Explain measurements of angles in different quadrants.
- 6.2 Explain degree and radian measurements.
- 6.3 Define trigonometric functions.
- 6.4 Explain signs of trigonometric functions.
- 6.5 Explain graphical representation of trigonometric functions (Sine, Cos, Tan)
- 6.6 Explain fundamental identities
- 6.7 Solve problems.

7. Understand Trigonometric Identities

- 7.1 Define fundamental law and deductions.
- 7.2 Explain sum and difference formulae.
- 7.3 Define double angle identities.
- 7.4 Define half angle identities.
- 7.5 Explain conversion of sum or difference to products.
- 7.6 Solve problems.

8. Explain Solution of Triangles.

- 8.1 Define solution of oblique triangles.
- 8.2 Define the law of sines.
- 8.3 Define the law of cosines.
- 8.4 Define and explain solution of right triangles.
- 8.5 Explain measurement of heights and distances.

8.6 Solve problems.

9. Define and explain Vectors.

- 9.1 Define scalars & vectors.
- 9.2 Explain addition and subtraction.
- 9.3 Define The unit vectors i, j, k
- 9.4 Define direction cosines
- 9.5 Define scalar product of two vectors.
- 9.6 Define vector product of two vectors.

10. Understand Mensuration of Prisms and Cylinders.

- 10.1 Explain introduction and review of formulae of plane figures.
- 10.2 Understand definitions.
- 10.3 Define and explain types of prisms and cylinders.
- 10.4 Define and explain formulae for surfaces and volumes.
- 10.5 Solve problems.

11. Understand Mensuration of Pyramids and Cones and their Frusta.

- 1.1 Understand definitions.
- 1.2 Explain types of pyramids, cones and frusta.
- 1.3 Understand formulae for surfaces and volumes.
- 1.4 Solve problems.

12. Explain Mensuration of Spheres.

- 12.1 Understand definitions.
- 12.2 Explain surface area of sphere.
- 12.3 Explain volume of a sphere.
- 12.4 Solve problems

**DAE CIVIL TECHNOLOGY
YEAR 1**

CH-112

APPLIED CHEMISTRY

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

AIM: After studying this subject 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 principles of chemistry as applied in the fields of civil technology
3. Know the scientific methods for production, properties and use of materials of industrial & technological significance.
4. Gain skills for the efficient conduct of practicals in the chemistry lab and its useful real time applications
5. Be prepared for vertical academic development

COURSE CONTENTS

1. Basic Concepts 2 Hours

- 1.1 Introduction
- 1.2 Atom
- 1.3 Relative Mass
- 1.4 Isotopes
- 1.5 Analysis of a compound – empirical & molecular formulas
- 1.6 Concept of mole
- 1.7 Stoichiometry
- 1.8 Limiting reactant
- 1.9 Yield

2. Atomic Structure 2 Hours

- 2.1 Sub atomic particles of atom
- 2.2 Rutherford's model of atom
- 2.3 Plank's quantum theory
- 2.4 Bohr's model of atom
- 2.5 Spectrum
- 2.6 X-Rays and atomic number
- 2.7 Wave-particle nature of matter
- 2.8 Heisenberg's uncertainty principle
- 2.9 electronic distribution

3. Chemical Bonding

3 Hours

- 3.1 Introduction .
- 3.2 Atomic sizes
- 3.3 Ionization energy, electron affinity & electro negativity
- 3.4 Types of bonds
 - Ionic Bonding and Covalent Bonding,
- 3.5 Valence Bond Theory
- 3.6 Molecular Orbital Theory
- 3.7 Born-Haber cycle
- 3.8 Hydrogen Bonding
- 3.9 Theories of bonding in Metal (Band Theory)
- 3.10 Bond energy, bond length and dipole moment
- 3.11 The effect of bonding on the properties of compound

4. Gases

4 Hours

- 4.1 States of matter
- 4.2 Gas laws
- 4.3 General gas equation .
- 4.4 Avogadro's law
- 4.5 Dalton's law of partial pressures
- 4.6 Diffusion and effusion
- 4.7 Kinetic molecular theory of gases
- 4.8 Kinetic interpretation of temperature
- 4.9 Liquefaction of gases
- 4.10 Ideal behavior of gases
- 4.11 Plasma state

5. Liquids and Solids

4 Hours

- 5.1 Intermolecular Forces
- 5.2 Evaporation
- 5.3 Liquid crystals
- 5.4 Introduction to solids
- 5.5 Crystal Lattice
- 5.6 Crystal and their classification
- 5.7 Classification of Solids
- 5.8 Introduction to Solid State
- 5.9 Radius Ratio Rule
- 5.10 Space Lattice
- 5.11 Types of Unit Cell
- 5.12 Bragg's Equation and Calculation of density of unit cell
- 5.13 One and Two dimensional solids and Graphite as two dimensional solid and its conducting properties
- 5.14 Fullerene and its applications

- 6. Water.** 3 Hours
- 6.1 Chemical nature and properties.
 - 6.2 Sources of water
 - 6.3 Impurities.
 - 6.4 Hardness of water (types, causes & removal)
 - 6.5 Softening of water by L-S process and Reverse Osmosis, Treatment of boiler feed water by calgon process, Zeolite process, Water softening by synthetic Ion Exchange process.
 - 6.6 Scales of measuring hardness (degree Clark, French, PPM, Mg per liter).
 - 6.7 Boiler feed water, scales and treatment.
 - 6.8 Sea-water desalination
- 7. Experimental Techniques in Chemistry** 2 Hours
- 7.1 Filtration
 - 7.2 Sublimation
 - 7.3 Chromatography
 - 7.4 Solvent extraction
 - 7.5 Crystallization
- Chemical Kinetics**
- 7.6 Rate of Reaction, Rate Law and Order of reaction,
 - 7.7 Molecularity,
 - 7.8 Pseudo-Order reactions, Zero Order Reaction, First Order Reaction, Second Order Reaction, Third Order Reaction, Side Reaction, Reversible Reaction and Consecutive Reaction,
 - 7.9 Energy of activation and catalysis
- 8. Chemical Equilibrium** 3 Hours
- 8.1 Reversible and irreversible reactions
 - 8.2 Applications of chemical equilibrium in industry
 - 8.3 Ionic product of water
 - 8.4 Ionization constant of acids
 - 8.5 Ionization constant of bases
 - 8.6 Common ion effect
 - 8.7 Buffer solutions
 - 8.8 Equilibrium of slightly soluble ionic compounds
- 9. Solutions** 3 Hours
- 9.1 Concept of a solution
 - 9.2 Concentration units of solutions
 - 9.3 Types of Solutions
 - 9.4 Ideal and non-ideal solutions
 - 9.5 Vapor pressures of liquid-liquid solution

- 9.6 Solubility and solubility curves
- 9.7 Colligative properties of solutions
- 9.8 Energetics of a solution
- 9.9 Hydration and hydrolysis
- 9.10 pH-value of a solution and pH scale.

10. Electrochemistry

2 Hours

- 10.1 Electrolytic conduction
- 10.2 Electrode and equilibrium potential
- 10.3 Electrochemical Cell, Galvanic Cell, Concentration Cell
- 10.4 Corrosion and method of its control
 - 10.4.1 Introduction
 - Electrochemical
 - Theory of corrosion and Atmospheric Corrosion,
 - Types of corrosion
 - 10.4.2 Factors affecting rate of corrosion
 - 10.4.3 Corrosion control
 - Protection of Corrosion,
 - Cathodic and Anodic Protection, and
 - Galvanic Protection
 - Passivity.
- 10.5 Metal Finishing
 - 10.5.1 Introduction
 - 10.5.2 Factors involved in metal finishing
 - 10.5.3 Types of electroplating
 - 10.5.4 Electro less plating
- 10.6 Liquid Crystals
 - 10.6.1 Introduction
 - 10.6.2 Types of liquid crystals
 - 10.6.3 Liquid crystal behavior
 - 10.6.4 Effects of magnetic and electric field on liquid crystals
 - 10.6.5 Electro-optic effect
 - 10.6.6 Applications of liquid crystal
- 10.7 Polymers
 - 10.7.1 Introduction
 - 10.7.2 Classification of polymers
 - 10.7.3 Polymerization methods
 - 10.7.4 Polymerization techniques
 - 10.7.5 Properties of polymers
 - 10.7.6 Copolymers
 - 10.7.7 Plastics and resins
 - 10.7.8 Addition polymers
 - 10.7.9 Condensation polymers
 - 10.7.10 Elastomers and synthetic rubbers
 - 10.7.11 Fibers
 - 10.7.12 Adhesives
 - 10.7.13 Polymer composites

- 10.7.14 Molecular weight of polymers
- 10.7.15 Light emitting diodes
- 10.7.16 Photoconductive polymers
- 10.7.17 Liquid crystal polymer

11. Environmental Chemistry

4 Hours

- 11.1 Introduction
- 11.2 Ecology and eco-systems
 - 11.2.1 Introduction
 - 11.2.2 Geo-biochemical cycles
 - 11.2.3 Bio-geochemical cycles
 - 11.2.4 Solar energy and atmosphere
 - 11.2.5 Population dynamics
 - 11.2.6 Life-toxic substances and sustenance of life
 - 11.2.7 Pest control
 - 11.2.8 Agriculture and energy
 - 11.2.9 Control of toxic substances in environment
- 11.3 Types of pollution(air, water and land)
 - 11.3.1 Introduction
 - 11.3.2 Sources and effects of air pollution
 - 11.3.3 Pollution of air, water and land
 - 11.3.4 Air pollution effects (including acid rain, smog, green house effect and depletion of ozone layer in the stratosphere)
 - 11.3.5 Measurement techniques
 - 11.3.6 Air and water pollution control
- 11.4 Factors affecting the quality of water
 - 11.4.1 Dissolved oxygen (DO)
 - 11.4.2 Biochemical oxygen demand (BOD)
 - 11.4.3 Chemical oxygen demand (COD)
 - 11.4.4 Purification of water

RECOMMENDED / REFERENCE BOOKS:

1. Text Book of Intermediate Chemistry (I & II)
2. Ilmi Applied Science : Sh. Atta Muhammad.
3. Polytechnic Chemistry : J.N. Reedy (New Delhi)
4. Chemistry for Engineers : P.C. Jain (New Delhi)
5. Engineering Chemistry: Shradha Sinha Sudha Jain S. S. Dara, S. Chand & Company Ltd 2005
6. Engineering Chemistry : Putti R. Vijayasathy Prentice-Hall of India Pvt. Ltd. 2008
7. A textbook on Experiments and Calculations in Engineering Chemistry, S. S. Dara, [2008], S. Chand & Co New Delhi.
8. Engineering Chemistry, S. Sinha, S. Jain, S.S. Dara, 2nd Edition [2008], S. Chand & Co., New Delhi.
9. Applied Chemistry: G. Singh [2009], Discovery Publishing House Pvt. Ltd

INSTRUCTIONAL OBJECTIVES

1. Understand the Scope, Significance and Fundamental Role of the Subject.

- 1.1 Define chemistry and its important terms.
- 1.2 State the units of measurements in the study of chemistry.
- 1.3 Write chemical formula of common compounds.
- 1.4 Describe types of chemical reactions with examples.

2. Understand the Structure of Atoms and Arrangement of Sub Atomic Particles in the Architecture of Atoms.

- 2.1 Define atom. .
- 2.2 State the periodic law of elements
- 2.3 Describe the fundamental sub atomic particles.
- 2.4 Distinguish between atomic no. and mass no; isotopes and isobars.
- 2.5 Explain the arrangements of electrons in different shells and sub energy level
- 2.6 Explain the grouping and placing of elements in the periodic table:

3. Understand the Nature of Chemical Bond.

- 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 Nature of Gases

- 4.1 Define states of matter
- 4.2 Explain the gas laws
- 4.3 Explain general gas equation.
- 4.4 Define Avogadro's law
- 4.5 Define Dalton's law of partial pressures
- 4.6 Explain Diffusion and effusion
- 4.7 Describe Kinetic molecular theory of gases
- 4.8 Express Kinetic interpretation of temperature
- 4.9 Describe Liquefaction of gases
- 4.10 Explain Ideal behavior of gases
- 4.11 Define Plasma state

5. Comprehend Liquids and Solids

- 5.1 Explain intermolecular forces
- 5.2 Define evaporation
- 5.3 Describe liquid crystals
- 5.4 Explain introduction to solids

- 5.5 Define crystal lattice
- 5.6 Explain crystals and their classification
- 5.7 Describe classification of solids

6. Understand the Chemical Nature of Water.

- 6.1 Describe the chemical nature of water with its formula.
- 6.2 Describe the general impurities present in water.
- 6.3 Explain the causes and methods of removing hardness of water.
- 6.4 Express hardness in different units like mg/liter., p.p.m degrees Clark and degrees French.
- 6.5 Describe the formation and nature of scales in boiler feed water.
- 6.6 Explain the method for the treatment of scales.
- 6.7 Explain the sewage treatment and desalination of sea water.

7. Comprehend the Experimental Techniques in Chemistry

- 7.1 Explain Filtration
- 7.2 Describe Sublimation
- 7.3 Describe Chromatography
- 7.4 Explain Solvent extraction
- 7.5 Explain Crystallization

8. Understand about Chemical Equilibrium

- 8.1 Explain reversible and irreversible reactions
- 8.2 Describe the applications of chemical equilibrium in industry
- 8.3 Express the ionic product of water .
- 8.4 Ionization constant of acids
- 8.5 Ionization constant of bases
- 8.6 Common ion effect
- 8.7 Buffer solutions
- 8.8 Equilibrium of slightly soluble ionic compounds

9. Understand about Solutions

- 9.1 Concept of a solution
- 9.2 Concentration units of solutions
- 9.3 Types of Solutions
- 9.4 Ideal and non-ideal solutions
- 9.5 Vapor pressures of liquid-liquid solution
- 9.6 Solubility and solubility curves
- 9.7 Colligative properties of solutions
- 9.8 Energetics of a solution
- 9.9 Hydration and hydrolysis
- 9.10 pH-value of a solution and pH scale.

10. Understand about Electrochemistry

- 10.1 Electrolytic conduction
- 10.2 Electrode potential
- 10.3 Corrosion and method of its control
 - 10.3.1 Introduction
 - 10.3.2 Types of corrosion
 - 10.3.3 Factors affecting rate of corrosion
 - 10.3.4 Corrosion control
- 10.4 Metal Finishing
 - 10.4.1 Introduction
 - 10.4.2 Factors involved in metal finishing
 - 10.4.3 Types of electroplating
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- 10.5 Liquid Crystals
 - 10.5.1 Introduction
 - 10.5.2 Types of liquid crystals
 - 10.5.3 Liquid crystal behavior
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 - 10.6.2 Classification of polymers
 - 10.6.3 Polymerization methods
 - 10.6.4 Polymerization techniques
 - 10.6.5 Properties of polymers
 - 10.6.6 Copolymers
 - 10.6.7 Plastics and resins
 - 10.6.8 Addition polymers
 - 10.6.9 Condensation polymers
 - 10.6.10 Elastomers and synthetic rubbers
 - 10.6.11 Fibers
 - 10.6.12 Adhesives
 - 10.6.13 Polymer composites
 - 10.6.14 Molecular weight of polymers
 - 10.6.15 Light emitting diodes
 - 10.6.16 Photoconductive polymers
 - 10.6.17 Liquid crystal polymer

11. Understand about Environmental Chemistry

- 11.1 Introduction
- 11.2 Ecology and eco-systems
 - 11.2.1 Introduction
 - 11.2.2 Geo-biochemical cycles
 - 11.2.3 Bio-geochemical cycles
 - 11.2.4 Solar energy and atmosphere
 - 11.2.5 Population dynamics
 - 11.2.6 Life-toxic substances and sustenance of life

- 11.2.7 Pest control
- 11.2.8 Agriculture and energy
- 11.2.9 Control of toxic substances in environment

11.3 Types of pollution(air, water and land)

- 11.3.1 Introduction
- 11.3.2 Sources and effects of air pollution
- 11.3.3 Pollution of air, water and land
- 11.3.4 Air pollution effects (including acid rain, smog, green house effect and depletion of ozone layer in the stratosphere)
- 11.3.5 Measurement techniques
- 11.3.6 Air and water pollution control

11.4 Factors affecting the quality of water

- 11.4.1 Dissolved oxygen (DO)
- 11.4.2 Biochemical oxygen demand (BOD)
- 11.4.3 Chemical oxygen demand (COD)
- 11.4.4 Purification of water

LIST OF PRACTICALS

HOURS

1. General instructions about conduct of practicals and safety precautions in the lab and introduction to common apparatus, glassware and chemical reagents used in the chemistry lab.	6
2. To purify a chemical substance by crystallization.	3
3. To purify commercial NaCl by passing HCl gas	3
4. Determination of NaOH and Na ₂ CO ₃ in the given alkali mixture solution	3
5. Determination of NaHCO ₃ and Na ₂ CO ₃ in the given alkali mixture solution	3
6. Determination of hardness of a water sample	3
7. Estimation of chloride in a water sample by Mohr's method	3
8. Determination of dissolved oxygen (DO) in a water sample	3
9. Determination of free chlorine in a water sample	3
10. Determination of chemical oxygen demand (COD) in a waste water sample	3
11. Determination of biochemical oxygen demand (BOD) in a waste water sample	3
12. Determination of fluoride in water	3
13. Calculations on water softening by lime-soda process and zeolite process	3
14. Combustion calculations	3
15. Determination of molecular weight of a polymer	3
16. Determination of acid value of a plastic material	3
17. To separate a mixture of sand and salt.	3
18. To find the melting point of a substance.	3
19. To find the pH value of a solution with pH paper.	3
20. To separate a mixture of inks by chromatography.	3
21. To find the surface tension of a liquid with a stalagometer.	3
22. To perform electrolysis of water to produce Hydrogen and Oxygen. .	3
23. To get introduced with the scheme of analysis of salts for basic radicals.	3
24. To detect dilute acid group.	3

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- | | |
|---|---|
| 25. To get introduced with the methods/ apparatus of conducting volumetric estimations. | 3 |
| 26. To prepare standard solution of a substance. | 3 |
| 27. To find the strength of a given alkali solution. | 3 |
| 28. To find out the %age composition of mixture solution of KN03 and KOH volumetrically. | 3 |
| 29. To find the amount of chloride ions (Cl) in water volumetrically. | 3 |
| 30. Determination of iron concentration in sample of water by colorimetric method. | 3 |
| 31. The method involves the use of KCNS as color developing agent and the measurements are carried out at $\lambda_{\text{max}}480\text{nm}$. | 3 |

DAE CIVIL TECHNOLOGY

YEAR 1

PHY-122

APPLIED PHYSICS

TOTAL CONTACT HOURS:	228	T	P	C
Theory:	32	1	3	2
Practical:	196			

AIM: On completion, the student will be able to understand the fundamental principles and concepts of physics related to civil technology and use this knowledge to understand and solve problems in practical situations. The student will also be prepared for vertical academic development

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. Vectors and Equilibrium: 2 Hours

- 2.1 Basic Concepts of Vectors
- 2.2 Vector Addition by Rectangular Components
- 2.3 Product of Two Vectors
- 2.4 Torque
- 2.5 Equilibrium of Forces
- 2.6 Equilibrium of Torques

3. Motion And Force: 4 Hours

- 3.1 Displacement
- 3.2 Velocity
- 3.3 Acceleration
- 3.4 Velocity-Time Graph
- 3.5 Review of Equation of Uniformity Accelerated Motions
- 3.6 Newton's Laws of Motion
- 3.7 Momentum
- 3.8 Elastic and Inelastic Collisions
- 3.9 Force Due to Water Flow
- 3.10 Momentum and Explosive Forces
- 3.11 Rocket Propulsion
- 3.12 Projectile Motion

4. Work And Energy:

4 Hours

- 4.1 Work Done by a Constant Force
- 4.2 Work Done by a Variable Force
- 4.3 Work Done by a Gravitational Field.
- 4.4 Power
- 4.5 Energy
- 4.6 Interconversion of Potential Every and Kinetic Energy
- 4.7 Conservation of Energy
- 4.8 Non-Conventional Energy Sources

5. Circular Motion:

4 Hours

- 5.1 Angular Displacement
- 5.2 Angular Velocity
- 5.3 Angular Acceleration
- 5.4 Relation between Angular and Linear Velocities
- 5.5 Centripetal Force
- 5.6 Moment of Inertia
- 5.7 Angular Momentum
- 5.8 Law of Conservation of Angular Momentum
- 5.9 Rotational Kinetic Energy
- 5.10 Artificial Satellites
- 5.11 Real and Apparent Weight
- 5.12 Weightlessness in Satellites and Gravity Free System
- 5.13 Orbital Velocity
- 5.14 Artificial Gravity
- 5.15 Geostationary Orbits
- 5.16 Communication Satellites
- 5.17 Newton's and Einstein's Views of Gravitation

6. Fluid Dynamics:

4 Hours

- 6.1 Viscous Drag and Stokes Law
- 6.2 Terminal Velocity
- 6.3 Fluid Flow
- 6.4 Equation of Continuity
- 6.5 Bernoulli's Equation
- 6.6 Applications of Bernoulli's Equation

7. Electrostatics:

4 Hours

- 7.1 Coulomb's Law
- 7.2 Field of Force
- 7.3 Electric Field Lines
- 7.4 Applications of Electrostatics
- 7.5 Electric Flux
- 7.6 Electric Flux through a Surface Enclosing a Charge
- 7.7 Gauss's Law
- 7.8 Applications of Gauss's Law
- 7.9 Electric Potential

- 7.10 Electric Volt
- 7.11 Electric And Gravitational Forces (A Comparison)
- 7.12 Charge on an Electron by Millikan's Method
- 7.13 Capacitor
- 7.14 Capacitance of a Parallel Plate Capacitor
- 7.15 Electric Polarization of Dielectrics
- 7.16 Energy Stored in a Capacitor
- 7.17 Charging and Discharging Capacitor

8. Current Electricity:

3 Hours

- 8.1 Electric Current
- 8.2 Source of Current
- 8.3 Effects of Current
- 8.4 OHM's Law
- 8.5 Resistivity and its Dependence upon Temperature
- 8.6 Color Code for Carbon Resistances
- 8.7 Electrical Power and Power Dissipation in Resistors
- 8.8 Electromotive Forces (EMF) and Potential Difference
- 8.9 Kirchhoff's Rules
- 8.10 Wheatstone Bridge
- 8.11 Potentiometer

9. Alternating Current:

3 Hours

- 9.1 Alternating current
- 9.2 A.C. Circuits
- 9.3 A.C. through a Resister
- 9.4 A.C. through a Capacitor
- 9.5 A. C. through Inductor
- 9.6 Impedance
- 9.7 R-C and R-L Series Circuits
- 9.8 Power in A.C. Circuits
- 9.9 Series Resonance Circuits
- 9.10 Parallel Resonance Circuits
- 9.11 Three Phase A.C. Supply
- 9.12 Principles of Metal Detectors
- 9.13 Choke
- 9.14 Electromagnetic Waves
- 9.15 Principles of Generation Transmission and Reception of Electromagnetic Waves
- 9.16 Modulation

10. Properties of Solids:

2 Hours

- 10.1 Classifications of solids
- 10.2 Mechanical Properties of Solid
- 10.3 Electrical Properties of Solids
- 10.4 Superconductors
- 10.5 Magnetic Properties of Solids
- 10.6 Magnetism and Magnetic Materials

- 10.7 Differences between Diamagnetic
- 10.8 Paramagnetic and Ferromagnetic Materials
- 10.9 Curie Temperature and Curie-Weiss Law
- 10.10 Hysteresis and Definition of Some Magnetic Parameters
- 10.11 Relation between Magnetic Intensity, Magnetic Induction and Intensity of Magnetization

11. Dielectric Properties of Materials

- 11.1 Electric Potential, Electric Field Strength, Relation between Electric Potential and Electric Field Strength
- 11.2 Para electricity, Ferro electricity, Piezoelectricity, Ferro electricity vs. Piezoelectricity
- 11.3 Frequency Dependence of Dielectric Constant, Dielectric Loss Applications of Dielectrics

12. Fiber Optics

- 12.1 Introduction: Structure of the Optical Fiber and Principle of Optical Fibers Step Index Fiber, Graded Index Fiber, Fiber packing
- 12.2 Losses in Optical Fibers and Applications of Optical Fibers

13. Nanotechnology

- 13.1 Introduction to Nano-materials, Nano-science and nanotechnology Fundamental Concepts of Nan science and Nanotechnology
- 13.2 Bucky balls, Carbon Nano-tubes, Structure of Carbon Nano-tubes: Single-walled and Multi-walled Nano-tubes
- 13.3 Growth Mechanism of Nano tube and Synthesis of Nano-tubes
- 13.4 Properties of Nano tubes and Applications of Nanotechnology

RECOMMENDED / REFERENCE BOOKS:

1. Fundamentals of Physics Vol- I and II :**Tahir Hussain**
2. Fundamentals of Physics Vol - I and II: **Farid Khawaja**
3. Schaum's Series Physics :**Wells and Slusher**
4. Advanced Level Practical Physics: **Nelkon and Oybron**
5. Practical Physics :**Mehboob Ilahi Malik and Inam- ul- Haq**
6. Experimental Physics Note Book :**M. Aslam Khan and M. Akram Sandhu**
7. Textbook of Engineering Physics: **N. Mehta** [2009], PHI Learning, New Delhi
8. Modern Physics for Scientists & Engineers: **J.R. Taylor, C.D. Zafiratos and M.A. Dubson** [2009], PHI Learning, New Delhi
9. Applied Physics: **T.B. Sankaam, G.S. Kumar & G. Prasad**, [2005], BS Publications New Delhi

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. Understanding Motion And Force:

- 3.1 Explain Displacement, Velocity and Acceleration
- 3.2 Describe the Velocity-Time Graph
- 3.3 Describe the Equation of Uniformity Accelerated Motions
- 3.4 Explain Newton's Laws of Motion
- 3.5 Describe Momentum
- 3.6 Explain Elastic and Inelastic Collisions
- 3.7 Derive Force Due to Water Flow
- 3.8 Describe Momentum and Explosive Forces
- 3.9 Describe Rocket Propulsion and Projectile Motion

4. Work And Energy:

- 4.1 Work Done by a Constant Force
- 4.2 Work Done by a Variable Force
- 4.3 Work Done by a Gravitational Field.
- 4.4 Power
- 4.5 Energy
- 4.6 Interconversion of Potential Energy and Kinetic Energy
- 4.7 Conservation of Energy
- 4.8 Non-Conventional Energy Sources

5. Circular Motion:

- 5.1 Angular Displacement
- 5.2 Angular Velocity
- 5.3 Angular Acceleration
- 5.4 Relation between Angular and Linear Velocities

- 5.5 Centripetal Force
- 5.6 Moment of Inertia
- 5.7 Angular Momentum
- 5.8 Law of Conservation of Angular Momentum
- 5.9 Rotational Kinetic Energy
- 5.10 Artificial Satellites
- 5.11 Real and Apparent Weight
- 5.12 Weightlessness in Satellites and Gravity Free System
- 5.13 Orbital Velocity
- 5.14 Artificial Gravity
- 5.15 Geostationary Orbits
- 5.16 Communication Satellites
- 5.17 Newton's and Einstein's Views of Gravitation

6. Fluid Dynamics:

- 6.1 Viscous Drag and Stokes Law
- 6.2 Terminal Velocity
- 6.3 Fluid Flow
- 6.4 Equation of Continuity
- 6.5 Bernoulli's Equation
- 6.6 Applications of Bernoulli's Equation

7. Electrostatics:

- 7.1 Coulomb's Law
- 7.2 Field of Force
- 7.3 Electric Field Lines
- 7.4 Applications of Electrostatics
- 7.5 Electric Flux
- 7.6 Electric Flux through a Surface Enclosing a Charge
- 7.7 Gauss's Law
- 7.8 Applications of Gauss's Law
- 7.9 Electric Potential
- 7.10 Electric Volt
- 7.11 Electric And Gravitational Forces (A Comparison)
- 7.12 Charge on an Electron by Millikan's Method
- 7.13 Capacitor
- 7.14 Capacitance of a Parallel Plate Capacitor
- 7.15 Electric Polarization of Dielectrics
- 7.16 Energy Stored in a Capacitor
- 7.17 Charging and Discharging Capacitor

8. Current Electricity:

- 8.1 Electric Current
- 8.2 Source of Current
- 8.3 Effects of Current
- 8.4 OHM's Law
- 8.5 Resistivity and its Dependence upon Temperature

- 8.6 Color Code for Carbon Resistances
- 8.7 Electrical Power and Power Dissipation in Resistors
- 8.8 Electromotive Forces (EMF) and Potential Difference
- 8.9 Kirchhoff's Rules
- 8.10 Wheatstone Bridge
- 8.11 Potentiometer

9. Alternating Current:

- 9.1 Alternating current
- 9.2 A.C. Circuits
- 9.3 A.C. through a Resistor
- 9.4 A.C. through a Capacitor
- 9.5 A. C. through Inductor
- 9.6 Impedance
- 9.7 R-C and R-L Series Circuits
- 9.8 Power in A.C. Circuits
- 9.9 Series Resonance Circuits
- 9.10 Parallel Resonance Circuits
- 9.11 Three Phase A.C. Supply
- 9.12 Principles of Metal Detectors
- 9.13 Choke
- 9.14 Electromagnetic Waves
- 9.15 Principles of Generation Transmission and Reception of Electromagnetic Waves
- 9.16 Modulation

10. Properties of Solids:

- 10.1 Mechanical Properties of Solid
- 10.2 Electrical Properties of Solids
- 10.3 Superconductors
- 10.4 Magnetic Properties of Solids

LIST OF PRACTICALS

HOURS

- | | |
|---|---|
| 1. General instructions about conduct of practicals and safety precautions in the lab | 6 |
| 2. Draw graphs representing the function:
a) $y = mx$ for $m = 0, 0.5, 1, 2$
and $y = x^2$ or $y = 1/x$ | 6 |
| 3. Find the volume of a given solid cylinder using vernier calipers. | 9 |
| 4. Find the area of cross-section of the given wire using micrometer screw gauge and prove that force is directly proportional to (a) mass, (b) acceleration, using fletchers, trolley. | 6 |
| 5. Verify law of parallelogram of forces using Grave-sands apparatus. | 6 |
| 6. Verify law of triangle of forces and Lami's theorem | 6 |

7. Determine the weight of a given body using	6
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.	6
9. Locate the position and magnitude of resultant of like parallel forces.	6
10. Determine the resultant of two unlike parallel forces.	6
11. Find the weight of a given body using principle of moments.	6
12. Locate the centre of gravity of regular and irregular shaped bodies.	6
13. Verify Hooke's Law using helical spring and find Young's Modulus of Elasticity of a metallic wire.	9
14. To find the unknown weight of a body by the method of vector addition of forces	6
15. To determine the value of 'g' by free fall method using an electric timer	3
16. To verify the following relations of the simple pendulum	9
a) Time period is independent of the amplitude	
b) Time period is independent of its mass or density of the bob\	
c) Time period is directly proportional to the square root of its length	
17. To find the acceleration due to gravity by oscillating mass spring system	6
18. To study the laws of conservation of momentum by colliding trolleys and ticker timer for elastic and inelastic collision	6
19. To verify the second conditions of equilibrium using a suspended meter rod	3
20. To study the fall of a body through viscous medium and hence deduce the co-efficient of viscosity of medium (liquid)	6
21. To find the moment of inertia of a fly wheel	3
22. To find the co-efficient of linear expansion of the material of a rod by Pullinger's apparatus	3
23. To measure the mechanical equivalent of heat by electrical method	
24. To find the resistance of	6
a) a wire by slide wire bridge	9
b) a galvanometer by half deflection method	
c) a voltmeter by drawing graph between R and I/V (6)	
25. Variation of resistance of thermister with temperature	
26. Conversion of	6
a) galvanometer into ammeter	6
b) galvanometer into voltmeter	6
27. To find the internal resistance of a cell using a potentiometer	6
28. To determine the e.m.f. of a cell using potentiometer	6
29. Relation between current passing through tungsten filament lamp and the potential applied across it	6
30. Variation of magnetic field along the axis of a circular coil	6
31. Charging and discharging of a capacitor and to measure time constant	6
32. Relation between current and capacitance when different capacitors are used in A.C. circuit.	6

**DAE CIVIL TECHNOLOGY
YEAR 1**

CT-114

BASIC SURVEYING

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

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

COURSE CONTENTS

- 1. Introduction** 4 Hours
 - 1.1 Definition of surveying
 - 1.2 Main divisions of surveying including Chain & Compass Surveying, Topographic Surveying, Engineering Surveys, Cadastral Surveys and Geographical Information Systems(GIS)
 - 1.3 Linear and angular measurement
 - 1.4 Fundamental principles of surveying including reliability of a survey
 - 1.5 Introduction of chain survey.e.g principles of chain surveying , types of ranging, off-setting its types and methods

- 2. Compass Traversing** 4 Hours
 - 2.1 Introduction to compass survey and their determination
 - 2.2 Concept of meridian and its types
 - 2.3 Introduction of whole circle bearing and reduced bearing
 - 2.4 Determination of whole circle bearing from reduced bearing and vice versa
 - 2.5 Determination of Dip and Declination
 - 2.6 Local attractions
 - 2.7 Determination of errors in traversing

- 3 Plane Table Surveying** 6 Hours
 - 3.1 Introduction to equipment used.
 - 3.2 Setting of plane table - centering, leveling & orientation
 - 3.3 Methods of plane tabling -radiation, intersection, traversing and resection.
 - 3.4 Merits and demerits of plane table survey

- 4 Leveling** 24 Hours
 - 4.1 Introduction.
 - 4.2 Definitions of terms-level line, level surface, datum line, reduced level, line of collimation, horizontal plane, vertical plane, station point, axis of telescope, axis of bubble tube etc.

- 4.3 Bench mark and its types.
 - 4.4 Types of leveling instruments, component parts
 - 4.5 Types of leveling staves
 - 4.6 Temporary adjustment of level
 - 4.7 Finding reduced levels.
 - 4.8 Booking - height of instrument and rise & fall method, finding missing data in a level book page.
 - 4.9 Classification of leveling and detailed description.
 - 4.10 Errors in leveling
 - 4.11 Introduction and use of Laser Level.
- 5 Contouring.** 8 Hours
- 5.1 Definition, contour interval, horizontal equivalent
 - 5.2 Purpose and use of contouring
 - 5.3 Characteristics of contour lines
 - 5.4 Methods of contouring
 - 5.5 Marking of alignment & grade of road, railway and canal. Computing earthwork, capacity of reservoir using trapezoidal and prismoidal rule
- 6 Tacheometry.** 6 Hours
- 6.1 Definition, types and principles.
 - 6.2 Finding horizontal distances & elevations of different objects by tacheometry.
- 7 Hydrographic Survey.** 6 Hours
- 7.1 Introduction and purpose.
 - 7.2 Soundings - sounding boat, sounding rod, still water recess, current meter, fathometer, velocity rod.
 - 7.3 Long section & cross section of a small distributory, determination of velocity and area.
 - 7.4 Discharge of different sections
- 8. Computations of Areas and Volumes** 6 Hours
- 8.1 Regular and irregular geometrical figures
 - 8.2 Area enclosed between surveying lines (railway line, highways, etc) and irregular boundary lines by:
 - 8.2.1 Mid Ordinate Rule
 - 8.2.2 Average Ordinate Rule

RECOMMENDED / REFERENCE BOOKS:

1. Surveying & Leveling: **T.P.Kanetar and S.V. Kulkarni**, [2000], A.V.G Publications
2. Text Book of Surveying : **S.K. Hassan**
3. Surveying: **Hakim Ali**
4. Professional Practice in surveying and viva voce: **P.B. Shahani**
5. Rasul Manual (volume I & II) on surveying
6. Plane and Geodetic Surveying : **David Clark**
7. Surveying (theory & practice): **E. Davis**
8. Practical field surveying and computation: **A.L. Allan**
9. Guide to site surveying: **Ralph Hewitt**
10. Surveying: **A. Bannister, S. Raymond and R. Baker**, [2009], Pearson Education
11. Surveying and Levelling: **R.Agor**, [2007], Khanna Publishers
12. Surveying with Construction Applications: **Barry F. Kavanagh**, [2004], Pearson Prentice-Hall
13. Surveying, Principles and Applications: **Barry F. Kavanagh**, [2006], Pearson Prentice-Hall
14. Surveying and Levelling: **N.N. Basak**, [1994], Tata McGraw-Hill, NewDelhi
15. Fundamentals of Surveying: **S.K. Roy**, [2007], Prentice-Hall of India, New Delhi

INSTRUCTIONAL OBJECTIVES

1. Know Basic Facts About Surveying

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

2. Compass Traversing

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

2.7 Compute problems relating to declination

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

- 3.1 State the purpose and principles of plane table surveying
- 3.2 Identify the functions of accessories used in plane table surveying
- 3.3 Explain the operations involved in setting-up plane table.
- 3.4 Explain the methods of Orientation
 - (a) By back sighting
 - (b) By Trough compass
- 3.5 Explain the methods of plane tabling.
- 3.6 List steps involved in carrying out plane table surveying
- 3.7 Describe three point problem
- 3.8 Explain solution of three point problem by
 - (a) By mechanical method
 - (b) By graphical method
- 3.9 State the merits and demerits of plane table surveying
- 3.10 List the errors in plane table surveying and precaution to be taken

4. Understand the Principles of Leveling for Different Engineering Purposes

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

5. Understand Methods of Contouring and Computation of Volumes

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

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

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

7. Understand the Principles of Hydrographic Survey

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

8. Understand the Computation of Areas and Volume

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

LIST OF PRACTICALS	HOURS
1. Ranging and chaining of various survey lines and taking off-set	3
2. Setting up the compass and observation of bearings.	6
3. Compass survey of an area and its plotting	9
4. Plane table survey of an area.	9
5. Solution of two and Three point problem by Graphical method	6
6. Reading different types of staves.	3
7. Temporary adjustment of level and taking readings.	6
8. Taking reduced levels of various points and recording in the field book.	9
9. Fly leveling and finding R.Ls by height of collimation and rise fall method.	9
10. Route leveling (by auto set level).	6
11. Reciprocal leveling and its booking.	9
12. Finding and setting gradient using a level and staff.	9
13. Taking longitudinal section and cross section of a 1/2 mile long route and their plotting, marking alignment and gradient calculation of earth work.	6
14. Leveling by Laser Level (Fly Leveling, Route Leveling).	9
15. Contouring of small area by radial and square method and preparing of a contour map	9
16. Determination of horizontal distance and elevation by stadia tacheometry.	9
17. Measuring distance by Hydrographic survey of a small channel	9
18. Determination of area: enclosed between surveying line (Railway lines/Highways and irregular boundary lines in the field)	3

DAE CIVIL TECHNOLOGY

YEAR 1

CT-123

ENGINEERING MATERIALS & CONSTRUCTION

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

The student will be able to:

AIM:

1. Understand about the manufacture, properties and uses of building materials in order to produce the required finished facility and to use it to the best advantage
2. Understand the fundamentals of building construction and gain skills through practical work.

COURSE CONTENTS

1. Bricks and Tiles	2 Hours
1.1 Merit as building material	
1.2 Classification of bricks	
1.3 Testing of bricks.	
1.4 Tiles, classification and their classification.	
2 Mortars	2 Hours
2.1 Classification of mortars.	
2.2 Mixing.	
2.3 Functions	
3 Stones	2 Hours
3.1 Quarrying	
3.2 Characteristics	
3.3 Types	
3.4 Uses	
3.5 Dressing of stones	
4 Lime	3 Hours
4.1 Sources of lime	
4.2 Calcination, slaking and hydraulicity	
4.3 Classifications, quick lime and hydraulic lime	
4.4 Uses and storage	

5	Cement	2 Hours
5.1	Types of cement and their uses.	
5.2	Storage	
6	Sand	2 Hours
6.1	Sources and classification	
6.2	Grading	
6.3	Bulking	
6.4	Uses	
7	Concrete and Concreting Operations	6 Hours
7.1	Composition and propositioning	
7.2	Batching of materials by volume and weight	
7.3	Mixing of concrete	
7.4	Transportation of concrete	
7.5	Compaction of concrete	
7.6	Finishing of concrete surface, types	
7.7	Curing of concrete	
7.8	Joints in concrete	
7.9	Classification of concrete	
8	Ferrous Metals and Non Ferrous Metals	6 Hours
8.1	Types of ferrous metals	
8.2	Structural steel sections and their use in building construction.	
8.3	Steel used in Reinforced cement concrete-Plain steel, deformed bars, Cold twisted steel bars.	
8.4	Special steels-High carbon steel, high tensile steel, properties and uses.	
8.5	Types of non ferrous metals and their uses in construction.	
8.6	Lead and Zinc properties and uses.	
9	Paints and Varnishes	2 Hours
9.1	Types and uses of paints-oil paints, Enamel, colour wash	
9.2	Characteristics of a good paint.	
9.3	Varnishes-French Polish types and uses.	
10	Timber	3 Hours
10.1	Classification and uses.	
10.2	Structure and growth	
10.3	Felling and conversion of timber.	
10.4	Seasoning of timber-importance and types.	
10.5	Defects and decay of timber.	
10.6	Qualities-characteristics, section of timber	
10.7	Wood products-plywood, veneer	

11	Advanced Construction Materials.	4 Hours
11.1	Introduction to modern materials	
11.2	Glass types and uses, glass tiles and glass doors.	
11.3	Bitumen, Asphalt and tar grades and uses.	
11.4	Tiles and their types including Tuff tiles-uses and construction	
11.5	Fiber reinforced concrete	
11.6	Fiber reinforced polymers.	
11.7	Construction bonding materials	
12	Surface Finishing	4 Hours
12.1	Plastering objectives, types and procedures.	
12.2	White washing, distempering and their specifications.	
12.3	Painting old and new surfaces - wooden, metal and wall surfaces.	
12.4	Defects in painting.	
12.5	Pointing objectives and types.	
12.6	Graffito & Rockwall finishing	
12.7	Tiles Finishing	
12.8	Panel Finishing	
13	Classification of Buildings.	2 Hours
13.1	Definition of building classification based on materials and occupancy.	
13.2	Different parts of building and their functions.	
14	Foundations	4 Hours
14.1	Introduction	
14.2	Concepts of foundation, types of soils and bearing capacity.	
14.3	Sub soil investigation-trial pit, trench, drilling holes.	
14.4	Shallow foundation definition, types and suitability.	
14.5	Design of thickness, width and depth of foundation for concrete block wall.	
14.6	Deep foundation - necessity uses and types.	
14.7	Construction of foundation-layout, for excavation.	
14.8	De-watering.	
15	Brick Masonry	4 Hours
15.1	Brick bonds and their types.	
15.2	Methods of bedding bricks.	
15.3	Construction of brick walls.	
15.4	Classification of Stone Masonry.	
15.5	Specifications of Stone Masonry.	
16	Damp Proof Course.	2 Hours
16.1	Causes and effects of dampness	
16.2	Necessity, Types and materials used.	

16.3	Method of laying damp proof course	
17	Walls	3 Hours
17.1	Purpose of walls.	
17.2	Classification of walls according to functions and material used.	
18	Scaffolding, Shoring and Underpinning, Formwork.	4 Hours
18.1	Types of scaffolding.	
18.2	Types of shoring.	
18.3	Methods of underpinning.	
18.4	Purpose of formwork	
18.5	Types of formwork	
19	Arches and Lintels.	2 Hours
19.1	Arches-definition, terminologies, parts, and functions	
19.2	Classification-according to material used, function and shapes.	
19.3	Methods of arch construction including stone arches.	
19.4	Lintels-types and construction.	
19.5	Plinth beams and grade beams	
20	Doors, windows and ventilators	2 Hours
20.1	Introduction	
20.2	Doors, windows and ventilators	
20.3	Standard sizes of doors, windows and ventilators	
20.4	Types of doors	
20.5	Windows and its types	
21	Roofs	6 Hours
21.1	Definition, functions	
21.2	Classification of roofs	
21.3	Pitched roofs-types and roof covering materials	
21.4	Types of trusses for pitched roofs	
21.5	Introduction and construction of False Ceiling	

RECOMMENDED / REFERENCE BOOKS:

1. Engineering Material: **Surrender Singh.**
2. Building Materials: Choudhry.
3. Building Construction : **Kulkarne**
4. Building Construction : **Arora & Gupta**
5. Building Construction: **Mitchell.**
6. Building Construction: **Mckay.**
7. Engineering Materials: **Handoo.**

8. Building Construction: **P. C. Varghese** [2009], PHI Learning, New Delhi
9. Building Construction: **N.L.Arora and B.R.Gupta**, [2001], Prakashar, New Delhi
10. Construction Technology: **Eric Fleming**, [2004], Blackwell Publishing
11. Steel Designer's Manual: **Buick Davison and Graham Owens**, [2005], Blackwells Publishing
12. Fundamentals of Building Construction : **Edward Allen**, [1985], Wiley & Sons
13. Rehabilitation and Re-use of Old Buildings: **D. High field**, [1987], E & F. N Spon
14. Building Materials and Construction: **Theodore Marotta**, [2005], Pearson Apprentice-Hall

INSTRUCTIONAL OBJECTIVES

1. Understand the Selection of Suitable Bricks for Construction Work

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

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

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

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

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

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

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

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

- 5.1 Explain the types of cement and their uses
- 5.2 Explain the methods of storage of cement under various situations

6. Understand the Characteristics of Sand

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

7. Understand the Principles of Preparation of Concrete

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

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

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

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

- 9.1 Describe the characteristics of a good paint
- 9.2 State the types of paints and their uses in construction works
- 9.3 State the types and uses of varnishes

10. Understand the Selection of Wood for Construction Work

- 10.1 List the common varieties of timber used in civil engineering works
- 10.2 Describe the structure of tree
- 10.3 Describe the felling procedure of trees and conversion
- 10.4 State the importance of seasoning

- 10.5 Explain the methods of seasoning i.e. air seasoning, kiln seasoning, water seasoning and steam seasoning
- 10.6 State the defects and decay of timber and method of preservations of timber
- 10.7 Describe the characteristics of good timber
- 10.8 Explain the construction and uses of wood products in construction works

11. Understand the Properties and Uses of Advance Materials i.e. Glass, Asphalt, Tuff Tiles and Fiber Reinforced Concrete

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

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

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

13. Know the Classification of Building as Per Building Code

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

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

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

15. Understand Masonry Work

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

16. Understand the Function of Damp Proof Course in Building

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

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

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

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

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

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

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

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

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

21. Understand the Methods of Construction of Roofs

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

LIST OF PRACTICALS

HOURS

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

**DAE CIVIL TECHNOLOGY
YEAR 1**

CT-133

BASIC CIVIL ENGINEERING DRAWING

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

The student will be able to:

AIM:

1. Understand proper use of drawing instruments for preparation of geometric and multi-view pictorial drawings.
2. Understand the construction of various geometric figures as applicable in civil technology.
3. Apply the techniques of free hand sketching for preparation of finished sketches of given objects.

COURSE CONTENTS

1.	Introduction.	2 Hours
1.1	Meanings of drafting and its scope.	
1.2	Free hand sketching of plane figures and solid figures.	
2.	Engineering Drawing Instruments.	3 Hours
2.1	Classification; basic and advance drawing tools and their uses.	
2.2	Scales.	
2.3	Line; type and selection of line thickness.	
2.4	Selection of pencil.	
2.5	Title strip/block-types and sizes.	
3.	Lettering/Printing.	2 Hours
3.1	Importance and types.	
3.2	Size and style.	
3.3	Lettering stencils.	
4.	Geometrical Constructions.	3 Hours
4.1	Construction of angles.	
4.2	Construction of Triangles, quadrilaterals, and polygons.	
4.3	Meaning of inscribed and circumscribed figures.	
4.4	Terms used in a circle.	
4.5	Conical curves, ellipse, parabola, hyperbola and their applications in civil engineering.	

5.	Orthographic Projections.	2 Hours
5.1	Planes including principal plane.	
5.2	Projections and projection lines.	
5.3	Dihedral and trihedral angles.	
5.4	Types of orthographic projections.	
5.5	Principal views in 1 st & 3 rd angle	
6.	Sectioning	2 Hours
6.1	Definition & purpose of sectional views.	
6.2	Location of cutting plane- purpose of cutting plane line.	
6.3	Direction of arrowheads of CPL in 1st & 3rd angle projections.	
6.4	Position of cutting plane lines in case of full & half section.	
7.	Dimensioning.	2 Hours
7.1	Definition	
7.2	Elements in dimensioning.	
7.3	System of dimensioning.	
8.	Pictorial Drawing	3 Hours
8.1	Definition & uses.	
8.2	Brief description of different types of pictorial drawing.	
8.3	Isometric axis, angles and scales.	
8.4	Isometric arc, angles, scales.	
8.5	Oblique drawing & their uses.	
8.6	Angle of receding axis.	
8.7	Similarity between front and oblique view.	
8.8	Lettering in oblique cavalier and cabinet views.	
8.9	Perspective drawings; definition and purpose, vanishing point, parallel & angular (diametric and trimetric) perspective, principles of making perspective views.	
9.	Auxiliary Views	1 Hours
9.1	Necessity, auxiliary plane	
9.2	Cases of auxiliary views.	
10.	Building Drawing	8 Hours
10.1	Conventions and terms used for buildings.	
10.2	Symbols used for public health & electrical installations.	
10.3	Plan; site plan, line plan, detailed plan and layout plan.	
10.4	Instructions for drawing plan, elevation and cross-section of single and double storey building.	
10.5	Instruction on baths and kitchen arrangement.	
10.6	Building bye-laws of CDA	

10.7 Categories of Government servants residences

11. House Planning

2 Hours

11.1 Significance of house planning.

11.2 Selection of site and its governing factors.

11.3 Introduction to factors affecting the planning of a house, orientation, selection of material, ventilation and position of openings.

RECOMMENDED / REFERENCE BOOKS:

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

INSTRUCTIONAL OBJECTIVES

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

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

2. Understand Different Engineering Drawing Instruments and Accessories.

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

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

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

4. Understand the Construction of Geometrical Figures.

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

5. Understand Types & Techniques of Orthographic Projections.

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

6. Understand the Basics of Sectioning.

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

7. Understand Techniques of Dimensioning.

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

8. Understand the Techniques of Pictorial Drawings.

- 8.1 Define pictorial drawing.
- 8.2 State the types of pictorial drawings and their general uses.
- 8.3 Sketch isometric axis, angles, scales, arcs and circles.
- 8.4 Differentiate between the isometric and non-isometric lines.
- 8.5 Sketch isometric drawing and isometric projection.

- 8.6 Sketch the isometric projection from the given orthographic drawings.
- 8.7 Explain the angle of receding axis.
- 8.8 State the oblique drawing and its uses.
- 8.9 Sketch and letter the oblique cavalier and cabinet views.
- 8.10 Define perspective drawing.
- 8.11 Explain the purpose of perspective drawing.
- 8.12 State the vanishing point.
- 8.13 State the principles of making perspective views.
- 8.14 State the parallel and angular (diametric and trimetric) perspective.

9. Know the Types and Uses of Auxiliary Views.

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

10. Understand the Techniques of Development of Surfaces.

- 10.1 Definition of development pattern drawing.
- 10.2 State the necessity of development of surfaces.
- 10.3 State ruled, single curved, plane and double curved surfaces.
- 10.4 State the uses of development drawings.
- 10.5 Explain the method of development i.e. right-angled triangle and revolution method.
- 10.6 State the rules for calculation of true length.
- 10.7 Sketch the development of surfaces of prism, pyramid, cylinder and cone.
- 10.8 Explain the intersection and line of intersection.
- 10.9 Explain the procedures for finding line of intersection.

11. Understand the Types and Procedures of Building Drawing.

- 11.1 Define conventional symbols and give its importance.
- 11.2 Sketch the x-section of wall with flooring and roofing
- 11.3 Label the parts of given plan.
- 11.4 State the sizes of rooms for different classes of houses.
- 11.5 Follow measurements from a given plan.
- 11.6 Define site plan, detailed plan, layout plan, index plan, elevations & sections.
- 11.7 Sketch plans elevations and sections of buildings from given line diagrams.
- 11.8 Explain the procedure for preparing plans, elevations and sections for single storey and double storey buildings.
- 11.9 State the different fixtures required for bath, kitchen, dining and courtyards.
- 11.10 Sketch the different fixtures in kitchen and bathrooms at their proper places.

12. Know the Importance and Factors of House Planning.

- 12.1 Define House planning
- 12.2 State the necessity of house planning
- 12.3 State the factors, which govern the selection of site for building

- 12.4 Define orientation
- 12.5 State the factors affecting the planning of a house
- 12.6 State the minimum area of the building services
- 12.7 State principles of providing building services
- 12.8 State the inter-relationship of different rooms
- 12.9 Select materials for building structures
- 12.10 State the portion of different openings in building at their appropriate places
- 12.11 Draw sketches of different sizes of plots along with location of commercial area
- 12.12 State building by laws of different agencies i.e., CDA,LDA
- 12.13 State the classes of residential buildings

LIST OF PRACTICALS	HOURS
1. Printing/Lettering on graph paper	5
i. Block printing in ratio 4:5 & 4:7	
ii. Single stroke printing in ratio 4:5 & 4:7	
iii. Italic printing; free hand, gothic letters, figures in capital and lower case letters.	
2. Space distribution of drawing sheet and drawing of title strips and drawing different types of lines.	5
3. Freehand proportionate sketching & sketching to scale of lines, triangle, quadrilaterals, polygon and circle.	9
4. Construction of scales useful for civil engineering.	
5. Drawing triangles with inscribed and circumscribed circles, hexagons inside and outside circle, cones, and conic sections (ellipse, parabola, and hyperbola).	7
6. Sketching three views of V-block and different wooden blocks.	9
7. Completion of missing views when two views are given.	9
8. Drawing of full sectional front view and outside top view of the hollow concrete block.	9
9. Drawing of full sectional front view, side view and top view of the prisms, pyramids of different types.	3
10. Drawing isometric views of a cube having circular hole in its focus and R.C.C. stairs (First three steps).	9
11. Create an oblique drawing of different prisms and pyramids from its given principal views.	9
12. Perspective drawing of slotted block and different wooden blocks from there given principal views.	9
13. Draw partial, symmetrical and auxiliary view when top and front views are given, front and side views are given.	9
14. Draw development of a right and oblique truncated hexagonal prism, cylinder and pyramid.	9
15. Pattern drawing of a funnel from given data.	9
16. Draw the following features;	8
17. Symbols used in building work including public health and electrical installation.	14
18. X-section of wall with foundation, floor and roof details. (9",13-1/2",20cm,30cm Thick)	
19. Line plan of a single room, two roomed quarter and C-Type (2500 sft)	

	residence.	
20.	Detailed plan, elevation and section of; a) Single room with verandah. b) C-class residence c) Double storey building.	15
21.	Foundation/layout plan of ; a) C-type residence. b) A-class residence.(3500 sft)	15
22.	Detailed plan of; a) A & C class bathroom showing internal arrangement. b) Kitchen with internal fittings.	15
23.	Drawing plan of C type residence showing public health and water supply connections.	9
24.	Draw layout plan for electrification and circuit diagram for C type residence	6

**DAE CIVIL TECHNOLOGY
YEAR 1
SHOP-162
WORKSHOP PRACTICE
(WOOD WORKING AND WIRING)**

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

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

COURSE CONTENTS

1. **Work Shop Polish Safety Precautions and Importance of Wood** 1 Hours
 - 1.1 Work shop orientation
 - 1.2 Safety precaution
 - 1.3 Importance wood for industry

2. **Wood, Constriction, Types and Uses** 3 Hours
 - 2.1 Define wood
 - 2.2 Explain Construction of wood with sketch
 - 2.3 Explain wood types
 - 2.4 Uses of wood
 - 2.5 Wood defects

3. **Wood Seasoning, Method and Safety Precaution** 1 Hours
 - 3.1 Wood seasoning
 - 3.2 Method
 - 3.3 Safety precaution during seasoning

4. **Wood working tools, measuring, Marking Holding, cutting and planning** 2 Hours
 - 4.1 Wood tool
 - 4.2 Measuring tool
 - 4.3 Marking tools
 - 4.4 Holding tool
 - 4.5 Cutting tool
 - 4.6 Planning tool

5. **Wood Working Machines** 3 Hours
 - 5.1 Wood working Machines
 - 5.2 Circular SAW

5.3 W.W, Planer	
5.4 Wood Turning lathe	
6. Wood Sawing And Method Of Sawing	1 Hours
6.1 Sawing of log and timber	
6.2 Method of sawing	
7. Wood Joints and Their Uses	
7.1 Classification of wood joints	
7.2 Uses of wood joints	
8. Wood Finishing and Polishing	2 Hours
8.1 Glue	
8.2 Fastener	
8.3 Sprit polish	
8.4 Lacquering and paints	
9. Calculation of Wood Square and Log	2 Hours
9.1 Measuring of wood	
9.2 Measuring of Log	
9.3 Measuring of board	
9.4 Measuring of squire	
10. Basic Terms/Units & Laws	2 Hours
10.1 Conductor, Insulator, Semi Conductor current, Ampere voltage, Resistance and ohm	
10.2 Define ohms law specific resistance laws up Resistance make calculation using	
10.3 Define these laws resistance in series and parallels solve series and parallel circuits	
11. Cable And Protection Device	4 Hours
11.1 Define wire and cable, parts of cable, types of insulating materials.	
11.2 Define Types of cable w.r.t insulation and core	
11.3 Define fuse and types (Rewire able, HRC and Cartridge fuse)	
11.4 Define Earthling, necessity of earthling and parts of earthling	
11.5 Define different steps up cable Jointing (Skinning, Scraping Soldering and tapping)	
11.6 Wiring types & Test	
12. Define Types Of Domestic Wiring (Cleat Wiring) Latten Wiring, Casing And Capping Wire And Conduit	6 Hours
12.1 Define wiring testing equipment (Millimeter, Mager)	
12.2 Define Testing of wiring (Polarity test, short circuit test)	
12.3 State the service line, main cable sub main cable, Branch circuit and final sub circuit	
12.4 Distribution fuse boards and types (Single phase D.F.B and three phase D.F.B)	
12.5 Define Magnetic Contactor thermal relay	

13. Electricity Rules & Safety

4 Hours

- 13.1 State Pakistan electricity rules 1973, (25,28,19,32,40,46,49,51,57,58)
- 13.2 Define fire, causes of fire, types of fire (Class A,B,C, D, E) fire fighting equipment precautions during fire fighting, principle of fire fighting
- 13.3 State General safety precaution
- 13.4 Define Electric shock, Causes and treatment

RECOMMENDED / REFERENCE BOOKS:

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

INSTRUCTIONAL OBJECTIVES

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

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

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

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

3. Understand Seasoning, Method Of Seasoning, Safety Precautions

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

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

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

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

- 5.1 Enlist wood working machines
- 5.2 Explain band saw
- 5.3 Explain circular saw
- 5.4 explain planer
- 5.5 Explain wood turning lathe

6. Understand wood sawing, method of sawing,

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

7. Wood Joints and Their Uses

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

8. Wood Finishing And Polishing

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

9. Calculation Of Wood, Squire, Board And Log

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

10. Basic Terms/Units & Laws

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

11. Cable And Protection Device

- 11.1 Define wire and cable, parts of cable, types of insulating materials. Define Types of cable w.r.t insulation and core
- 11.2 Define fuse and types (Rewire able, HRC and Cartridge fuse)
- 11.3 Define Earthling, necessity of earthling and parts of earthling

- 11.4 Define different steps up cable Jointing (Skinning, Scraping Soldering and tapping)
- 11.5 Wiring types & Test
- 11.6 Define types of domestic wiring (cleat wiring) latten wiring, casing and capping wire and conduit
- 11.7 Define wiring testing equipment (Millimeter, Mager)
- 11.8 Define Testing of wiring (Polarity test, short circuit test)
- 11.9 State the service line, main cable sub main cable, Branch circuit and final sub circuit
- 11.10 Distribution fuse boards and types (Single phase D.F.B and three phase D.F.B)
- 11.11 Define Magnetic Contactor thermal relay

12. Electricity Rules & Safety

- 12.1 State Pakistan electricity rules 1973, (25,28,19,32,40,46,49,51,57,58)
- 12.2 Define fire, causes of fire, types of fire (Class A,B,C, D, E) fire fighting equipment precautions during fire fighting, principle of fire fighting
- 12.3 State General safety precaution
- 12.4 Define Electric shock, Causes and treatment

List Of Practicals

1. Study the wiring accessories and tools used in different types of wirings including latest/modern accessories with specifications.
2. Treatment against electric shock
3. Control of one lamp with a single way switch control of Two lamps in series with a single way switch
4. Control of one lamp with Two, Two way switches
5. Construct a test board
6. Construct a bell indicator circuit
7. Construct of one ball with two push but tow with their indicators
8. Construct up two lamps with two one way switch in batten wiring
9. Construct one lamp with single way witch with conduit wiring
10. Construct one lamp with two, two way switches with conduit wiring
11. Construct three lamps in parallel with Individual single way switches with conduit wiring
12. Construct tunnel light circuit
13. Study and connect fluorescent lamp circuit
14. Perform the wiring lay out up of a three phase pump
15. Demonstrate earthling for residential building and machinery along with circuit diagrams
16. Measuring of voltage current and resistance using modern electronic measuring equipment.
17. Introduction to work shop, safety precaution
18. Introduction different wood working tools such as lag out, measuring, Holding, cutting and planning
19. Sawing Practice (Tobs1)
20. Planning and squaring to dimensions (Tob2)
21. Sharpening plane iron and wood chisel

22. Making dado Joint (Job3)
23. Making cross Lap Joint (Job4)
24. Making Mortise and Tennon Joint (Job5)
25. Nailing and wood screwing process (Job6)
26. Boring Process, making holes (Job 7)
27. Polishing (Prepare wood surface for polishing staining and lacquering)

**DAE CIVIL TECHNOLOGY
YEAR 1**

COMP-111

COMPUTER APPLICATIONS

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

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

RECOMMENDED / REFERENCE BOOKS:

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

LIST OF PRACTICALS

HOURS

- | | |
|---|---------------------|
| 1. Introduction to Computer | 6 Hours |
| 1.1 Demonstrate & practice identification/application of Input/ Output devices | |
| 1.2 Demonstrate & practice identification/application of Hardwares/ Softwares & their types | |
| 1.3 Demonstrate & practice identification/application of Computer Resources | |
|
2. Windows Operating System & Internet |
12 Hours |
| 2.1 Practice start, restart, shut down, log on/off | |
| 2.2 Demonstration & Practice Windows interface | |
| 2.3 Demonstration & Practice Windows Help | |
| 2.4 Practice File / folder Manipulation | |
| 2.5 Demonstration & Practice window search | |
| 2.6 Practice Windows Advance setting options. | |
| 2.7 Demonstration & Practice Partitioning & installation of windows | |
| 2.8 Demonstration Introduction to internet | |
| 2.9 Demonstration & Practice setting up internet connection using internet browser | |
| 2.10 Practice Make/Maintain E-Mail address | |
| 2.11 Practice send/Receive E-Mail | |
| 2.12 Practice Downloading data | |
| 2.13 Practice search teaching & learning Resources (TLRs) | |

3. Word Processing

24 Hours

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

4. MS-Excel

54 Hours

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

- 4.17 Practice data sorting
- 4.18 Practice filtering data
- 4.19 Practice table Manipulation
- 4.20 Practice creating macro
- 4.21 Practice find/replace data
- 4.22 Practice merge/split cells

5. AutoCAD

27 Hours

- 5.1 Installation of Auto CAD Software
- 5.2 Introduction to AutoCAD and demonstration of its use
- 5.3 Demonstration & Practice of AutoCAD Menus
- 5.4 Demonstration & Practice of AutoCAD Graphic window
- 5.5 Demonstration & Practice of coordinate system (Types of coordinates).
- 5.6 Practice setting of model and its layout.
- 5.7 Practice of Draw commands
- 5.8 Practice of File commands
- 5.9 Practice of Edit commands
- 5.10 Practice of dimensions.
- 5.11 Practice of display command.
- 5.12 Modify Commands
- 5.13 Insert object
- 5.14 Formatting Commands
- 5.15 Practice to use existing templates and also create relevant templates.
- 5.16 Practice of drawing of plane and solid geometrical figures
- 5.17 Practice for incorporation of data from WORD and Excel.
- 5.18 Practice of drawing of two roomed house (detailed plan, elevation and sections) and setting layouts for plotting.
- 5.19 Plotting of two roomed house.
- 5.20 Practice of drawing of over head & under ground Water Tanks (detailed plan, elevation, steel reinforcement and sections) and setting layouts for plotting.
- 5.21 Practice of Plotting of drawing of over head & under ground Water Tanks (detailed plan, elevation, steel reinforcement and sections)
- 5.22 Practice of drawing of framed structure building (detailed plan, elevation, steel reinforcement and sections) and setting layouts for plotting.
- 5.23 Practice plotting of drawing framed structure building.
- 5.24 Drawings of road structures and their plotting.
- 5.25 Practice Integration of Total Station with AutoCAD & MS Excel.

DAE CIVIL TECHNOLOGY
YEAR 2

اسلامیات / مطالعہ پاکستان

GEN 211

مضبوط (اسٹریٹجک)

تمام کورس اسلامیات

حصہ دوم مطالعہ پاکستان

ٹیسٹ 1
10
کل وقت: 20 گھنٹے

موضوعات

- 1- سورۃ المؤمنین آیت تا آیہ آیات کا معنی
- 2- دس منتخب احادیث مع ترجمہ و تفسیر
- 3- خیبر کب سے تعظیم القرآن و علوہ
- 4- لا ايمان لمن لا امانة له ولا دين لمن لا عهد له
- 5- وياكم واطمن ان اظن انكم ب الاحديث
- 6- من احديث في امرنا بقاءه ليس هت فمورد
- 7- من حمل عليا السلاح فليس منا
- 8- لاو كافل البتيم في الجنة
- 9- لا ضرر ولا ضرار في السلام
- 10- كلكم راع وكللكم راع وكلكم مسؤول عن رعيته
- 11- سيرة طيبة
- 12- كى زندقه وارتبه بعثه اجرت
- 13- خلق زندقه - موافقت - مشقن بدعت - حج كره (اسباب و نتائج)
- 14- حضور ﷺ به حيشيت
- 15- خطبه جيمه لوران
- 16- مهم كحل سرپرده خاندان
- 17- اطالاي معاشره
- 18- كليم تعليم لوران كى مقصوده حسن و انصاف امر بالمعروف - نهي عن المنكر
- 19- جملو - كسب طراي - سبوح الاميت (فضيلت)
- 20- اسنادي رياست كى تعريف - اسنادي رياست كى خصوصيات - اسنادي حكومت كى فرائض - اسنادي طرز حكومت

اسلامیات

تدریس مقاصد

- عمومی مقاصد بطالعلم یہ جان سکے کہ آیات قرآنی کی روشنی میں مومن کے اوصاف کیا ہیں
- قرآن مجید
- فصوصی مقاصد:
- ☆ قرآنی آیات کا ترجمہ بیان کر سکے
 - ☆ قرآنی آیات کی تشریح کر سکے
 - ☆ قرآنی آیات کی روشنی میں ایک مومن کے اوصاف بیان کر سکے
 - ☆ قرآنی آیات میں بیان کردہ مومن کے اوصاف اپنے اندر پیدا کر سکے
- احادیث نبویہ
- ☆ عمومی مقصد احادیث کی روشنی میں اسلامی اخلاقی اقدار (انفرادی و اجتماعی) سے آگاہ ہو سکے
- فصوصی مقاصد:
- ☆ احادیث کا ترجمہ بیان کر سکے
 - ☆ احادیث کی تشریح کر سکے
 - ☆ احادیث کی روشنی میں اسلام کی اخلاقی اقدار کی وضاحت کر سکے
 - ☆ ان احادیث کی دی گئی تعلیمات کے مطابق اپنی زندگی گزار سکے
- سیرت طیبہ
- ☆ عمومی مقصد: حضور ﷺ کی سیرت طیبہ کے بارے میں جان سکے
- فصوصی مقاصد:
- ☆ حضور ﷺ کی ابتدائی زندگی اختصار کے ساتھ بیان کر سکے
 - ☆ حضور ﷺ کی ہجرت کا واقعہ بیان کر سکے
 - ☆ حضور ﷺ کی مدنی زندگی اختصار سے بیان کر سکے
 - ☆ حضور ﷺ کی بطور معلم خصوصیات بیان کر سکے

☆	حضور حضرت محمد ﷺ کی بطور سربراہ خاکدان بیان کر سکے
	اسلامی معاشرہ
	عمومی مقصد: اسلامی معاشرہ کی خصوصیات سے آگاہی حاصل کر سکے
	خصوصی مقاصد:
☆	اسلامی معاشرہ کا معنی و مفہوم بیان کر سکے
☆	اسلامی معاشرہ کی اقداری خصوصیات بیان کر سکے
☆	اسلامی معاشرہ میں عدل و احسان کی اہمیت بیان کر سکے
☆	تبلیغ کے لغوی معنی بیان کر سکے
☆	تبلیغ کی اہمیت و ضرورت بیان کر سکے
☆	جہلو کے لفظی و اصطلاحی معنی بیان کر سکے
☆	جہلو کی اہمیت بیان کر سکے
☆	جہلو اور قتل میں فرق بیان کر سکے
☆	جہلو کی مختلف اقسام بیان کر سکے
☆	اقط مسجد کی تعریف کر سکے
	مسجد کی ساجد حیثیت کو بحال کرنے کے بارہ میں اقدامات کو 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 و مقاصد بیان کر سکے
☆	اسلامی ریاست کے قیام کیلئے جدوجہد کر سکے

نصاب مطالعہ پاکستان

ٹی بی سی
1 0 1
کل وقت 2:15 گھنٹے

سہ ماہی	حصہ دوم	موضوعات
☆	☆	یہ قومی نظریے
☆	☆	تحریک پاکستان
☆	☆	انڈین نیشنلسٹس
☆	☆	مسٹر ایب
☆	☆	تفسیر بنگلہ
☆	☆	میشن کمنٹری
☆	☆	تحریک خلافت
☆	☆	سندھ تحریک
☆	☆	پولویٹو رسی
☆	☆	سورجیوٹ
☆	☆	قانون اعظم کے چودہ نکات
☆	☆	خلیفہ آل انڈیا
☆	☆	انقلاب 1938 اور انقلاب 1971
☆	☆	قرارداد پاکستان

حصہ دوم

سزاوار پاکستان

تدریس مقاصد

تحریک پاکستان

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

خصوصی مقاصد:

- ☆ قومیت کے مفہوم کو بیان کر سکے
- ☆ دو قومی نظریہ کی تعریف و توضیح کر سکے
- ☆ دو قومی نظریہ اہمیت بیان کر سکے
- ☆ ہندوستانی مسلمانوں کی عموماً کو بیان کر سکے
- ☆ قومی شخص کو بھلا رکھنے کے لئے مسلمان ہند کی مساعی بیان کر سکے
- ☆ آزادی ہند اور قیام پاکستان علامہ اقبال اور قائد اعظم کی مساعی بیان کر سکے
- ☆ قیام پاکستان سے مستقبل اسلامی مملکت کے قیام کے لئے مسلم عوام کی کوششوں کو بیان کر سکے
- ☆ مسلم لیگ کے قیام پاکستان کے لئے جدوجہد بیان کر سکے

(غیر مسلم طلباء کے لئے)

ٹی ڈی اے
کُل وقت: 20 گھنٹے

نصاب اختلاقیات
سال: دوم

موضوعات

سحاشتی، تدارک، اہلکار، سرمایہ، قوم، قوی سطح، شہری سطح، صنعتی اربوروں کی سطح، ضروریات، درجہ

- ۶۶ حقوق و فرائض
- ۶۷ قوت بیزنس
- ۶۸ قوت اربوی
- ۶۹ نکلن و جذبہ
- ۷۰ وسیع نظری
- ۷۱ بے غرضی
- ۷۲ مسائل دوستی
- ۷۳ سخاشتی شعور
- ۷۴ پاس آڑائی
- ۷۵ کمال اچھی
- ۷۶ تعصبات کو قبول کرنا
- ۷۷ خود شناسی

نسب اخلاقیات

سلسلہ دوم

تدریس مقاصد

عمومی مقاصد:

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

خصوصی مقاصد: طالب علم اس قدر تیار ہو کہ

۶۶ موضوعات کا مطلب بیان کر سکے

۶۷ عملی زندگی سے مثالوں کی نشاندہی کر سکے

۶۸ اپنی شخصیت اور -حاضرے پر موضوعات کے متعلق مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے

۶۹ اعلیٰ اخلاقی تقواریں سے

توبہ برداشت - قوت ارادی - نکلن جذبہ - وسیع النظری - بے غرضی - انسانی دوستی - خالصی - شعور - پس سزاویہ

کمال اعلیٰ اور ذرا شہابی کی اہمیت بیان کر سکے

۷۰ اخلاقیات سے متعلق ہر قسم کی خدمت اور طور پر انہم سے سکے

**DAE CIVIL TECHNOLOGY
YEAR 2**

MATHS-212

APPLIED MATHEMATICS-II

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

AIM: On completion, the student will be able to solve problems of calculus and analytical geometry and apply it in relevant fields of civil engineering work

COURSE CONTENTS

- 1. Functions & Limits.** 6 Hours
 - 1.1 Constants and variables
 - 1.2 Functions & their types
 - 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 Continuous function
 - 1.8 Problems

- 2. Differentiation.** 10Hours
 - 2.1 Derivative of a function.
 - 2.2 Geometrical interpretation of differentiation.
 - 2.3 Differentiation by first principle.
 - 2.4 Rules for differentiation.
 - 2.5 Differentiation of algebraic functions.
 - 2.6 Differentiation of trigonometric and inverse trigonometric functions.
 - 2.7 Differentiation of logarithmic and exponential functions.
 - 2.8 Problems.

- 3. Higher Derivatives and Application of Differential Calculus.** 8Hours
 - 3.1 Second derivative of a function.
 - 3.2 3rd derivative of a function.
 - 3.3 Increasing and decreasing function.
 - 3.4 Maximum and minimum values.
 - 3.5 Criteria for maximum and minimum values.

- 3.6 Methods of finding maxima and minima.
3.7 Problems.
- 4. Integration. 8Hours**
- 4.1 Basic concepts of integration.
4.2 Fundamental formulae & important rules.
4.3 Integration by substitution.
4.4 Integration by trigonometric substitution.
4.5 Integration by parts.
4.6 Definite integrals and its applications.
4.7 Problems
- 5. Integration by Using Partial Fractions. 10Hours**
- 5.1 Introduction to partial fractions.
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 Integration of rational fractions.
5.7 Problems.
- 6. Differential Equations. 6Hours**
- 6.1 Introduction
6.2 Differential equation of order-1
6.3 Differential equation of order-2
6.4 Solution of 1st and 2nd order differential equations
6.5 Problems
- 7. Fundamentals of Plane Analytic Geometry and Straight Line. 9Hours**
- 7.1 Rectangular coordinate system.
7.2 Distance formula.
7.3 Ratio formula.
7.4 Slope of a line.
7.5 Slope formula and angle formula.
7.6 Parallel and perpendicular lines.
7.7 Equation of lines parallel to X-axis and Y-axis.
7.8 Important forms of equation of the straight line.
7.9 Intersection of two lines.
7.10 Distance between a line and a point.
7.11 Problems

8. **Conic Sections.** 5Hours
- 8.1 Circle
 - 8.2 Standard equation of a circle
 - 8.3 General equation of a circle
 - 8.4 Radius and coordinates of centre
 - 8.5 Parabola
 - 8.6 Standard equation of parabola
 - 8.7 Four forms of standard equation
 - 8.8 General equation of parabola
 - 8.9 Ellipse
 - 8.10 Standard equation and related definitions
 - 8.11 Hyperbola
 - 8.12 Standard equation and related definitions
 - 8.13 Problems.
9. **Statistics.** 2 Hours
- 9.1 Concept of mean, media and mode
 - 9.2 Standard deviation
 - 9.3 Laws of probability
 - 9.4 Problems.

RECOMMENDED / REFERENCE BOOKS:

1. Technical Mathematics : **Ghulam Yasin**
2. Technical Mathematics : **Zafar Iqbal**
3. Technical Mathematics : **Ilyas Bhatti**
4. Introduction to Engineering Mathematics: Vol I. **H. K. Das**, [2009], S. Chand & Co New Delhi.
5. Introduction to Engineering Mathematics: Vol II. **H. K. Das**, [2009], S. Chand & Co New Delhi
6. Engineering Mathematics: **A. S. Sharma H. K. Das**, [2009], Discovery Publishing House, New Delhi.
7. Elementary Mathematics: **Heng Hwa Heng** [2001], Longman.

INSTRUCTIONAL OBJECTIVES

1. **Understand Functions & Limits.**
- 1.1 Define Constants and variables
 - 1.2 Define Functions & their types
 - 1.3 Define The concept of limit
 - 1.4 Define Limit of a function
 - 1.5 Define Fundamental theorems on limit

- 1.6 Define Some important limits
- 1.7 Define Continuous function
- 1.8 Solve Problems

2. Differentiation.

- 2.1 Explain Derivative of a function.
- 2.2 Explain Geometrical interpretation of differentiation.
- 2.3 Explain Differentiation by first principle.
- 2.4 Explain Rules for differentiation.
- 2.5 Explain Differentiation of algebraic functions.
- 2.6 Explain Differentiation of trigonometric and inverse trigonometric functions.
- 2.7 Explain Differentiation of logarithmic and exponential functions.
- 2.8 Solve Problems.

3.

Explain

Higher Derivatives and Application of Differential Calculus.

- 3.1 Explain Second derivative of a function.
- 3.2 Explain 3rd derivative of a function.
- 3.3 Explain Increasing and decreasing function.
- 3.4 Explain Maximum and minimum values.
- 3.5 Explain Criteria for maximum and minimum values.
- 3.6 Explain Methods of finding maxima and minima.
- 3.7 Solve Problems.

4. Understand Integration.

- 4.1 Explain Basic concepts of integration.
- 4.2 Explain Fundamental formulae & important rules.
- 4.3 Explain Integration by substitution.
- 4.4 Explain Integration by trigonometric substitution.
- 4.5 Explain Integration by parts.
- 4.6 Explain Definite integrals and its applications.
- 4.7 Solve Problems

5. Understand Integration by Using Partial Fractions.

- 5.1 Understand Introduction to partial fractions.
- 5.2 Explain Linear distinct factors case-I
- 5.3 Explain Linear repeated factors case-II
- 5.4 Explain Quadratic distinct factors case-III
- 5.5 Explain Quadratic repeated factors case-IV
- 5.6 Explain Integration of rational fractions.
- 5.7 Solve problems.

6. Understand Differential Equations.

- 6.1 Explain introduction
- 6.2 Explain Differential equation of order-1
- 6.3 Explain Differential equation of order-2
- 6.4 Explain Solution of 1st and 2nd order differential equations
- 6.5 Solve problems

7. Define and explain Fundamentals of Plane Analytic Geometry and Straight Line.

- 7.1 Explain rectangular coordinate system.
- 7.2 Explain distance formula.
- 7.3 Define ratio formula.
- 7.4 Define slope of a line.
- 7.5 Define slope formula and angle formula.
- 7.6 Define parallel and perpendicular lines.
- 7.7 Define equation of lines parallel to X-axis and Y-axis.
- 7.8 Explain important forms of equation of the straight line.
- 7.9 Explain intersection of two lines.
- 7.10 Explain distance between a line and a point.
- 7.11 Solve problems

8. Explain Conic Sections.

- 8.1 Define and explain Circle
- 8.2 Explain standard equation of a circle
- 8.3 Explain general equation of a circle
- 8.4 Explain radius and coordinates of centre
- 8.5 Explain parabola
- 8.6 Explain Standard equation of parabola
- 8.7 Explain Four forms of standard equation
- 8.8 Explain General equation of parabola
- 8.9 Define Ellipse
- 8.10 Explain Standard equation and related definitions
- 8.11 Define Hyperbola
- 8.12 Explain Standard equation and related definitions
- 8.13 Solve Problems.

9. Explain Statistics.

- 9.1 Define Concept of mean, media and mode
- 9.2 Define Standard deviation
- 9.3 Define Laws of probability
- 9.4** Solve Problems.

**DAE CIVIL TECHNOLOGY
YEAR 2**

GEN 221 COMMUNICATION SKILLS AND REPORT WRITING

TOTAL CONTACT HOURS:	40	T	P	C
Theory:	40	1	0	1
Practical:	0			

AIM: 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 | 6 Hours |
| 1.1 Listening comprehension | |
| 1.2 Principals for teaching listening comprehension | |
| 1.3 How to listening skill be developed | |
| 2. Speaking Skills | 8 Hours |
| 2.6 Starting and Ending conversations | |
| 2.7 Introducing oneself and others | |
| 2.8 Greeting, praises and compliments | |
| 2.9 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 | 8 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.

12 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:

1. Communications Skills : **Mathew McKay**[2009], New Harbinger Publications
2. A course in English Communication: **M. Apte**, [2009], PHI Learning, New Delhi.
3. Communication Skills Handbook: **Jane Summers and Brett Smith** [2005], Wiley & Sons
4. 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

- 12.5 Understand and demonstrate different types of writing and describing a process
- 12.6 Explain and demonstrate about writing simple sentences and writing complex sentences
- 12.7 Developing and demonstration about coherence and cohesion
- 12.8 Explain about 'beginning of topic' and 'its middle and end' and demonstrate its application
- 12.9 Explain about 'linking different paragraphs' and demonstrate its use
- 12.10 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

DAE CIVIL TECHNOLOGY YEAR 2

CT-212

PUBLIC HEALTH TECHNOLOGY

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

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

INTRODUCTION OF PH ENGG

1. **Pipes Used In Plumbing Water And Gas Supply:** 2 Hours
 - 1.1 Types.
 - 1.2 Description of pipes with reference to material e.g. G.I, PVC, PPR CI & A/C PIPES
 - 1.3 Specification of pipes.

2. **Plumbing Fixtures:** 4 Hours
 - 2.1 Flushing cistern, water closets, urinals.
 - 2.2 Traps-functions, wash hand basin and bath tub

3. **Faucets, Valves & Specials:** 3 Hours
 - 3.1 Taps and their types.
 - 3.2 Valves and their types.
 - 3.3 Mixer of different types.

4. **Introduction to Water Supply** 2 Hours
 - 4.1 General importance of water supply.
 - 4.2 Need for protected water supply.
 - 4.3 Development of water supply.

5. **Sources Of Water:** 3 Hours
 - 5.1 Surface source, lakes, streams, rivers, rainfall, intensity of rainfall, run off, catchments area, and yield from surface sources.
 - 5.2 Underground sources, springs, wells-its kinds (i.e. tube well), infiltration galleries
 - 5.3 Yield from wells-Quantity of underground water, water table, aquifer, cone of

depression.

6. **Intakes:** 3 Hours
- 6.1 Intakes and its types-Reservoir intakes, river intakes, lake intake, canal intake, factor governing the selection of site for an intake.
7. **Quantity Of Water:** 4 Hours
- 7.1 Total quantity of water for a town, per capita demand, factors affecting demand
7.2 Water requirement for domestic, industrial, fire fighting & commercial purposes.
7.3 Variation in demand
8. **Quality of Water.** 3 Hours
- 8.1 Meaning of pure water.
8.2 Impurities in water
8.3 Turbidity
8.4 Colour
8.5 Temperature
8.6 Taste and Odour
8.7 Suspended Solids
8.8 Total Dissolved Solids (TDS)
8.9 Alkalinity
8.10 Hardness
8.11 Fluorides
8.12 Biological Water Quality Parameters (Pathogens)
8.13 Tests of water (physical chemical tests and biological) and PH Value of water / use of WHO Standards and guidelines for drinking water
9. **Treatment of Water.** 8 Hours
- 9.1 Sedimentation-purpose of sedimentation, plain sedimentation, Types of settling tanks based on functions and shapes.
9.2 Coagulation-purpose, use of coagulants and kinds. Method of feeding and mixing.
9.3 Filtration
 - Theory of filtration,
 - Construction and operation of slow sand, rapid sand, pressurized filters,
 - comparison between slow sand and
 - rapid sand filters

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

- 9.5 Water softening.
- Purposes
 - Types of hardness
 - Methods of softening.
- 9.6 Miscellaneous methods of water treatment, aeration, fluoridation, colour, odour and taste removal.
10. **Distribution System of Water.** 6 Hours
- 10.1 Methods of distribution, gravity, combined and direct pumping.
- 10.2 Methods of supply of water intermittent and continuous.
- 10.3 Methods of layout of pipes, dead end, grid, ring and radial system.
- 10.4 Storage-underground and overhead service reservoirs, necessity and accessories.
- 10.5 Appurtenance in distribution system. Use of sluice valves, air valves, drains valves, fire hydrants, water meter, reflux valve, scour valves.
11. **Pumps & pumping.** 3 Hours
- 11.1 Necessity, kinds of pumps, fundamental principle of pumping.
- 11.2 Selection of site for tube-well.
12. **Introduction to Sanitary Engg** 3 Hours
- 12.1 Terminology of sanitary Engineering. e.g. refuse, garbage, sludge, etc.
- 12.2 Sanitation systems, conservancy system, water carriage system and cesspool system their comparison.
- 12.3 Types of sewerage systems and their suitability
13. **Quantity of Sewage & design of sewer** 8 Hours
- 13.1 Quantity of discharge in sewer, dry weather flow, Self cleansing velocity, variation in quantity of dry weather flow.
- 13.2 Quantity of storm water flow-run off, its co-efficient, time of concentration impervious factor, hydraulic formula for velocity of flow.
- 13.3 New Numerical problems
14. **House Drainage** 3 Hours
- 14.1 Requirements of house drainage.
- 14.2 Shapes & construction of different type of drains & ducts.
- 14.3 House drains slopes & connection with main sewer.
- 14.4 One & two pipe system of drainage and their comparison.

15. **Alignment & Layout of sewer Line** 3 Hours
- 15.1 Layout of sewer.
 - 15.2 Location of sewer line - longitudinal & X-Section showing sewer lines.
 - 15.3 Layout of sewer line gradient fixing, bedding, handling, laying, jointing, testing & back filling.
16. **Sewer Appurtenances** 6 Hours
- 16.1 Brief description, location, function and construction of:- Man holes, shallow MH, Deep MH, drop-man hole, inlets, clean out, lamp hole, grease, & oil traps, inverted syphon, trestles & piers.

RECOMMENDED / REFERENCE BOOKS:

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

INSTRUCTIONAL OBJECTIVES

1. Understand the Types and Specifications of Pipes.

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

2. Understand about Faucets and their use.

- 2.1 Explain taps and their types.
- 2.2 Explain valves and their types.
- 2.3 Explain Mixer and their types
- 2.4 Explain G.I and their uses and specifications.
- 2.5 Explain cocks their types and uses.

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

- 3.1 Define flushing cistern, water closets, urinals, wash hand basin, bathtub & traps.
- 3.2 Describe use & function of flushing cistern, water closets, urinals, wash hand basin, bathtub & traps.

- 3.3 Explain the procedure for installation of water closet, flushing cistern, soil pipe, and urinal
- 3.4 Part with flushing cistern and wash hand basin (complete).

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

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

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

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

6. Understand Intakes and Pipe Laying and Test

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

7. Understand Total Quantity of Water for a Town

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

8. Understand the Quality & Tests for Quality of Water

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

9. Understand the Methods and Process for Treatment of Water

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

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

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

11. Understand Principle of pumping

- 11.1 Recognize different types of pumps
- 11.2 Describe about tube well

12. Understand basic facts about Sanitary Engineering

- 12.1 Define terms; sewage, sanitary sewage, domestic sewage, industrial sewage, storm or rain sewage, sewerage works, sewage treatment and sewage disposal
- 12.2 State types of sewer (sanitary sewer, storm sewer, combined sewer, lateral sewer,

- house sewer, submain sewer, main or trunk sewer, out fall sewer and relief sewer)
- 12.3 Compare systems of sewage disposal, conservancy system, water carriage system and cesspool drainage system
 - 12.4 State types of sewerage system and their suitability
 - 12.5 Compare the sewerage systems with each other

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

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

14. Understand the Fundamentals and its Requirements of House Drainage

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

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

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

16. Understand the Various Types of Sewer Appurtenances.

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

LIST OF PRACTICALS

HOURS

- | | |
|--|---|
| 1. Layout drawing of training institution's plumbing lab. | 3 |
| 2. Demonstration of various tools and pipe appurtenances. | 3 |
| 3. Cutting and threading of G.I. Pipes and connections of PPR pipes. | |

4. Taking out water connection from main pipe.	6
5. Fitting/replacement of water taps.	6
6. Installation of water closet, flushing cistern and pipe.	3
7. Installation of urinal with flushing cistern and waste pipe.	6
8. Installation of wash hand basin (complete).	6
9. Jointing of pipes (cast iron and concrete).	3
10. Making model of dead system grid, system, ring system and, radial System with G.I. Pipe.	6 6
11. Repair of single acting reciprocating pumps and replacement of non-return valve.	6
12. Demonstration on boring of tube-well/hand pump.	3
13. Drawing of intakes for water supply.	3
14. Turbidity and hardness test of water, PH (testing)	3
15. Drawings of settling tank, slow sand filter rapid sand filter	3
16. Flow diagram of water treatment.	3
17. General layout of water supply and sanitary fitting in a house and calculation of all fixtures.	3 6
18. Visit of water treatment plant, and water works.	6
19. Drawing sketches of various sewer appurtenances (lamp hole, manhole ,shallow and deep man hole drop man hole inlets, regulator, grease and oil trap, inverted syphon, trestles and piers	5 5
20. Demonstration for excavation of trenches of a small sewer line with proper grade.	1
21. Visit of Sewage Treatment Plant	1
22. Preparation of hydraulic statement of water supply scheme	
23. Preparation of hydraulic statement of sewerage scheme	

DAE CIVIL TECHNOLOGY YEAR 2

CT-224

ADVANCED SURVEYING

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

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

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

COURSE CONTENTS

1. Theodolites Traversing

18 Hours

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

2. Triangulation

4 Hours

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

- 2.7 Correction of base line measurement
- 3. Curves** 16 Hours
- 3.1 Definition, types and necessity of curves
 - 3.2 Designation of curves
 - 3.3 Elements and notation of simple circular curves & their relationship
 - 3.4 Calculation of data & methods of setting out simple circular curves
 - 3.5 Setting out simple curve beyond obstacles
 - 3.6 Description, types and necessity of transition curves
 - 3.7 Characteristics, elements & notation of transition curve and their inter relationship
 - 3.8 Introduction to super elevation and methods of calculation length of transition curve with numerical problems
 - 3.9 Calculation of data and methods of setting out of transition curve
 - 3.10 Calculation of data and Setting out vertical curves
 - 3.11 Introduction to vertical curves, types of vertical curves, elements, term and their inter relationship.
- 4. Setting Out/Layout of Structures (Buildings, Bridges, Housing Schemes, Etc)** 4 Hours
- 5. Electronic Distance Measurement (EDM) and Total Station** 16 Hours
- 5.1 Introduction to EDM
 - 5.2 Functions and mode of EDM
 - 5.3 Preparations for observations/operations by EDM
 - 5.4 Introduction, types, main parts and accessories of Total Stations.
 - 5.5 Functions and modes of a Total Station.
 - 5.6 Setting of parameters.
 - 5.7 Preparation for observations and operations
 - 5.8 Use for taking distances, angles, bearings and co-ordinates.
 - 5.9 Downloading data from the Total Station (knowledge of downloading software).
 - 5.10 Putting data in the respective software and its mapping.
- 6. Global Positioning System (GPS)** 6 Hours
- 6.1 Introduction to GPS.
 - 6.2 Functions and modes of GPS.
 - 6.3 Setting parameters.
 - 6.4 Preparation for observations.

RECOMMENDED / REFERENCE BOOKS:

1. Surveying & Leveling : **T.P. Kanatkar**
2. Surveying Leveling : **S.K. Hussain**
3. Rasul Manual (I&II) on surveying
4. Surveying : **David Clark**
5. Manuals for Total Station and GPS
6. Surveying : **S. Ahmed**
7. Advanced Surveying : **P. S. Ghosh**
8. Surveying theory and practice : **Raymond E. Davis**
9. A text book of Advanced Surveying: **R. Agor.**
10. Surveying and leveling : **R. Agor**
11. Surveying: **A. Bannister, S. Raymond and R. Baker**, [2009], Pearson Education
12. Surveying and Levelling: **R.Agor**, [2007], Khanna Publishers
13. Surveying with Construction Applications: **Barry F. Kavanagh**, [2004], Pearson Prentice-Hall
14. Surveying, Principles and Applications: **Barry F. Kavanagh**, [2006], Pearson Prentice-Hall
15. Surveying and Levelling: **N.N. Basak**, [1994], Tata McGraw-Hill, NewDelhi
16. Fundamentals of Surveying: **S.K. Roy**, [2007], Prentice-Hall of India,

INSTRUCTIONAL OBJECTIVES

1. Understand the Construction of Theodolites and its Basic Function

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

2. Understand Techniques of Triangulation

- 2.1 Define Geodetic and Trigonometrical survey
- 2.2 Describes the triangulation and its types

- 2.3 Explain the factors governing the selection of stations & base line
- 2.4 Enlist the steps in measurement of base line
- 2.5 Compute correction of base line measurement

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

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

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

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

5. Understand the Total Station and its use

- 5.1 Identify the parts of a total station
- 5.2 Describe the functions and modes of total station.

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

6. Global Positioning System (GPS).

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

LIST OF PRACTICALS		HOURS
1	Vernier/Microptic theodolites and its parts and use	15
2	Practice in setting of theodolites on a station point	15
3	Measurement of horizontal & vertical angles.	12
4	Setting out angles in the field	12
5	Theodolites traversing	12
6	Setting out horizontal curves in the field by theodolites	12
7	Setting out vertical curves in the field	12
8	Setting out transition curve in the field	12
9	Finding out height of inaccessible point, with a theodolites	12
10	Measurement of slope distance, horizontal distance and vertical distance by total station.	12
11	Demonstration and practice of advance functions of a total station for mapping.	12
12	Setting out horizontal curves in the field by total station	18
13	Area calculation with the help of total station	12
14	Determination of storage capacity of a reservoir	12
15	Demonstration and practice of functions and modes of GPS.	12

DAE CIVIL TECHNOLOGY YEAR 2

CT-233

BUILDING CONSTRUCTION

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

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

COURSE CONTENTS

- 1. Components of a building and building specifications** 4 Hours
 - 1.1 Introduction
 - 1.2 Construction of a building: Civil Works
 - 1.3 Building specifications
 - 1.4 Various steps in construction of a residential building
- 2. Site preparation and setting out of works** 6 Hours
 - 2.1 Introduction
 - 2.2 Site layout of Civil Project
 - 2.3 Water supply ground water control-permanent exclusion of
 - 2.4 Electrical supply
 - 2.5 Initial checks on drawings
 - 2.6 Layout / Setting out of buildings
 - 2.7 Construction procedure of a Multistory building
- 3. Construction of Foundation and Deep Foundation** 4 Hours
 - 3.1 Simple foundation design
 - 3.2 Setting out for brickwork of a load bearing wall
 - 3.3 Foundations of framed buildings
 - 3.4 Foundations for staircases
 - 3.5 Eccentrically-loaded foundations
 - 3.6 Deep Foundations

4. Block masonry and Marble Work	4 Hours
4.1 Considerations for use of hollow concrete blocks	
4.2 Laying of blocks	
4.3 Hollow concrete blocks with concrete infilling	
4.4 Special features of concrete block masonry	
4.5 Compound walls in block work	
4.6 Tools for stone and marble work	
5. Water Proofing / Termite Proofing of Structures	4 Hours
5.1 Water proofing materials and products.	
5.2 Water proofing of struck (horizontal/ vertical)	
5.3 Termite proofing	
5.4 Materials used in termite proofing	
6. Flooring	4 Hours
6.1 Ground floors	
6.2 Suspended floors	
6.3 Laying of toppings	
6.4 Choice of floor finishes	
6.5 Use of abrasives in floors	
6.6 Types of floors	
7. Form Work	4 Hours
7.1 Components of formwork wares	
7.2 Characteristics of a good form work quality, safety, and economy	
7.3 Types of formwork collapsible, progressive, slip formwork and non-removable	
7.4 Preparation of formwork for placing concrete-	
7.5 Loads on formwork	
7.6 Form work for different components of structure	
8. Steel fixing in RCC Works	4 Hours
8.1 Fixing of Reinforce in ordinary Rcc work.	
8.2 Fixing of steel in precast conceals	

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- 9. Stairs, Stair Case and lifts / Elevators and Escalators** 4 Hours
- 9.1 Important technical terms.
- 9.2 Types of different stairs and staircases with brief specifications and parts
- 9.3 Planning and design of a stair-relation between going and rise, width of stair, length of flight, landing and location of stair etc.
- 9.4 Types of stairs according to material used & ramps.
- 9.5 Lifts and escalators
- 10. Fire Protection of Buildings** 4 Hours
- 10.1 Causes and effects of fire
- 10.2 Fire resisting materials-characteristics, fire-resisting properties of construction materials
- 10.3 Arrangements for fire-protection of building-alarm system, protection of openings, stairs and floors, smoke detectors, fire extinguishing arrangement
- 10.4 Fire-resisting construction-classification of building for fire resistance, fire protection of concrete, wooden and steel structures
- 10.5 Means of escape in case of fire basic principles of means of escape means of escape required for flat, office building, and public building.
- 11. Air conducting and ventilation of building** 4 Hours
- 11.1 Introduction, definition, conditioned air, purity, humidity cooling, heating, ventilation.
- 11.2 Thermal insulation, transmission of heat, insulating material
- 11.3 Factors affecting ventilation of building, functional requirements of ventilation, method of ventilation
- 11.4 Heating of building, methods of heating, warm air furnace steam heating, hot water heating system, panel heater, and unit heater.
- 11.5 Cooling of building methods of cooling, chilling water cooling, ice cooling, spray cooling, mechanical refrigeration (air conditions)
- 11.6 Air conditioning plants, system of air conditioning, air circulation filters.
- 12. Acoustics of Buildings** 4 Hours
- 12.1 Technical terms-sound, pitch, loudness, intensity of sound, reflection, transmission and absorption of sound, optimum time of reverberation
- 12.2 Factors to be considered in an acoustics of buildings.
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- 12.3 Sound absorbing materials-characteristics
- 12.4 Acoustic design of an auditorium
- 12.5 Sound insulation-methods of sound insulation.
- 12.6 Physical measurement of sound
- 12.7 Reverbation of echos
- 12.8 Sound isolation
- 12.9 Common acoustical defects and remedies of conference halls
- 12.10 Use of ray diagram and echo
- 12.11 Design of auditoriums
- 12.12 Requirements of an auditorium
- 12.13 Acoustical materials
- 12.14 Recommendations for different types of buildings for good acoustics

13. Maintenance of Buildings

4 Hours

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

14. Introduction to Seismic Proof Construction.

6 Hours

- 14.1 Important seismic related Definition & Terms,
- 14.2 Different seismic zones
- 14.3 Seismic Design Parameters
- 14.4 Seismoresistant building architecture

- 14.5 Ductility considerations in earthquake resistant design of buildings
- 14.6 Construction in different seismic zones
- 14.7 Methods and materials of construction

15. Municipal Requirements in planning of buildings

4 hours

- 15.1 Introduction
- 15.2 Classification of buildings
- 15.3 Example of building regulations

RECOMMENDED / REFERENCE BOOKS:

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

INSTRUCTIONAL OBJECTIVES

1. Under stand components of building & building

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

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

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

3. Understand Construction precedence of foundations.

- 3.1 State simple foundation design.
- 3.2 Describe setting out for brick work of a load bearing wall.
- 3.3 State foundations of framed buildings.
- 3.4 Describe foundation of staircase.
- 3.5 Explain exceptionally loaded foundations.
- 3.6 Explainer dup found date the inecessicity
 - Pile foundation
 - Coffor Dam
 - Cassion foundation

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

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

4.6 State the stripping of formwork.

5. Understand water proofing/Termite proofing of structure.

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

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

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

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

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

8. Understand steel fixing in Rcc works.

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

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

- 9.1 Define the terms used.
- 9.2 Describe different stain stainca and pasts.
- 9.3 Explain principles to be observed while planning and design of stain.

9.4 State the types of stains according.

10. Understand the Principles for Fire Protection of Buildings

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

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

- 11.1 Define terms, conditioned air, purity of air, humidity, cooling heating and ventilation.
- 11.2 State the importance of thermal insulation of building.
- 11.3 Explain principles to be observed while planning and design of stain.
- 11.4 State the standards for ventilation of building.
- 11.5 Explain the methods of ventilation i.e. natural and mechanical ventilation.
- 11.6 Explain the methods of heating a building.
- 11.7 Explain the methods of cooling building
- 11.8 State the systems of mechanical air conditioning of building.
- 11.9 State the air distribution and cleaning method
- 11.10 Explain the working principles of mechanical air conditioning plant/system

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

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

13. Understand the Maintenance Required for Building

- 13.1 Explain the annual and special repairs required for building.
- 13.2 Explain the methods of repair of damaged plastered surface, white wash, distemper and painting.
- 13.3 Explain the procedure of repair of various damaged floors such as, concrete floor, terrazzo floor, mosaic and timbre floors.
- 13.4 Explain causes of spelling in R.C.C members and protections against it.
- 13.5 Explain causes, method of repair for leakage through roofs.
- 13.6 Explain causes and symptoms of cracks in masonry and their repairs.

- 13.7 Explain repair of sanitary system electrical, water supply, septic tank and drainage system.
- 13.8 Explain repair of concrete structures.
- 13.9 Explain renovation/revalidation of striation

14. Understand the Principles of seismic proof construction

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

15. Understand Municipal Requirement in planning

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

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

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- | | | |
|----|---|----|
| 18 | Visit to a precast concrete factory and preparation of its layout and report. | 6 |
| 19 | Demonstration of manufacturing of tough tiles. | 15 |
| 20 | Renovation & rehabilitation of academic/admin block, hostel & staff colony. | |

**DAE CIVIL TECHNOLOGY
YEAR 2**

CT-244 CIVIL ENGINEERING DRAWING & AUTO CAD

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

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

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

COURSE CONTENTS

- | | | |
|----------|--|---------|
| 1 | Drawing of Building Components. | 8 Hours |
| | 1.1 Instruction for detailed drawing of foundations, lintels, arches, stairs, floors, roofs (flat and sloping), doors, windows, C-windows, calculations of spread footing. | |
| | 1.2 Instructions on drawing plan and x-section of R.C.C. column. | |
| | 1.3 Instructions on drawing plan and x-section of R.C.C. slab roof with main and secondary beams. | |
| | 1.4 Introduction to steel truss and its parts | |
| 2 | Frame Structure Buildings. | 7 Hours |
| | 2.1 Definition of frame structure. | |
| | 2.2 Instruction on drawing of raft foundation with steel reinforcement. | |
| | 2.3 Instruction for detailed drawing of frame structure showing all components. | |
| 3 | Drawing of Road Structures. | 7 Hours |
| | 3.1 Instructions for drawing of x-section of roads. | |
| | 3.2 Instructions for drawings of R.C.C. road culvert 5 ft span | |
| | 3.3 Instructions for detailed drawing of high level two span R.C.C. Deck Bridge with 25' span-each. | |
| | 3.4 Instructions for detailed drawing of 25' span plate girder steel bridge. | |

4	Drawing of Irrigation Structures.	6 Hours
4.1	Instructions for drawing typical section of an Irrigation Channel in cutting and filling.	
4.2	Instruction for drawings of A.P.M. out-let, masonry flume.	
4.3	Instruction for drawing of sluice (gate) of barrage	
5	Inking and Printing.	2 Hours
5.1	Introduction to inking and ammonia printing.	
5.2	Introduction for ink tracing including materials and apparatus used.	
6	Septic Tank and Soakage Pit	2 Hours
6.1	Introduction to septic tank	
6.2	Introduction to soakage pit	
6.3	Sketch and label septic tank and soakage pit	
7	Introduction to Auto CAD	2 Hours
7.1	What is AutoCAD and Auto desk	
7.2	Interface of AutoCAD	
7.3	Means of commands in CAD	
8	Coordinate System	3 Hours
8.1	Cartesian coordinates	
8.2	Absolute coordinates	
8.3	Relative coordinates	
8.4	Direct distance entry system	
8.5	U.C.S setting	
9	Description of Menu of Auto CAD	4 Hours
9.1	File	
9.2	Edit	
9.3	View	
9.4	Insert	
9.5	Format	
9.6	Tools	
9.7	Draw modify	
9.8	Windows help, etc	

10	Tool Bars	4 Hours
	10.1 Standards	
	10.2 Proportions	
	10.3 Layers and their practical application	
11	CAD Commands and their Aliases	4 Hours
	11.1 2D commands for plane figures and their practical applications	
12	Drafting Setting	3 Hours
	12.1 Units, limits, grid, snap, snaps etc	
	12.2 Model setting and layout setting. Layers and proportions etc	
13	Preparation of 2D Drawings	3 Hours
	13.1 Composite geometrical figures, isometric views and their orthographic projections.	
	13.2 Plans, elevation and sections of buildings	
14	Dimensioning & Text	2 Hours
	14.1 Dimensioning types, styles & application	
	14.2 Text settings & application	
15	3D Commands	4 Hours
	15.1 Solid figures	
	15.2 Modification of solid figures	
	15.3 Conversion of 2D into 3D	
	15.4 Shading and Rendering	
	15.5 View setup	
16	Plotting	3 Hours
	16.1 Layout setting	
	16.2 Print layout setup	
	16.3 Use of plotters	

RECOMMENDED / REFERENCE BOOKS:

1. Building Drawing : **Gur Charn Singh**
2. Engineering Drawing : **French and Vierick**
3. How to plan a House : **Townsend**
4. Be your own Architect: **Z.H. Syed.**
5. Irrigation : **Iqbal**
6. Building construction: **Michel.**
7. Building construction, drafting and design : **Molnar**
8. Engineering Drawing: **N.D. Bhatt and V. M. Panchal**, [2006], Prabhat Publishers, Delhi

INSTRUCTIONAL OBJECTIVES

1. Understand Techniques of Drawing Building Components.

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

- 1.24 State the different types of doors and windows.
- 1.25 Explain the various parts of doors and windows.
- 1.26 State the different materials used for doors, windows and ventilators
- 1.27 Sketch the elevations, sectional plans and vertical sections of doors, windows and ventilators.

2. Understand Techniques of Drawing Building Frame Structure

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

3. Understand Techniques of Drawing Road Structures.

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

4. Understand Techniques of Drawing Irrigation Structures.

- 4.1 State the different irrigation structures.
- 4.2 State the definition of irrigation channel.

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

5. Understand The Techniques Of Inking And Printing.

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

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

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

LIST OF PRACTICALS		HOURS
1.	Detailed Drawings of building components as given in theory. (at least 8 sheets).	60
2.	Detailed drawings of irrigation structures. (at least 6 sheets).	20
3.	Ink tracing of a given drawing and taking its prints.(at least 4 sheets)	20
4.	Detailed drawing of septic tank and soakage pit.	10
5.	Practice of Installation of Auto Cad software	1
6.	Practice of applying drafting setting (units, limits, snap, auto on. Off	1

7.	Practice of various 2D commands i.e. Line, trim, offset, extend etc	14
8.	Practice of using layer option	2
9.	Practice of using dimensioning & text option	2
10.	Practice of preparing plan, elevation & section of building	44
11.	Practice of x-section & L-section of road & canal	10
12.	Practice of using basic 3D commands	6
13.	Practice of layout setting and printing of Cad drawing	2

**DAE CIVIL TECHNOLOGY
YEAR 2**

CT-253

MECHANICS OF STRUCTURES

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

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

COURSE CONTENTS

- | | | |
|----------|---|---------|
| 1 | Center Of Gravity(C.G) | 4 Hours |
| 1.1 | Introduction and definition of terms used. | |
| 1.2 | Methods of determining C.G | |
| 1.3 | Steps for the calculation of centroid of composite sections. | |
| 1.4 | Calculation of C.G. of various structural sections, i.e. I-Section, H-Section, T-section, Channel Section, Angle Section and Composite Section. | |
| 2 | Moment Of Inertia. | 4 Hours |
| 2.1 | Introduction and definition of terms used. | |
| 2.2 | Moment of Inertia of rectangle, triangle and circle. | |
| 2.3 | Theorems of perpendicular and parallel axes. | |
| 2.4 | Calculation of moment of inertia of common structural sections, I, T, Circular, Angle and Composite sections. | |
| 2.5 | Calculation of polar moment of inertia for circular sections. | |
| 3 | Hardness. | 2 Hours |
| 3.1 | Brief description of hardness | |
| 3.2 | Brinell Hardness Test & Rockwell Hardness test. | |
| 4 | Shear Force and Bending Moment. | 8 Hours |
| 4.1 | Definition of beam, support and load. | |
| 4.2 | Types of support beam and load. | |
| 4.3 | Calculation of reactions for different types of beams | |
| 4.4 | Shear force and bending moment. | |
| 4.5 | Calculation of S.F. & B.M. for different types of beams carrying Point loads, U.D.L. | |

- and combined loadings.
- 4.6 Draw S.F.D, B.M.D.
- 4.7 Calculation of maximum and minimum shear force and bending moments for the beams and their locations.
- 4.8 Point of zero shear and point of contraflexure
- 4.9 Standard formulas for S.F. and B.M.
- 5 Simple Stresses and Strains** 6 Hours
- 5.1 Introduction, definitions of stress
- 5.2 Description of strain
- 5.3 Hook's Law
- 5.4 Different modulli
- 5.5 Mechanical properties of materials
- 5.6 Introduction of universal testing machine, tensile and compression test and stress-strain curve
- 5.7 Numerical problems.
- 6 Stresses In Beams** 4 Hours
- 6.1 Types of stresses in beams (bending and shearing stresses).
- 6.2 Assumptions in simple bending
- 6.3 Bending equation
- 6.4 Normal stress distribution in beams of Rectangular section.
- 6.5 Practical application and simple problems, based on bending equation.
- 6.6 Shear stress in beams and distribution of shear stress for rectangular, circular and I-sections.
- 6.7 Problems based on shear stress
- 7 Deflection of Beams.** 4 Hours
- 7.1 Introduction and significance of deflections
- 7.2 Name of various methods of deflection calculation.
- 7.3 Maximum deflection in different types of beams.
- 7.4 Formula for calculation of maximum deflection in cantilever and simply supported beams for various loading conditions.
- 8 Column.** 6 Hours
- 8.1 Introduction of different terms used
- 8.2 Failure patterns of columns
- 8.3 Buckling load, crushing load, safe load, F.O.S, slenderness ratio, radius of gyration, fatigue, effective length of column
- 8.4 End conditions of column
- 8.5 Euler's formula and Rankine's formula
- 8.6 Numerical problems based on Euler's and Rankine's formulae.

9	Torsion.		4 Hours
9.1	Introduction of different terms used		
9.2	Effects of torsion		
9.3	Torsion formula, strength equation and stiffness equation.		
9.4	H.P. transmitted by circular shaft & design problems of solid and hollow circular shafts.		
9.5	Application of above formulae to problems		
10	Riveted Joints.	6 hou	4 Hours
10.1	Introduction to different terms related to riveted joints.		
10.2	Different types of riveted joints.		
10.3	Failure of riveted joints, strength and efficiency of a joint.		
10.4	Design of riveted joints, strength, efficiency and pitch.		
11	Welded Joints.		3 Hours
11.1	Introduction and comparison of riveted and welded joints.		
11.2	Types of welded joints.		
11.3	Design of welded joint, fillet welds only (strength and dimension).		
12	Fundamentals of Steel Structures		2 Hours
12.1	Introduction to Steel Structures		
12.2	Merits of Steel Construction		
12.3	Demerits of Steel Construction		
12.4	Types of Structural Steel		
12.5	Hot Rolled Structural Shapes		
12.6	Cold-formed Shapes		
12.7	Built-up Sections		
12.8	Cladding		
13	Trusses		6 Hours
13.1	Introduction of truss, steel truss, parts.		
13.2	Methods of truss analysis.		
13.3	Determination of forces in members of statically determinate trusses by method of section and method of joints.		
14	Retaining Walls.		6Hours
14.1	Introduction and description of terms used.		
14.2	Pressures on retaining wall and stresses at base (toe and heel) Rankine's formula and application.		
14.3	Stress distribution diagram.		

- 14.4 Conditions of stability of retaining wall.
- 14.5 Checking stability of retaining wall.
- 14.6 Numerical problems

RECOMMENDED / REFERENCE BOOKS:

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

INSTRUCTIONAL OBJECTIVES

1. Understand the Concept and Computation of Center of Gravity

- 1.1 Define and explain the terms: Center of gravity, Centroid, first moment of area, reference axes, centroidal axes and symmetrical axes.
- 1.2 Describe the methods of finding center of gravity.
 - By geometrical consideration
 - By the method of moments
- 1.3 Explain the steps for the calculation of centroid of composite sections
- 1.4 Determine position of C. G. for various structural sections i.e. I-section, H-section, T-section, channel section, angle section, Z-section and composite sections by method of moments.

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

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

2.5 Determine polar moment of inertia for circular section applying perpendicular axes theorem

3. Understand the Hardness Property of Material.

3.1 Define Hardness.

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

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

4.1 Define beam, support and load.

4.2 State types of support, beam and load.

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

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

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

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

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

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

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

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

5. Understand Behavior of Materials under Simple Stress.

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

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

5.3 Define and explain Hook's Law.

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

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

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

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

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

- 6.1 Explain the types of stresses in beams (Bending & Shear stresses).
- 6.2 State the assumptions made in theory of simple bending.
- 6.3 State and explain bending equation.
- 6.4 Explain Bending stress distribution across rectangular section.
- 6.5 Solve problems on theory of simple bending.
- 6.6 State formula for shear stress and shear stress distribution across rectangular, circular & I-sections of beam.
- 6.7 Solving problems on shear stress.

7. Understand Deflection of Beams under Loading.

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

a. For cantilever beam.

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

b. For simply supported beam.

- i Point load at mid span.
- ii U.D.L on whole span.
- iii Combination of above loads.

8. Understand the Behaviors of Columns under Axial Loads.

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

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

- 9.1 Define the terms: torque, torsion, angle of twist, shear stress, shear modulus, polar moment of inertia, etc.
- 9.2 Describe effects of torsion.
- 9.3 State the torsion formula, strength equation and stiffness equation for solid & hollow

circular shafts.

- 9.4 Calculate the diameters of solid & hollow circular shafts to transmit given horse power at permissible shear stress and at a permissible angle of twist.
- 9.5 Solve problems on torsion applying torsion formula.

10. Understand the Behavior of Rivetted Joint.

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

11 Understand the Behavior of Welded Joints.

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

12 Understand the theoretical fundamental concepts of Steel Structures

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

13 Understand the Effect of Loads on Statically Determinate Truss.

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

14 Understand Stability and Stresses Developed in Retaining Walls.

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

LIST OF PRACTICALS

HOURS

(96)

1. Solving problems of centroid for composite sections.
2. Solving problems of M.O.I for composite sections.
3. To find the relation between the stress and strain of a given copper wire with the help of a Young's modulus apparatus. Plot a graph between the stress and strain. Hence find the Young's modulus of the material of the wire.
4. To find tensile strength of a mild steel specimen plotting and interpretation of stress strain curve.
5. Draw S.F.D. and B.M.D in case of simply supported beams under various loading conditions.
6. Draw S.F.D. & B.M.D in case of over hanging beams under various loading conditions.
7. Draw S.F.D & B.M.D of cantilever beams under various loading conditions.
8. Practice in designing the homogeneous beam by simple bending equation.
9. Drawing of bending and shear stress distribution for symmetrical sections of beams.
10. Show by means of deflection of beam apparatus that the deflection is proportional to the cube of span also draw a graph and also show that the deflection is proportional to the load.
11. Solving problems on deflection of beams
12. Solving problems on Euler's and Rankine's formulae.
13. Solving problems based on torsion formula and power transmitted.
14. Design & drawing of butt-joint and lap joint.
15. Design problems on welded joints
16. Practice in finding stresses in various members of a given truss by joint and section methods.
17. Check stability of given retaining wall.
18. Sketch stress distribution diagrams for retaining walls.

**DAE CIVIL TECHNOLOGY
YEAR 2**

CT-262

QUANTITY SURVEYING

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

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

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

COURSE CONTENTS

- | | | |
|-----------|---|---------|
| 1. | Introduction | 3Hours |
| 1.1 | Review of area, perimeters and volumes of various plane and solid geometrical figures. | |
| 1.2 | Estimate and its types. | |
| 1.3 | Data for estimating. | |
| 2. | Specifications. | 2 Hours |
| 2.1 | Definition of purpose of specs | |
| 2.2 | Principle of writing specs | |
| 2.3 | General specifications. | |
| 2.4 | Detailed specifications of all items of work. | |
| 3. | Building Estimates. | 7 Hours |
| 3.1 | Terms used in quantity surveying (provisional sum, prime cost, input rates, MRS, CSR, Premium, rebate, contingencies, petty establishment charges, cost, value, bill and BOQs). | |
| 3.2 | Rough cost estimate of Buildings. | |
| 3.3 | P.W.Ds, MES and English method of writing measurement in MB. | |
| 3.4 | Methods, of detail EST. | |
| 3.5 | Instructions on working out quantities of various types of wall Shapes/sections. | |
| 3.6 | Rules for deduction of different work teams. | |
| 3.7 | Instructions on working out quantities and Abstract of quantities of various items of work of a single storey building (building portion only). | |
| 3.8 | Study of schedule of rates and preparation of abstract of cost for all item of work of a single storey building (building portion only). | |
| 3.9 | Annual and special repair estimates for building main tenance. | |

- 4. Earth Work Estimates.** 4 Hours
- 4.1 Units of measurement/payment, methods of calculation.
4.2 Tech terms used in earth work (lead, lift, dead man, borrow pit.
4.3 Preparation of proforma for earth works.
4.4 Taking out quantities for embankment, roads in plain and hills and irrigation channel (including remodeling).
- 5. Road Estimates.** 3 Hours
- 5.1 Types of road, & their structures along with tech terms
5.2 Units of measurements/payments.
5.3 Instruction regarding complete estimate of bituminous road, cement concrete road.(for original & repair works)
- 6. Rate Analysis.** 5 Hours
- 6.1 Definition & prerequisite for analysis of rates
6.2 Labor required for constructional work.
6.3 Instruction on Market rates, (Materials, labour, carriage and equipment) (PWD, MES Rate Schedules)
6.4 Schedule of labour, schedule of equipment, hiring and cost owing, of machinery work their output.
6.5 Rate analysis for:
– Cement concrete of different ratios.
– Brick work in cement mortar.
– Cement conglomerate floor
– Dry brick paving.
– Cement plaster of given ratios.
– Cement pointing (Struck & Flush type)
– White washing/ Distemper to wall and preventing to doors/window.
– Item Works for water supply & sewerage
– Flush Door
– Tile Work
– Electrical Work (ET)
– Plumbing Work (DH-I)
– Carpentry / Woodwork
- 6.6 Material statement for various items of building work.
- 7. Sewerage and Water Supply Schemes.** 4 Hours
- 7.1 Items to work with
7.2 Units of measurements & payments.
7.3 Rough cost estimate for water supply and sewerage schemes.
7.4 Detailed estimate for sewer line and its appurtenance (Manholes, septic tank etc).
7.5 Prepare hydraulic statement for a sewerage scheme comprising of 10 manholes length.
7.6 Prepare hydraulic statement for a water supply scheme for 1000 ft. length in five parts

8. Valuation of Property.

5 Hours

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

RECOMMENDED / REFERENCE BOOKS:

1. Rasul Manual No.4 on Estimating.
2. Estimating and Costing: Dutta.
3. Estimating and Costing: M.A. Aziz.
4. Construction Cost Estimating: Len Holm, John Schaufelberger, Dennis Griffin and Thomas Cole, [2005], Prentice-Hall, USA
5. Civil Engineering Quantities: Ivor Seeley and George P. Murray,[2001], Palgrave Publishers

INSTRUCTIONAL OBJECTIVES

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

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

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

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

3. Understand Principles Involved in Preparation of Building Estimates.

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

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

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

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

- 5.1 Describe parts of road structure and their specifications.
- 5.2 State the units and method of measurement of all items of works for a road.
- 5.3 Prepare detailed & repair estimate for bitumen and cement concrete road.

6. Understand Rate Analysis of Major Items of Works.

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

7. Understand Detailed Estimate for Water Supply and Sewerage Schemes

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

8. Understand Valuation of Building and Fixation of Rent.

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

LIST OF PRACTICALS		HOURS
1.	Preparation of rough cost estimates of buildings.	6
2.	Writing specifications/Description of various items.	6
3.	Taking out measurements of a straight wall, T, L, H, F, U, shaped walls and circular walls.	6
4.	Complete estimate of a single storey building. (Except PHI & EI)	12
5.	Preparation of annual repair/special repair estimates. (B/R)	6
6.	Working out earth work of earthen embankment of given design and data.	6
7.	Working out earth work of road (in plain and hilly areas), and irrigation	6

	channel.	6
8.	Complete estimate of arterial roads (bituminous and concrete road).	9
9.	Rate analysis for various items of building work viz cement concrete of ratios, Brick work in cement mortar in foundation and plinth and superstructure, dry brick paving, cement conglomerate floor, cement plaster of ratios, cement pointing, white washing. Tile work flush door.	12
10.	Preparation of material statements of various items of building works.	
11.	Preparation of estimate rough cost estimate of water supply and sewerage schemes including analysis of rates for woks.	6
12.	Preparation of estimate of sewer line including manhole etc.	9
13.	Calculation of present market value of an existing building by standard rent method and depreciation method.	6
		6

DAE CIVIL TECHNOLOGY YEAR 3

اسلامی معریت / صرف اللہ کا شکر ہے

سہ ماہی سوئم
حصہ اول اسلامیات

تدریس مقاصد

- قرآن حکیم
عمومی مقصد: منتخب سورتوں اور آیات کی روشنی میں اسلام کے بنیادی مقاصد اور عبادت جان سکے
خصوصی مقاصد: طالب علم اس نقل ہو جائے گا کہ
سورۃ الفاتحہ: آیت الکرسی۔ سورۃ بقرۃ کی آخری آیات از امن الرسول سے اور سورۃ اخلاق کا ترجمہ و تشریح کر سکے
طالب علم درج ذیل کا مفہوم بیان کر سکے
- ☆ رب العالمین صرف اللہ تعالیٰ ہے
 - ☆ اللہ رحم کرنے والا ہے
 - ☆ قیامت کے دن پادشاہی اللہ کی ہوگی
 - ☆ عبادت اور استغانت کا حقدار صرف اللہ ہے
 - ☆ طالب علم درج ذیل کا مفہوم بیان کر سکے
 - ☆ اللہ پاک ہر عیب سے پاک ہے
 - ☆ اللہ کے اسمائے حسہ حق اور قیوم ہیں
 - ☆ تعلیم انبیاء پر ایمان لانا ضروری ہے
 - ☆ رسولؐ ملا کہ کتب سلویہ پر ایمان لانا فرض ہے
 - ☆ اعلا مت حقیقی صرف اللہ کے لیے ہے
 - ☆ اسلامی احکامات پر عمل کرنا انسانی بدلا میں ہے
 - ☆ کفر کو اللہ کی مدد کے بغیر شکست نہیں دی جاسکتی
 - ☆ اللہ ایک ہے
 - ☆ اللہ کسی کا محتاج نہیں نہ اس کا کوئی شریک ہے
- منتخب احادیث
عمومی مقصد: احادیث کی روشنی میں اسلامی تعلیمات پر عمل پیرا ہو سکے
خصوصی مقصد:
☆ احادیث کا ترجمہ بیان کر سکے

۱۲۰	احادیث کی تشریح کر سکے
۱۲۱	معاشرتی اور انفرادی زندگی میں احادیث سے رہنمائی حاصل کر سکے
	حقوق و فرائض
	عمومی مقصد: اسلامی معاشرے کا ایک اچھا فرد بن سکے
	خصوصی مقاصد:
۱۲۲	والدین کے حقوق و فرائض بیان کر سکے
۱۲۳	بسیوں کے حقوق بیان کر سکے
۱۲۴	اسلام میں حقوق و فرائض کی صورت میں اپنے اندر خدمت خلق کا جذبہ پیدا کر سکے
	اسلامی اقدار
	عمومی مقصد: طالب علم جان سکے گا کہ تعلیم کا مقصد حسن اخلاق سے متصف ہونا ہے
	خصوصی مقاصد:
۱۲۵	اخلاق کے معنی و مفہوم کو بیان کر سکے
۱۲۶	اسلام میں حسن اخلاق کی اہمیت بیان کر سکے
۱۲۷	قرآن و سنت کی روشنی میں صبر و استقلال کی اہمیت بیان کر سکے
۱۲۸	اسلام میں غصہ و درگزر کی اہمیت بیان کر سکے
۱۲۹	ایمانے عہد کی اہمیت بیان کر سکے
۱۳۰	انہوت کے معنی و مفہوم کو بیان کر سکے
۱۳۱	انہوت اسلامی کی اہمیت بیان کر سکے
۱۳۲	اسلام کی اعلیٰ قدر کو اپنا کر مثالی معاشرہ پیدا کر سکے

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کل وقت: 20 گھنٹے

GEN III

نصاب (سہل سوئم)
مظاہرہ پاکستان
حصہ دوم

موضوعات

- ☆ قیام پاکستان
- ☆ پونڈری کمیشن
- ☆ ریڈ کلف ایوارڈ
- ☆ تقسیم بنگلہ و نکلت
- ☆ تقسیم پنجاب
- ☆ مسئلہ سماجی بن
- ☆ ریاست کالہانہ
- ☆ ریاست جموں و کشمیر
- ☆ سری پٹی کا تجزیہ
- ☆ قرار دلو مقاصد
- ☆ علماء کے بائیس نکلت
- ☆ 1956-1962 اور 1973 کے سماجی اسلامی واقعات
- ☆ پاکستان کا محل وقوع اور اس کی جغرافیائی اہمیت
- ☆ قدرتی وسائل (نخل-گیس-کونکر)

مطالعہ پاکستان (حصہ دوم)
قیام پاکستان

تدریس مقاصد

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

- ☆ خصوصی مقصد:
- ☆ باؤنڈری کمیشن تشکیل اور اس کے فرائض بیان کر سکے
 - ☆ ریڈ کلف اور اس کے ایوارڈ کے بارے میں بیان کر سکے
 - ☆ بنگل 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
 - ☆ سری پانی کے تنازعہ کو بیان کر سکے
 - ☆ قرار و لو مقاصد کی تفصیلات بیان کر سکے
 - ☆ 22 علماء کے متفقہ اسلامی نکلت بیان کر سکے
 - ☆ قیام پاکستان کے بعد نفاذ اسلام کی کوششوں کو بیان کر سکے
 - ☆ پاکستان کے محل وقوع اور اس کی جغرافیائی اہمیت بیان کر سکے
 - ☆ پاکستان میں قدرتی وسائل (تیل-گیس-کونکرہ) کے بارے میں بیان کر سکے

(غیر مسلم طلباء کے لئے)

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کل وقت: 20

Gen 311

نصاب اخلاقیات	☆
سال سوئم	☆
موضوعات	☆
احساس ذمہ داری	☆
ثبت زبان	☆
عدل و انصاف	☆
قوی خدمت کا جذبہ	☆
ذکر و نظریہ پاکیزگی	☆
الزام آدمیت	☆
شائستگی	☆
خود درگزر	☆
بہاداری	☆
خود انحصاری	☆
اثر و نفوذ	☆
جامعیت	☆
اپنی ذات کی معرفت (بذریعہ ہم عمر طلباء اساتذہ اہم شخصیات اور)	☆

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات

سل سوئم

تدریس مقاصد

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

خصوصی مقاصد: طالب علم اس قابل ہو گا کہ

☆ موضوعات کا مطلب بیان کر سکے

☆ عملی زندگی سے مثالوں کی نشاندہی کر سکے

☆ موضوعات کی اہمیت بیان کر سکے

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

☆ مثبت ذہن کے ساتھ کام کر سکے

☆ عدل و انصاف سے اوارہ میں، دفتر میں بہتر ماحول پیدا کر سکے

☆ ماحول کو اخلاقی طور پر پاکیزہ بنائے

☆ کارکنوں کی بہتر طور پر دل جوئی کر سکے

☆ کارکردگی میں اضافہ کر سکے

☆ باہمی احترام کی برکات سے استفادہ کر سکے

**DAE CIVIL TECHNOLOGY
YEAR 3**

CT-312 PROJECT MANAGEMENT

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

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

COURSE CONTENTS

1	Introduction.	6 Hours
1.1	Objectives and functions of Project Management.	
1.2	Construction stages.	
1.3	Types of civil engineering projects.	
1.4	Classification of works-original, major, minor & petty work, annual repair and special repair works.	
1.5	Parties/Professionals - scope of duties & responsibilities of construction team	
1.6	Project Management Life Cycle	
2.	Organization Aspects	4 Hours
2.1	Forms of organizations-	
2.2	Organizational structure of different engineering departments-duties of various officers/officials, power of sanction of various officers.	
2.3	Classes of Establishment in works department.	
2.4	Essential qualities of project Manager	
3.	Preliminary Planning.	4 Hours
3.1	Preliminary aspects of planning.	
3.2	Pre feasibility study.	
3.3	Types of feasibility study.	
3.4	Steps involved in fusibility study.	
3.5	Collection of data and preparation of project report.	

4. Construction Planning.	12 Hours
4.1 Construction activities.	
4.2 Construction schedule, rate of executing work, time calculations.	
4.3 Material, labour and equipment schedule.	
4.4 Procurement of labour, material and equipment.	
4.5 Planning by bar chart/time and progress chart Gantt Chart	
4.6 Project planning with net work analysis (CPM)-terms used, advantages of CPM.	
4.7 Steps in CPM method-preparation of net work, critical path, determination of network time.	
4.8 Review of network and crash programming	
4.9 Preparation of work progress charts.	
4.10 Site organization of a construction job.	
5. Planning and Management of Construction	6 Hours
5.1 Characteristics, operations and safety of construction machinery	
5.2 Cost of owning and operating construction machinery	
5.3 Main factors in selection of construction machinery	
5.4 Productivity of different construction machinery, e.g. Bulldozer, Excavator, etc	
6. Inspection and Quality Control	6 Hours
6.1 Duties of inspecting officers-Assistant Engineer, Executive Engineer etc	
6.2 Duties of sub-engineer-regarding works, stores and accounts, Handing over and taking over charge. Including duties of Sub Engr. Railways and his responsibilities about record keeping.	
6.3 Site order book-principles of supervision.	
6.4 Quality control-enforcement of specifications, sampling and testing materials.	
7. Entrepreneurship/Self Employability	6 Hour
7.1 How to get registration in PEC	
7.2 Enlistment with Government Department	
7.3 Issuance of bidding documents	
7.4 Pricing of bidding documents'	
7.5 Signing of contract agreement	
7.6 Establishment of guarantees	
7.7 Actual performance	
7.8 Project completion & documentation	
7.9 Defect liability period	

8. Methods of Execution of Works.

4 Hours

- 8.1 Departmental execution of works.
- 8.2 Contract:-
- 8.3 Types of contracts-
- 8.4 Merits and limitations of each contract system.
- 8.5 Work order-difference between work order and contract.

9 Tendering

6 Hours

- 9.1 Pre-requisite for tendering-administrative approval, technical sanction, Budget provision and allocation of funds
- 9.2 Invitation of tenders- by negotiation, selective tenders and public notice.
- 9.3 Prequalification of Bid. Tender notices - Characteristics, instruction on calling tender.
- 9.4 Tender document-components, condition of contract, special condition of tender, guarantees from tender, tender fee, Tender report.
- 9.5 Submission of tenders/bids-instruction to bidders.
- 9.6 Earnest money, security deposit.
- 9.7 Opening of tenders, tender evaluation, scrutiny of tenders, comparative statement, acceptance of tenders, Bid bond, performance bond, and insurance bond.
- 9.8 Award and commencement of work, possession of site.
- 9.9 Mobilization advance, secured advance, retention money.
- 9.10 Conditions of contract agreement-penalty, Liquidated damages, time of completion, Extension of time, termination of contract, Arbitration Delays.
- 9.11 Variation order

10 Work Records and Payment.

6 Hours

- 10.1 Measurement Book (MB), standard measurement book, rules to be followed in recording measurements, preparation of abstract of payment in measurement book, irregularities in M.B.
- 10.2 Muster-roll, preparation, daily labour report, casual labour.
- 10.3 Preparations of bills, running bills, final bills, deductions to be made from bills checking of bills, value engineering, cost accounting (interim payment certificate)
- 10.4 Mode of payment-bills, vouchers, first and final bill, interim payment, final payment, advance payment, secured advance payment, bill forms, Hand receipt, imprest, recoverable payments.
- 10.5 Terms-competent authority, controlling officer, Disbursing officer, Divisional officer, contingencies of work, deposit work, supervision charges, issue rate, market rate, storage rate and charges, suspense account.
- 10.6 Major expenditure heads-major head, minor head, sub head and detailed head.

11 Stores.

4 Hours

- 11.1 Classification of stores - stock, tools and plants, Road metal and materials charged direct to the work.
- 11.2 Stock-sub-heads of stock receipts and issue of stock, stock account, Register of stock receipts and issues, shortages and surpluses of stock, monthly stock account.
- 11.3 Material at site account, Road metal account.
- 11.4 Tools and plants-sub heads of tools and plants, Issues and receipts of T & P, T & P account, verification of tools and plants (Shortage and surplus).
- 11.5 Principles of storing materials, Location of T & P protection of stores, store room record, bin card, ordering procedure of store.
- 11.6 Indenting of materials-instruction for preparation of indents, specifications, and supply procedures in works departments.

RECOMMENDED / REFERENCE BOOKS:

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

INSTRUCTIONAL OBJECTIVES

1. Understand Management, Functioning of Civil Engineering Projects

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

2. Understand Organization and Organizational Structure of Govt Engineering Departments

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

3. Understand Various Aspects of Preliminary Planning

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

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

- 4.1 State the objectives of scheduling
- 4.2 Break down the constructions work in to activities
- 4.3 Explain the procedure of making constructions schedule i.e. sequencing and time computation of each activity

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

5. Understand the Methodologies behind Planning and Management of Construction

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

6. Understand the Principles of Inspection and Quality Control

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

7. Understand Entrepreneurship/Self Employability

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

8. Understand the Methods of Execution of Works

- 8.1 State methods of departmental execution of works i.e. daily Labour, piece work and day work
- 8.2 Define terms contract, tender

- 8.3 Explain the various contracting systems for construction works i.e. Lumpsum contract, item rate contract, cost plus fee contract, cost plus percentage contract, labour contract, Negotiated rate contract, turn-key contract and package contract etc.
- 8.4 List the merits and limitations of each contracting system
- 8.5 Distinguish between work order and contract

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

- 9.1 Define terms budget provision, administrative approval, Technical sanction and Allocation of funds
- 9.2 State the pre-requisites for tendering
- 9.3 State the methods of invitation of tender
- 9.4 Draft a tender notice
- 9.5 Prepare tender documents
- 9.6 Explain the need of earnest money and security deposit
- 9.7 Lists the steps involved in fixing up the agency through tender system
- 9.8 Discuss the instruction to bidders/contractor for filling tenders/bids
- 9.9 Prepare comparative statement and selection of contractor from tenders
- 9.10 Explain the conditions of contract such as penalty, Arbitration, Time of completions and Extension of time

10. Understand the Procedures of Measurements and Payments

- 10.1 State the importance of measurement book
- 10.2 List the rules to be followed in recording measurement
- 10.3 Record measurements in M.B and prepare abstract of payment in M.B
- 10.4 Explain the mode of payment to contractors
- 10.5 State the types of bills to be used
- 10.6 Prepare works bills of payment, surveying bills, final bills
- 10.7 Prepare muster roll. daily labour report etc
- 10.8 Explain terms, Hand receipt, imprest, recoverable payment, competent authority, controlling officer, Disbursing officer, Divisional officer, cogences of work, deposit work, supervision charges, suspense account, market rates, storage rate and charges, major head, minor head, sub head, Detailed head

11. Understand Store Management

- 11.1 Explain need for store in a project
- 11.2 State the classification of stores
- 11.3 State the classification of the items held in general stock
- 11.4 Explain the principles of storing materials and T&P in store
- 11.5 Prepare the register of store issuer and receipt
- 11.6 State the need for materials at site account
- 11.7 Explain the verification procedures of stores

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- 11.8 Explain the procedure of taking delivery from stores
 - 11.9 Explain procedure involved in indenting of materials

**DAE CIVIL TECHNOLOGY
YEAR 3**

CT-323

ADVANCED QUANTITY SURVEYING

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

AIM: To understand :

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

COURSE CONTENTS

- 1 Estimation of Framed Structure Buildings.** 6 Hours
- 1.1 Enlist different works for RCC Framed Structure Building.
 - 1.2 Instructions on calculation of quantities of different items of work.
 - 1.3 Instructions on preparation of quantity of structural steel work, beams and columns of different shape (I, L, H, etc) and truss of 60' span (60x100 shed)
 - 1.4 Instructions on Preparation of Abstract of Cost & Bar Bending Schedule
- 2 Estimation of Bridge and Water Tanks** 4 Hours
- 2.1 Enlist different items of work for RCC Over Head Deck Bridge and single span masonry arch culvert.
 - 2.2 Instructions on calculation of quantities of different items of work.
 - 2.3 Instructions on preparation of Abstract of Cost.
 - 2.4 Enlist different works for RCC Over Head and Under Ground Water (Circular)
 - 2.5 Instructions on calculation of quantities of different items of work.
 - 2.6 Estimation of single span plate girder steel bridge 40' span
- 3 Methods of Execution of Works.** 3 Hours
- 3.1 Departmental execution of works - daily labour, day work and piece work
 - 3.2 Contract:-
 - 3.2.1 Definitions-contract, tender.
 - 3.2.2 Types of contracts-Lumpsum contract, item rate contract, cost plus fee

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

3.2.3 Merits and limitations of each contract system.

3.3 Work order-difference between work order and contract.

4 Building Services Estimation.

4 Hours

4.1 Introduction on calculation of quantities of various items of work for C Class residence

1. Water supply installations
2. Sanitary installation
3. Electrification
4. Telephone and cable
5. Gas installations

5 Well Estimation

4 Hours

5.1 Calculation of quantities of

- ube well boring
- owering of pipes
- urbine installation and accessories
- ump rooms

5.2 Excavation of Persian well

5.3 Construction and sinking of Persian well

6 Application of Softwares

11 Hours

6.1 Instructions regarding use of MS EXCEL software and Eagle Point software in estimation

6.2 Use of Prima Vera software for project planning

RECOMMENDED / REFERENCE BOOKS:

1. Rasul Manual No: 4 on Estimating.
2. Estimating & Costing: M. A. Aziz.
3. Estimating and Costing: B. N. Dutta.
4. Estimating and Costing in Civil Engineering: B.N. Dutta, [2005], UBSPD, New Delhi

INSTRUCTIONAL OBJECTIVES

1 Under Stand Procedure for Estimation of Framed Structure Buildings.

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

3. Understand Building Services Estimation

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

4 Understand Estimation of Wells

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

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

5 Understand Softwares Used for Estimation and Planning

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

LIST OF PRACTICALS

HOURS

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

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

**DAE CIVIL TECHNOLOGY
YEAR 3**

CT-332

ENVIRONMENTAL TECHNOLOGY

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

AIM: To understand the need of environmental technology including pollution & their effects. & remedies

COURSE CONTENTS

- 1. Environmental Pollution** 2 Hour
 - 1.1 Introduction to environmental pollution
 - 1.2 Environment interaction between humans and environment
 - 1.3 The role of environmental scientist, technologist and Engineer
 - 1.4 Ecology and eco system

- 2. Water Pollution** 8 Hours
 - 2.1 Definition
 - Sources of Water Pollution
 - Composition of Sewage
 - Properties of Sewage(physical, chemical, biological)
 - Tests for Sewage (physical, chemical, biological)
 - Biochemistry
 - Sewage treatment and disposal
 - Water standards for different uses

- 3. Air Pollution** 6 Hours
 - 3.1 Definition, sources and emission of air pollutants
 - 3.2 Methods of detection and measurement of air pollution
 - 3.3 Common air pollutants, their sources and pathological effects on man

- 4. Solid waste pollution** 8 Hours
 - 4.1 Definition,
 - 4.2 Sources of solid waste
 - 4.3 Classification of solid wastes
 - 4.4 Disposal of solid wastes(sanitary, landfill, incineration, composting, recycling)

5. Noise Pollution	6 Hours
5.1 Definition	
5.2 Sources of noise Pollution (Noise from traffic, Aircraft noise, Noise from construction and civil engineering works, Noise from industry)	
5.3 Measurements of intensity of sound	
5.4 Effects of noise on peoples' lives	
5.5 Control of noise pollution	
6. Land Pollution	6 Hours
6.1 Definition	
6.2 Main soil pollutants and their influence	
6.3 Control of land pollution	
7. Biogeochemical cycles	8 Hours
7.1 Carbon cycle	
7.2 Nitrogen cycle	
7.3 Sulphur cycle	
7.4 Phosphorus cycle	
7.5 Hydrologic cycle	
8. Ventilation of Sewerage System	4 Hours
8.1 Definition	
8.2 Reasons of ventilation	
8.3 Methods of ventilation	
8.4 Vents ad venting (single and double pipe system)	
9. Industrial waste pollution	12 Hours
9.1 Paper and card Industry	
– Main pollutants, their sources & Effects	
– Remedial measures	
9.2 Fertilizer industry	
– Main pollutants, their sources & Effects	
– Remedial measures	
9.3 Dairy industry	
– Main pollutants, their sources & Effects	
– Remedial measures	

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

10. Environment Impact Assessment

4 Hours

- 10.1 Definition
- 10.2 Environmental Impact of Projects
- 10.3 Ways and means to reduce adverse impacts
- 10.4 Methods to shape projects to suit local environment

INSTRUCTIONAL OBJECTIVES

1. Understand the meaning of Environment Pollution

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

2. Understand the sources, properties and Sewage treatment

- 2.1 State Sources, composition of sewage
- 2.2 Explain Properties of sewage
- 2.3 Explain Tests of sewage
- 2.4 Explain sewage treatment and water standards

3. Understand the Concept of air Pollution

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

4. Understand the concept of solid waste Pollution

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

5. Understand the concept of noise pollution

- 5.1 Define noise pollution

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

6. Understand the concept of land pollution

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

7. Understand the concept of biogeochemical cycles

- 7.1 Explain carbon cycle
- 7.2 Explain Nitrogen cycle
- 7.3 Explain Sulphur cycle
- 7.4 Explain Phosphorous Cycle
- 7.5 Explain hydrologic cycle

8. Understand the Concept of ventilation

- 8.1 Define Ventilation
- 8.2 State reasons of ventilation
- 8.3 Explain methods of ventilation
- 8.4 State vents and venting

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

- 9.1 State pollutants
- 9.2 State Sources of pollutants
- 9.3 Explain effects of pollutants
- 9.4 Explain remedial measures

10. Understand the concept of Environment Impact Assessment

- 10.5 Definition
- 10.6 State the Environmental Impact of Projects
- 10.7 Describe the ways and means to reduce adverse impacts
- 10.8 Explain the methods to be adopted to shape projects to suit local environment

**DAE CIVIL TECHNOLOGY
YEAR 3**

CT-344

HYDRAULICS AND IRRIGATION

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

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

COURSE CONTENTS

- | | |
|--|---------|
| 1. Introduction | 3 Hours |
| 1.1 Introduction to the Hydraulics | |
| 1.2 Physical properties of fluids; density, specific weight, specific volume, specific gravity, surface tension, viscosity and capillary action. | |
| 2. Fluid Pressure and its Measurement. | 3 Hours |
| 2.1 Pressure, intensity of pressure, pressure head and Pascal's law. | |
| 2.2 Atmospheric pressure, Gauge pressure, Absolute pressure | |
| 2.3 Measurement of fluid pressure through Piezometer tube and simple Manometer. | |
| 3. Hydrostatics. | 6 Hours |
| 3.1 Introduction | |
| 3.2 Pressure on immersed surface. | |
| 3.3 Total pressure on a horizontal and vertical immersed surface. | |
| 3.4 Center of pressure, resultant pressure and center of pressure of immersed surface. | |
| 4. Floating Bodies Equilibrium. | 3 Hours |
| 4.1 Buoyancy & floatation, buoyant force, center of buoyancy | |
| 4.2 Metacentre, metacentric height | |
| 4.3 Kinds of equilibrium of a floating body | |

5. Hydro kinematic.	3 Hours
5.1 Introduction	
5.2 Discharge-equation of continuity of a liquid flow	
5.3 Types of flow lines-path lines and stream lines	
6. Hydrodynamics.	6 Hours
6.1 Introduction	
6.2 Kinds of energy of flowing liquid	
6.3 Total head of flowing liquid	
6.4 Bernoulli's theorem definition, formula.	
6.5 Practical application of Bernoulli's equation.	
7. Flow through Pipes.	3 Hours
7.1 Introduction	
7.2 Types of flow in a pipe	
7.3 Loss of head in pipes & Darcy's formula	
7.4 Chezy's formula for loss of head in pipe	
7.5 Hydraulic gradient and total energy lines	
8. Flow through Orifices.	3 Hours
8.1 Introduction	
8.2 Types of orifices	
8.3 Jet of water, vena contract	
8.4 Co-efficient of discharged	
8.5 Discharge through a large rectangular orifice	
8.6 Mouth pieces	
9. Flow over Notches.	3 Hours
9.1 Introduction	
9.2 Types of notches	
9.3 Discharge formula for notches	
9.4 Numerical problems	
10. Flow over Weir.	3 Hours
10.1 Introduction	
10.2 Types of weirs	
10.3 Velocity of approach discharge formula for weirs	
10.4 Velocity of approach	
10.5 Numerical problems	

11. Flow through Open Channel.	6 Hours
11.1 Introduction	
11.2 Chezy's formula for discharge through open channel	
11.3 Manning's formula for discharge through open channel	
11.4 Bazin's formula for discharge through open channel	
11.5 Kennedy's Critical velocity & Lacy's regime velocity	
11.6 Most economical section of channel, conditions for maximum discharge through channel	
11.7 Discharge through rectangular & trapezoidal channel sections	
11.8 Numerical problems	
12. Introduction of Irrigation.	3 Hours
12.1 Historical Background of Irrigation	
12.2 Definition, necessity and scope of Irrigation	
12.3 Benefits of Irrigation and ill effects of Irrigation	
12.4 Types of Irrigation	
12.5 Sources of irrigation water	
13. Irrigation System in Pakistan	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 Definitions of Some Common Important Terms	
14.4 Factors Affecting Duty and Methods of Improving Duty	
14.5 Relation between Duty (D), Base (B) and Delta	
15. Methods of Water Distribution to Crop Fields	2 Hours
15.1 Basic Methods of Distribution	
15.2 Sprinkler Irrigation Method	
15.3 Sub-surface Irrigation (Drip or Trickle Irrigation)	

16. Storage Irrigation.	1 Hours
16.1 Necessity.	
16.2 Various terms used.	
16.3 Assessment of maximum runs off from a catchment area.	
17. Reservoirs	6 Hours
17.1 Definition	
17.2 Purposes of Reservoir: classification	
17.3 Site Selection of Reservoir	
17.4 Classification of Dams	
17.5 Choice of Kinds of Dam for Hydro project	
17.6 Construction details of earthen dams.	
17.7 Causes of failure of Earthdams and their remedies.	
17.8 Seepage Control in Earth Dam	
18. Weirs & Barrages.	3 Hours
18.1 Introduction to weir	
18.2 Purpose of weir/barrage	
18.3 Types of weirs	
18.4 Site selection	
18.5 Component parts	
18.6 Surface flow at weirs	
19. Regulating and Silt Controlling Works.	3 Hours
19.1 Brief Description.	
19.2 Head regulator	
19.3 Types of head regulators	
19.4 Types of silt controlling works	
20. Canals	6 Hours
20.1 Irrigation Canals and their types	
20.2 Components of canal Section	
20.3 Classifications of Canal	
20.4 Alignment of Canal	
20.5 Necessity of Lining	
20.6 Types of Lining	
20.7 Selection of Type of Lining	
20.8 Merits & Demerits of Lined and unlined channel	
20.9 Kemmedy's critical velocity and Lacy's Regime velocity	

20.10 Design of canals

21. Canal Falls.	3 Hours
21.1 Introduction, Definition & basic requirements.	
21.2 Types of Canal Fall	
21.3 Site selection for canal falls	
22. Cross Drainage Works.	3 Hours
22.1 Introduction	
22.2 Types; aqueduct, siphon, and drainage inlet.	
22.3 Super passage, siphon super passage, level crossing.	
22.4 Drainage out let, tail escape	
23. Maintenance of Canals.	3 Hours
23.1 Up-keep and maintenance.	
23.2 Breaches in canals-courses, preventive measures and methods of closing.	
23.3 Silting tanks, their classes, objects and working.	
23.4 Repair to berms, formation of new berms.	
24. Distribution Works.	6 Hours
24.1 Introduction of outlets	
24.2 Essential requirements of an outlet.	
24.3 Characteristics of outlet.	
24.4 Types of outlet-modular, semi modular and non-modular outlet.	
24.5 Design of outlet-modular, semi-modular and non-modular	
25. Water Logging & Salinity.	2 Hours
25.1 Water logging, definition	
25.2 Causes and prevention	
25.3 Salinity, definition	
25.4 Causes & prevention	
25.5 Methods of reclamation of soil	
26. River Training Works.	2 Hours
26.1 Spurs and their types.	
26.2 Groynes	
26.3 Guide Banks	

RECOMMENDED / REFERENCE BOOKS:

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

INSTRUCTIONAL OBJECTIVES

1. **Know the Scope, Significance and Basic Definitions of Hydraulics.**
 - 1.1 State development, scope and significance of Hydraulics in civil engineering.
 - 1.2 Define density, specific weight, specific volume, specific gravity, surface tension, viscosity and compressibility.
2. **Understand Fluid Pressure and its Measurement.**
 - 2.1 State pressure, intensity of pressure, pressure head, Pascal's law and its simple applications.
 - 2.2 Distinguish among atmospheric pressure, gauge pressure and absolute pressure.
 - 2.3 Describe measurement of fluid pressure by Piezometer tube and simple manometer.

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

- 3.1 Define Hydrostatics
- 3.2 State pressure on immersed surface.
- 3.3 Define center of pressure and resultant pressure.
- 3.4 Calculate the total pressure and center of pressure on a horizontal and vertical surface immersed in a liquid (i.e. water)

4. Know the Equilibrium of Floating Bodies.

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

5. Understand the Different Types of Flow of Liquids.

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

6. Understand the General Principles of Flow of Liquids.

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

7. Understand the Flow Through Pipes.

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

8. Understand the Function and Flow Through Orifices.

- 8.1 Define orifice
- 8.2 State types of orifices
- 8.3 State the terms; jet of water, vena contracta, co-efficient of discharge and velocity of approach.
- 8.4 Derive formulae for discharge through orifices
- 8.5 Differentiate between orifice and mouth piece.

9. Use Discharge Formula for Solving Problems on Notches.

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

10. Understand the Flow Over Weirs.

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

11. Understand the Principles of Flow Through Open Channel.

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

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

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

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

- 13.1 Describe with map the irrigation net work in Pakistan.
- 13.2 State the characteristics of Pakistan's rivers.
- 13.3 State the important barrages of Pakistan.
- 13.4 State Indus Basin Project
- 13.5 Explain need and details of replacement works in Indus Basin Project
- 13.6 Know IRSA and PIDA

14. Understand Water Requirement of Crops.

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

15. Understand Water Distribution to Crop Field

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

16. Understand the Basic Idea of Storage Irrigation.

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

17. Understand Reservoirs

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

18. Understand Features and Function of Weir/Barrages.

- 18.1 Define weir and barrages.
- 18.2 Distinguish between barrages and weirs and explain their purposes.

- 18.3 Describe with sketches the components/parts of a barrage.
- 18.4 State the factors governing the site selection of a barrage.
- 18.5 State the types of weirs.
- 18.6 Explain surface flow at weirs.

19. Understand the Regulating and Silt Controlling Works.

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

20. Understand the Basic Ideas About Canals.

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

21. Understand the Basic Idea of Canal Falls.

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

22. Understand the Basic Idea Cross Drainage Works.

- 22.1 Describe with sketches the different types of cross drainage works.
- 22.2 Describe with sketches, super passage, syphon supper passage and level crossing.
- 22.3 Describe drainage outlet and tail escape.

23. Understand the Principles of Maintenance of Canals.

- 23.1 Describe up keep and maintenance of canals.
- 23.2 Explain breaches in canal, water courses, preventive measure and methods of closing.
- 23.3 Describe with sketch the silting tanks their classes, objects and working.

23.4 Explain repair to bunds and formation of new bunds.

24. Understand the Basic Idea of Distribution Works.

24.1 Define outlet.

24.2 State essential requirements of an outlet.

24.3 Explain the characteristics of outlets.

24.4 Describe with sketches the types of outlets (modular, semi modular and non modular).

24.5 Design of outlet, modular, semi-modular and non-modular

25. Understand the Types of River Training Works.

25.1 List the objects of river training.

25.2 Explain with sketches different types of protective and river training works.

LIST OF PRACTICALS

HOURS

1.	Find the properties of fluids through hydrostatic bench:	
	a. Study of pressure gauges	2
	b. Numerical problems on Hydrostatics	3
	c. Numerical problems based on Hydrostatic pressure and center of pressure of vertically immersed surface	3
	d. Numerical problems on floating bodies equilibrium	3
	e. Numerical problems relating to metacentric height of a floating body	2
2.	Numerical problems on Hydro kinematics	4
3.	Numerical problems on Hydrodynamics	4
4.	Numerical problem pertaining to of venturimeter	3
5.	Numerical problems on flow through pipes	5
6.	To find the co-efficient of discharge through a rectangular notch.	3
7.	Numerical problems on uniform flow in open channels	4
8.	Draw a skeleton map of Pakistan showing rivers, main and link canal, Head works and barrages	2
9.	Draw a plan showing general lay out of river training and protection works.	3
10.	Draw typical cross-sections of a weir floors	3
11.	Draw a plan showing the general layout of head works of a perennial canal	3
12.	Draw the alignment of a canal, distributor minors and water courses on contour map	3
13.	Numerical problems on duty, delta and discharge	4
14.	Draw the typical X-sections of channels	3
15.	Numerical problems on velocity (Kennedy critical velocity & Lacey's regime velocity)	5
16.	Draw the plan and section of a silt ejector	4
17.	Draw the plane and L-section of a masonry flume	3
18.	Drawings of an Aqueduct crossing	

19.	Drawings of a pipe outlet	4
20.	Drawings of an A.P.M	3
21.	Sketches of various canal falls	3
22.	Practical on discharge measurement	2
23.	Draw the plan of a multipurpose irrigation project	5
24.	Practice for Lining in the campus for irrigation channels	5

**DAE CIVIL TECHNOLOGY
YEAR 3**

CT-353

TRANSPORTATION ENGINEERING

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

AIM: To understand the fundamentals of various forms of transportation engineering involving highways, airports, runways, railways, alignment and maintenance of tracks, docks and harbors

COURSE CONTENTS

1. **Highway Development and Planning.** 2 Hours
 - 1.1. Introduction importance of transportation and modes of transportation.
 - 1.2. Early road historical development of roads with special references to Pakistan.
 - 1.3. Description of terms Road highway, carriage way dual carriageway etc.

2. **Road Alignment** 4 Hours
 - 2.1. Introduction
 - 2.2. Fundamental principles.
 - 2.3. Factors controlling selection of road alignment.
 - 2.4. Special consideration for hilly road, grades and camber.

3. **Highway Geometric Design**
 - 3.1. Kerb, shoulder, footpath, driveway, right of way, bay of road.
 - 3.2. Sight distance
 - 3.3. Necessity of super elevation.
 - 3.4. Derivation of formula for super elevation.
 - 3.5. Method of introducing super elevation.
 - 3.6. Widening at curves and formula.
 - 3.7. Highway cross section.

4. **Structures.** 2 Hours
 - 4.1. Types of roads.
 - 4.2. Components of roads.
 - 4.3. Types of surfacing earth, gravel,

- 4.4. Economic consideration for selection of road surfaces.
- 4.5. Road materials-stone aggregates, bituminous materials, cement and concrete.
- 4.6. Retaining walls.

- 5. **Road Construction.** 4 Hours
 - 5.1. Detailed construction of water bound macadam, road.
 - 5.2. Dust nuisance and its prevention.
 - 5.3. Detailed construction of bituminous roads.
 - 5.4. Construction details of surfacing cold and hot process bituminous macadam, premix asphalt macadam bituminous concrete pavement, sheet asphalt pavement.
 - 5.5. Standard highway construction items of works

- 6. **Concrete Road.** 2 Hours
 - 6.1. Kinds premix conc, roads, cement bound macadam.
 - 6.2. Detailed construction of concrete roads.
 - 6.3. Comparison between rigid and flexible pavements.

- 7. **Road Drainage.** 2 Hours
 - 7.1. Introduction
 - 7.2. Importance of highway drainage.
 - 7.3. Surface drainage/causeway.
 - 7.4. Sub-surface drainage.
 - 7.5. Drainage of slopes and erosion control.
 - 7.6. Catch water drain in hilly area.

- 8. **Traffic Engineering.** 4 Hours
 - 8.1. Road accidents and their causes.
 - 8.2. Method of prevention of accidents.
 - 8.3. Road junction.
 - 8.4. Design consideration for provision of junctions.
 - 8.5. Traffic island, refuge island, pedestrian crossing

- 9. **Road Signs & Safety.** 2 Hours
 - 9.1. Types of road signs
 - 9.2. Characteristics of signs.
 - 9.3. Road signals, types and purposes.

- 10. **Road Maintenance.** 2 Hours
 - 10.1. Resurfacing.

- 10.2. Causes of defects of concrete roads and repair of concrete roads
11. **Construction Equipment** 4 Hours
- 11.1. Rollers, bulldozers and garder
- 11.2. Types of rollers and bulldozer
- 11.3. Tar boiler, premix plant, Asphalt paver, tractor, trolleys, batching plant, excavator, dragline, trencher, shovel, etc.
12. **Air Ports and Runways** 4 Hours
- 12.1. Important terms
- 12.2. Consideration of airport selection.
- 12.3. Classification of air ports.
- 12.4. Factors affecting site selection of an airport.
- 12.5. Runway pavement and its types
- 12.6. Patterns of runway
- 12.7. Drainage systems of an airport
- 12.8. Repair of runway.
13. **Role of Railways in Development of a Country.** 2 Hours
- 13.1. Introduction
- 13.2. Railway system in Pakistan
- 13.3. Comparison between Rail & Road transport
14. **Permanent Way.** 9 Hours
- 14.1. Definition
- 14.2. Requirements of permanent way
- 14.3. Components of permanent way, their functions and types
- 14.4. Gauge, its types
- 14.5. Factors governing adoption of a particular gauge
- 14.6. Rails-types Rail joints (including fastening-fish plates, bolts, spikes, chair and bearing plates)
- 14.7. Railway carriage wheel, conning of wheels
- 14.8. Requirement of good rail joint and ballast.
15. **Creep.** 4 Hours
- 15.1. Definition
- 15.2. Cause of creep
- 15.3. Magnitude of creep
- 15.4. Results of creep
- 15.5. Methods of correction of creep

16. **Points & Crossing.** 6 Hours
- 16.1. Purpose
 - 16.2. Sleepers for point & crossing (through & inter laced sleepers)
 - 16.3. Switches-shapes, length of stock & tongue rails, heal clearance, switch angle, through switches
 - 16.4. Types of crossing
 - 16.5. Theoretical & actual nose of crossing
 - 16.6. Crossing angle & number
 - 16.7. Station yards and their layout.
17. **Signals.** 4 Hours
- 17.1. Purpose & types
 - 17.2. Classification of signals according to function & location
 - 17.3. Signaling-objects
 - 17.4. Inter locking, principles & requirements
 - 17.5. Methods of inter-locking
18. **Tunnels.** 3 Hours
- 18.1. Necessity of tunnels
 - 18.2. Importance of tunnel engineering
 - 18.3. Alignment of tunnels and their construction
19. **Docks Harbors.** 6 Hours
- 19.1. Definition of harbors
 - 19.2. Classification of harbors
 - 19.3. Requirement of a commercial harbor its location & size
 - 19.4. Tidal waves break water & their classification
 - 19.5. Wharves, quay walls & jetties, piers
 - 19.6. Classification of docks.
 - 19.7. Beach erosion & protection
 - 19.8. Locks & lock gates
20. **Dredging.** 4 Hours
- 20.1. Definition
 - 20.2. Necessity of dredging
 - 20.3. Types of dredging devices
 - 20.4. Methods of dredging
 - 20.5. Disposal of dredged material

21. **Navigational Aids.**

2 Hours

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

RECOMMENDED / REFERENCE BOOKS:

1. Road, Railways, Bridges and tunnel: **Deshpande and Antia.**
2. Railway Engineering: **Deshpande.**
3. Principles of Railway Engineering: **S.C. Rangwala.**
4. Docks and Harbors : **A.T. Khan**
5. Railways, Dock and Harbors (Urdu) : **A.B. Mallick**
6. Railway Bridges and Tunnels: **Vazarni.**
7. Operational Safety of Rail Transport in Pakistan: **Abdul Kadoos.**
8. Railway Tracks: **Antia.**
9. Railway Track Engineering : **Agor**
10. Highway Engineering: **Gurcharan Singh**, [2001], Standard Publishers, Delhi
11. Highways: **C.A. O'Flaherty**,[2001], Butterworth Heinmann, Oxford
12. Highway Engineering: **Paul H. Wright and Karen Dixon**,[2004], John Wiley & Sons
13. Port Engineering: **Gregory P. Tsinker**,[2004], John Wiley and Sons
14. Road Engineering: **Piryani.**
15. Highway Engineering: **Gurcharn Singh.**
16. Development of Road and Road Transport in Pakistan : **Khalifa Afzal Hussain**
17. Highway Engineering and Airports: **K.L.Bhanot and S.B.Sehgal.**

INSTRUCTIONAL OBJECTIVES

1. Understand Highway Development Planning.

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

2. Understand Highway Surveys Required for Roads.

- 2.1 Define the term road alignment.
- 2.2 State the fundamental principles of road alignment.
- 2.3 State the factors influencing selection of alignment for a road in plain and hilly area.

2.4 Explain the surveys required for fixing alignment.

3. Understand Road Geometrics (Super Elevation).

3.1 Define the terms Kerb, Shoulder, Footpath, Drive way, Right of way, Bay of roads.

3.2 Explain sight distance, stopping and over taking sight distance.

3.3 Define super elevation and state its necessity

3.4 Describe method of introduction super elevation.

3.5 Explain methods of introducing super elevation.

3.6 Derive formula for super-elevation.

3.7 Explain widening at curves.

4. Understand the Component Part of Road Structure.

4.1 Describe the types of roads with sketches.

4.2 Explain the component of road i.e. sub-grade, sub-base, base and wearing course.

4.3 State the types of surfacing earth surface, general surface, water bound, bituminous and concrete roads.

4.4 State the economic consideration for selection of road surfaces.

4.5 Describe the road materials, stone aggregate, bituminous materials, cement and cement concrete.

4.6 Describe the necessity and function of retaining walls, with sketches.

5. Understand the Construction Process of Flexible Pavements.

5.1 Explain the construction procedure of water bound macadam road.

5.2 Explain the dust nuisance and its prevention.

5.3 Explain the construction procedure of concrete roads.

5.4 Explain the construction detail of surfacing cold and hot process bituminous macadam, premix asphalt macadam, bituminous concrete pavements and sheet asphalt pavement.

6. Understand the Construction of Concrete Roads

6.1 Explain the construction procedure of water bound macadam road

6.2 Explain the construction of concrete roads.

6.3 Compare rigid and flexible pavements.

7. Understand the Drainage of Roads

7.1 Introduction of highway drainage

7.2 State the necessity and importance of highway drainage.

7.3 Describe with sketch surface drainage.

- 7.4 Describe with sketch sub-surface drainage.
- 7.5 State drainage of slopes and erosion control.
- 7.6 State catch water drain in hilly area.

- 8. Understand the Causes and Prevention of Accidents, Road Junctions, Traffic Islands and Pedestrian Crossings.**

- 8.1 State accidents and their causes.
- 8.2 State method of prevention of accidents.
- 8.3 Describe with sketches road junction.
- 8.4 State design consideration for provision of junctions.
- 8.5 Describe with sketches traffic island refuge Island and pedestrian crossing.

- 9. Understand the Purpose of Road Signs and Signals.**

- 9.1 Describe with sketches different types of road sign.
- 9.2 Explain the characteristics of road sign.
- 9.3 Describe the purpose of road signals and their types.

- 10. Understand the Maintenance of Roads**

- 10.1 Explain resurfacing.
- 10.2 Describe the causes and repair of concrete roadside pot holes, corrugations and ruts.
- 10.3 Describe the causes of defects of concrete road and its repair.

- 11. Understand the Function of Different Types of Machinery used in Road Construction.**

- 11.1 Explain the working and uses of rollers, bulldozer, and grader.
- 11.2 Explain types of rollers and bulldozers
- 11.3 Explain the working and uses of tar-boiler, premix plant, asphalt paver, tractor, trolleys, batching plant, excavator, dragline, trencher, shovel, etc.

- 12. Understand the Layout and Components of an Airport and Runway.**

- 12.1 Explain the terms, landing strip, approach zone, run way length, taxiway, apron, etc.
- 12.2 Consideration of selection of airport
- 12.3 State the classification of an airport.
- 12.4 Sketch the general layout of various types of airport.
- 12.5 Explain the factors affecting for site selection of an air port.
- 12.6 Describe the run way pavements and its types.
- 12.7 Sketch different patterns of run way.
- 12.8 Explain the drainage systems of an air port.
- 12.9 Describe the routine and special repairs of run way.

13. Understand the Importance of Railway.

- 13.1 State the advantages of railway.
- 13.2 State salient features of railway system in Pakistan.
- 13.3 Compare rail and road transport.

14. Understand the Functions of the Permanent Way.

- 14.1 Define permanent way.
- 14.2 State the requirements of permanent way.
- 14.3 Explain the components of permanent way, their functions and types (formation, ballast and sleepers).
- 14.4 Explain gauge and its types
- 14.5 Explain factors governing adoption of a particular gauge
- 14.6 Explain the different types of rails, rail joints, rail fittings
- 14.7 Explain carriage wheel and conning of wheels.
- 14.8 State the requirement of good rail joint and ballast.

15. Understand Creep and its Correction.

- 15.1 Definition of creep.
- 15.2 Explain the causes of creep.
- 15.3 Explain with sketch magnitude of creep.
- 15.4 State the results of creep.
- 15.5 State the methods of correction of creep.

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

- 16.1 State the purpose of points and crossing.
- 16.2 Describe with sketches the sleepers for point and crossing (through and interlaced sleepers).
- 16.3 Explain the terms switches, shapes, length of stock and tongue rails, heel clearance, switch angle, through switches.
- 16.4 State the types of crossing.
- 16.5 Explain theoretical and actual nose of crossing.
- 16.6 Explain the terms crossing angle and number.
- 16.7 Explain station yards and sketch their layout.

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

- 17.1 State the purpose and types of signals.
- 17.2 State the classification of signals according to function and location.
- 17.3 Explain signaling and its objects.
- 17.4 Describe with sketches the inter locking its principles and requirements.

17.5 Explain the methods of inter locking.

18. Understand Alignment and Construction of Tunnels.

18.1 State necessity of tunnels

18.2 State importance of tunnel engineering

18.3 Demonstrate alignment of tunnels and their construction

19. Understand the Idea behind Docks and Harbors.

19.1 Define harbors.

19.2 State the classification of harbors.

19.3 Explain the requirement of a commercial harbor, its location and size.

19.4 Explain the terms tidal waves, break water and their classification.

19.5 Explain terms: Wharves, quay walls, jetties, piers, and moorings.

19.6 State the classification of docks.

19.7 Explain beach erosion and its protection

19.8 State the terms locks and lock gates.

20. Understand the Purpose of Dredging.

20.1 Define dredging

20.2 State the necessity of dredging.

20.3 Explain the types of dredging devices.

20.4 Explain methods of dredging.

20.5 Explain disposal of dredging material.

21. Understand Fundamentals of Navigation Aids.

21.1 Describe navigation aids.

21.2 Explain types of signals, light house, beacons, light ship and buoys.

LIST OF PRACTICALS		HOURS
1	Ductility test for bitumen	2
2	Softening point test for bitumen (ring and ball apparatus)	2
3	Marshal stability test for bituminous mixture	2
4	Viscosity determination for cutback or emulsion	2
5	Flash and fire test for bitumen / cutback	2
6	Quantitative extraction of bitumen from bituminous paving	2
7	Penetration (consistency) of bituminous material	2
8	Los Angeles Abrasion test	2
9	Visit to a nearby railway station and tracks, observation of parts drawing plan & cross section of permanent way	5

10	Drawing of the connection of rails to sleepers	2
11	Drawing of broad gauge track in cutting & filling	3
12	Drawing of various types of rails and chairs.	2
13	Sketching various fastening	2
14	Sketching railway carriage wheel.	2
15	Sketching points and crossing and staging yards.	3
16	Sketching various types of signals. (common, semaphore, light disc and dwarf signals)	3
17	Sketching of various tools used in rail track maintenance.	2
18	Visit to a nearby harbor (if convenient) or sketching general layout of harbor.	5
19	Drawing sections of breakwater.	3
20	Drawing layout of typical harbor and outline the important structures.	3
21	Sketching jetties and pier, lock gates, quay, draggers	3
22	Sketching a typical light house, floating signal (beacon, buoys, mooring buoys.)	4
19	Drawing skeleton plan/map of Pakistan showing major roads.	2
20	Demarcation of road alignment on a given contour map.	4
21	Drawing typical cross-section of National and Provincial Highway.	3
22	Measurement of Stone metal at site and marking main quarries on Pakistan map.	2
23	Drawing typical cross-section of hill roads.	3
24	Sketching various road junctions, traffic and refuge islands.	3
25	Sketching various types of traffic signs.	2
26	Sketching of subsurface drainage.	3
27	Visit to a road project under construction.	5
28	Preparation of general layout plan of an air port showing typical cross-section of run way.	5
29	Sketches of various air port patterns.	2

**DAE CIVIL TECHNOLOGY
YEAR 3**

CT-364 CONCRETE TECHNOLOGY & RCC DESIGN

TOTAL CONTACT HOURS:	192	T	P	C
Theory:	64	2	3	3
Practical:	96			

AIM: To establish an understanding of the behavior of structural concrete and develop and understanding of the methods used in design practice

COURSE CONTENTS

1 Tests of Cement and Concrete 3 Hours

- 1.1 Tests of cement
- 1.2 Tests of concrete
- 1.3 Non destructive tests of concrete
- 1.4 Mix Design methods

2 Properties of Concrete 3 Hours

- 2.1 Properties of fresh concrete
- 2.2 Factors affecting workability of concrete
- 2.3 Measurement of workability
- 2.4 Recommended slump values
- 2.5 Properties of hardened concrete
- 2.6 Factors affective properties of hardened concrete

3 Concreting Under Special Conditions. 3 Hours

- 3.1 Effects of temperature on concrete.
- 3.2 Recommended precautions and practice for hot weather concreting.
- 3.3 Recommended precautions and practice for cold weather concreting.
- 3.4 Under water concreting-method, precautions.

4 Pre-stressed Concrete. 2 Hours

- 4.1 Introduction of pre-stressing and methods of tensioning
- 4.2 System of pre-stressing
- 4.3 Steel and concrete used in pre-stressing
- 4.4 Advantages of pre-stressed concrete over R.C.C.

- 5 Reinforcement for R.C.C.** 2 Hours
- 5.1 Types and their properties.
 - 5.2 Storing, cleaning, bending, fixing, placing, binding and reinforcement.
- 6 R.C.C Design.** 6 Hours
- 6.1 Introduction to R.C.C. Design.
 - 6.2 Different types of Loads
 - 6.3 Advantages and disadvantages of R.C.C.
 - 6.4 Grades of concrete, characteristics, compressive strength, tensile strength, modulus of elasticities, modular ratio.
 - 6.5 Working and ultimate stresses of concrete and steel
 - 6.6 Bending moment and shear force in beams bending moment and shear force coefficient.
 - 6.7 Loads to be adopted in R.C.C design-live loads, dead loads, wind load, seismic loads.
 - 6.8 Methods of design-service load method (working stress method), strength method (limit-state design)
 - 6.9 Codes of practice for R.C.C design
- 7 Shear and Bond Stresses in Beam.** 6 Hours
- 7.1 Shear stresses in beam-horizontal shear, diagonal tension and compression
 - 7.2 Types of shear reinforcements-stirrups, inclined bars
 - 7.3 Design for horizontal shear diagonal tension, bent up bars, spacing of stirrups
 - 7.4 Design problems
 - 7.5 Bond between concrete and reinforcement bond stresses, development length, checking bond stresses in beam
- 8 Design of Rectangular Beam.** 4 Hours
- 8.1 Method of design (working stress method), assumptions used in working stress design
 - 8.2 Derivation of flexure formula for R.C.C beam
 - 8.3 Determination of design-constants for different values stresses and modular ratio
 - 8.4 Balanced, under reinforced and over reinforced sections
 - 8.5 Design of simple R.C.C beam code provisions, steps in design of R.C.C simple beam-design of simple supported, cantilever, over hanging beam under different situations.
 - 8.6 Design of R.C.C lintel
 - 8.7 Problems solving related to beam of lintel.

9 Design of one Way Slab/Slab Spanning in One Direction)	6 Hours
9.1 Definition, one way slab, two way slab	
9.2 Design steps and formulae	
9.3 Design of simply supported, overhanging one way slab in various situation	
10 Design of Doubly Reinforced Beam.	6 hours
10.1 Definition, necessity and use, limitation	
10.2 Methods of design, elastic theory, load factor	
10.3 Elements and assumption related to design, method design steps.	
10.4 Design of simply supported doubly reinforced beam.	
10.5 Numerical problems.	
11 Design of Two Way Slab.	4 Hours
11.1 Definition, code provisions and assumption related to design.	
11.2 Loads, bending moment coefficients and its use, torsion steel	
11.3 Design of isolated and two spans two way slab.	
12 Design of Tee and Ell Beam.	6 Hours
12.1 Definition, necessity, advantages, main and secondary beam	
12.2 Design simply reinforced Tee and Ell beam.	
13 Design of Axially Loaded Columns and Footings.	7 Hours
13.1 Columns	
13.2 Design formulae and code provisions	
13.3 Design depth of footing and reinforcement details	
13.4 Design of isolated column footing	
14 Design of Simple Stair Case.	3 Hours
14.1 Types, spanning horizontally and spanning longitudinally.	
14.2 Loads, design elements procedure	
14.3 Design of stair spanning horizontal and longitudinally.	

RECOMMENDED / REFERENCE BOOKS:

- 1 Concrete Technology : **Hando**
- 2 Properties of Concrete : **Nevile**
- 3 Concrete technology : **Ilyas Mughal**
- 4 Elementary Reinforced concrete design : **W. Morgan**

- 5 R.C.C Design : **J.L Sharma**
- 6 R.C.C Design : **C.K Wang**
- 7 R. C. C. design : **Nelson**
- 8 Concrete Technology: **A,M. Neville and J.J. Brooks**, [2006], Dorling Kindersley India, Delhi
- 9 Design of Reinforced Concrete Structures: **N.Krishna Raju**, [2003], Satish Kumar Jain
- 10 Design of Concrete Structures: **Arthur H. Nilson, David Darwin and Charles W. Nolan**, [2006], John Wiley and Sons
- 11 Design of Reinforced Concrete Structures PWS Engineering: **Hasson M. N.**

INSTRUCTIONAL OBJECTIVES

1. Understand the properties of Cement and Concrete

- 1.1 Explain the various tests of cement (i.e. initial and final setting time tests, soundness test, compression strength test and tensile strength test and tensile strength test, etc.
- 1.2 Explain compression strength test, tensile strength test, shear strength test and bond strength test of concrete.
- 1.3 Explain different non-destructing tests of concrete (smith hammer, PUNDIT test, etc.
- 1.4 Explain different methods of mix design i.e. (ordinary, minimum void w/c maximum density rate to method fineness methods)

2. Understand the factor influencing concrete properties

- 2.1 State properties of fresh concrete: segregation, blending, workability, etc.
- 2.2 State different factors affecting the workability of concrete
- 2.3 Describe the different tests for the measurement of workability, i.e. slump test, compacting factor test, vee-bee test, etc.
- 2.4 State the different recommended values of slumps for various conditions of placements
- 2.5 State the different properties of hardened concrete. i.e. strength impermeability, durability, elasticity, shrinkage, creep, thermal expansion, etc.
- 2.6 Describe the various factors affecting the properties of hardened concrete.

3 Understand Standard Practices for Concreting Under Special Conditions

- 3.1 Explain the effects of temperature on concrete
- 3.2 Explain standard practices and precautions for hot and cold weather concreting
- 3.3 Explain methods of concreting under water

4 Know About Principles of Pre-stressed Concrete

- 4.1 Understand principles of pre-stressing and methods of tensioning, i.e. post and pre tensioning.
- 4.2 State the systems of pre-stressing such as Freyssinet, Magnel Blaton, and Lee Mecall systems
- 4.3 State the requirements of concrete and steel for pre-stressing
- 4.4 Explain the advantages of pre-stressed concrete over conventional R.C.C

5 Understand Methods and Procedures of Laying Reinforcement

- 5.1 State the types of steel and their properties used in R.C.C
- 5.2 State standards for storing, straightening, cutting, bending, placing and binding reinforcement

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

- 6.1 Define R.C.C
- 6.2 State advantages and disadvantages of R.C.C
- 6.3 State grades of concrete, steel and their respective permissible stresses
- 6.4 Use standard tables of bending moment and shear force coefficients for finding bending moment in continuous beam
- 6.5 State the loads to be considered for design
- 6.6 State the methods of design of R.C.C structures i.e. E.T.M and L.E.M method
- 6.7 State the codes of practice for R.C.C design such as B.S code and A.C.I code (Adopt B.S code of practice for design).

7 Understand Shear and Bond Stresses in Beams

- 7.1 State shear stress in homogenous beam
- 7.2 Explain shear stress in R.C.C beam
- 7.3 Explain horizontal shear, diagonal tension and compression developed in a beam
- 7.4 Explain formulae and steps to be followed in the determination of number of stripes and mild bars as shear reinforcement
- 7.5 Explain bond between concrete and reinforcement

8 Understand the Flexural Formula and Design of Simple R.C.C Beam

- 8.1 State the assumption used in working stress method
- 8.2 Derive flexure formula for R.C.C beam
- 8.3 Calculate design-constants for different values of concrete and steel stresses and modular ratio
- 8.4 Explain balanced, under reinforced and over reinforced sections
- 8.5 Define simple R.C.C beam

- 8.6 State the steps and formulae to be followed in design of lintels
- 8.7 Practice of relevant numericals

9 Understand the Principles Involved in the Design of Slab

- 9.1 Distinguish between one way and two way slab and state the loads taken into account for design of slab
- 9.2 State the steps and formulae for designs of one way slab
- 9.3 Design simply supported, and overhanging one way slab in various situations

10 Understand Principles Involved in the Design of Doubly Reinforced Beam

- 10.1 Define doubly reinforced beam and explain necessity of compression reinforcements in beam
- 10.2 Explain various methods of design of doubly reinforced beam, i.e. elastic theory and load factor method
- 10.3 Explain elements and assumption related to design of doubly reinforced beam, also state steps and formulae for design
- 10.4 Design a simply supported doubly reinforced beam

11 Understand the Principles Involved in the Design of Two Way Slab

- 11.1 Define two way slab and explain design elements
- 11.2 Use banding moment coefficients for different conditions
- 11.3 State assumptions for design of simply supported and two spans continuous slabs
- 11.4 Solve problems on two way simply supported slab

12 Understand Principles Involved in the Design of Tee and Ell Beam

- 12.1 Define Tee and Ell beam and explain advantages of Tee and Ell beams
- 12.2 Solve problem on simply supported Tee and Ell beam

13 Understand The Principles Involved in the Design of Axially Loaded Column and Simple Column Footings

- 13.1 State short and long columns
- 13.2 Explain formulae for the design of column and its footing
- 13.3 Calculate depth of footing and reinforcement details
- 13.4 Design of isolated column footing; punching shear and BM in base, etc.

14 Understand the Procedure Involved in the Design of Stairs

- 14.1 Distinguish between stair spanning horizontally and stair spanning longitudinally
- 14.2 Compute loads taken into accounts for design of stairs and explain assumptions and steps involved in the design of stairs
- 14.3 Design a simple stair
 - Spanning horizontally
 - Spanning longitudinally

LIST OF PRACTICALS		HOURS
1.	Test on cement	96
1.1	Preparation of cement paste of standard consistence	
1.2	Determination of Initial and final setting time	
1.3	Le-Chatellier's test for soundness of cement	
1.4	Test for compressive strength of cement using mortar (1:3) cube	
1.5	Briquette test for tensile strength of cement using mortar (1:3)	
2.	Test on aggregates	
2.1	Determine clay percentage in sand	
2.2	Determination of particle size distribution of fine and coarse aggregates by sieve analysis	
2.3	Determination of bulk density and voids in aggregates	
2.4	Determination of flakiness index and elongation index of coarse aggregates	
2.5	Determination of specific gravity and water absorption of aggregates	
3.	Test on concrete	
3.1	Test for workability of concrete by slump cone	
3.2	Test for workability of concrete by compacting factor apparatus	
3.3	Preparation of concrete cubes and cylinders vibrated and hand compacted, hand mixed and machine mixed and with different water cement ratio	
3.4	Determination of compression strength of concrete using cubes	
3.5	Preparation of standard size beams for flexural strength of concrete	
3.6	Modules of rupture test, (breaking of beam prepared in above practical)	
3.7	Split cylinder test for tensile strength of R.C.C concrete Design	
3.8	Solve problems on bending moment and shear force in beams	
3.9	Prepare a chart showing the values of moment of resistance for different values of f_c , f_t and m .	
3.10	Design and drawing of simple rectangular R.C.C beam with U.D.L	
3.11	Design and drawing of simply supported and overhanging one way slab	

- 3.12 Design and drawing shear force reinforcements for a rectangular beam and check for bond
- 3.13 Design of cantilever beam and lintels.
- 3.14 Design and drawing of doubly reinforced beams along with shear reinforcement and check for bond
- 3.15 Design and drawing of two way slab
- 3.16 Design and drawing of simply supported Tee and Ell beams.
- 3.17 Design and drawing of main and secondary Tee & Ell beam for a hall
- 3.18 Design and drawing of R.C.C column with isolated footing
- 3.19 Design and drawing of stair case

**DAE CIVIL TECHNOLOGY
YEAR 3**

**CT-371 OCCUPATIONAL HEALTH & SAFETY ENVIRONMENT
(OHSE)**

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

AIM: On completion of the subject, the student will know about:

1. Safety practices adopted for civil engineering works.
2. Health hazards, site dangers and body protection.
3. Welfare of employees / workers.

COURSE CONTENTS

1. Accidents	6 Hours
1.1 Types	
1.2 Causes	
1.3 Effects	
1.4 Remedial measures	
2. Fire Hazards	4 Hours
2.1 Introduction.	
2.2 Causes	
2.3 Control	
3. Health Hazards	6 Hours
3.1 Introduction	
3.2 Causes.	
3.3 Prevention.	
4. Safety	6 Hours
4.1 Introduction	
4.2 Industrial ventilation, exhaust systems.	
4.3 Industrial noise and its control.	
4.4 Safety Precautionary Measures for	
– Scaffolding, Formwork, and Ladder.	
– Drilling & Blasting.	
– Demolition.	

– Hot bituminous works.	
– Fire hazards in building.	
– Excavation	
5. Safety Training of Employees	2 Hours
5.1 Necessity.	
5.2 Modes of training.	
6. Fire Control Systems	2 Hours
6.1 Type of equipments/ tools	
6.2 Operations and practices	
7. Legal Aspects of safety occupational health and building	4 Hours
7.1 Introduction.	
7.2 General legislation	
7.3 Compensation	
7.4 Insurance	
8. Natural Hazards (Earth Quakes, Slides, Etc)	2 Hours
8.1 Causes	
8.2 Effects	
8.3 Remedial measures	

RECOMMENDED / REFERENCE BOOKS:

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

INSTRUCTIONAL OBJECTIVES

- 1. Understand Accidents**
 - 1.1 Define accidents and explain types of accidents
 - 1.2 Explain causes of accidents
 - 1.3 Explain effects of accidents
 - 1.4 Explain remedial measures
- 2. Understand Fire Hazards**
 - 2.1 Introduction of fire hazards.
 - 2.2 Explain Causes of fire hazards.
 - 2.3 Explain Control of fire hazards.

3. Understand Health Hazards

- 3.1 Give Introduction
- 3.2 Explain Causes.
- 3.3 Explain Prevention.

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

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

5. Understand Safety Training of Employees

- 5.1 Explain Necessity of safety training of employees.
- 5.2 Explain Modes of training.

6. Understand the fire Control System

- 6.1 Explain types of Equipments/ Tools
- 6.2 Explain Operations and Practices

7. Understand Legal Aspects of safety occupational health and building

- 7.1 Introduction.
- 7.2 Explain General legislation
- 7.3 Explain Compensation
- 7.4 Explain Insurance

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

- 8.1 state reasons of earthquake, slides
- 8.2 Explain remedial measures of earthquake, slides.

**DAE CIVIL TECHNOLOGY
YEAR 3**

CT-373 SOIL MECHANICS AND BRIDGE ENGINEERING

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

- AIM:**
1. To know the importance of soil as a foundation and source for construction material for every building, bridge, dam, power station, roads, railroad, etc.
 2. To understand the physical properties of soil and behavior of soil masses subjected to various types of forces

COURSE CONTENTS

- 1. Introduction** 5 Hours
 - 1.1 Soil, soil mechanics, soil engineering
 - 1.2 Types of soil and their formation
 - 1.3 Three phase diagram of soil
 - 1.4 Physical properties of soil
 - 1.5 Specific gravity and various densities
 - 1.6 Various interrelationships
 - 1.7 Numerical problems

- 2. Soil Classification.** 5Hours
 - 2.1 Classification of soils
 - 2.2 System of classification: particle size classification, Textural classification, AASHTD classification
 - 2.3 Particle size analysis

- 3. Plasticity.** 5Hours
 - 3.1 Consistency of soil
 - 3.2 Description of Atterberg's Limit.
 - 3.3 Different Indices
 - 3.4 Methods of determination of Atterberg's Limits for given soil sample.

4. Compaction.	5 Hours
4.1 Compaction and necessity of compaction	
4.2 Principles of compaction	
4.3 Compaction and consolidation	
4.4 Standard proctor test and modified proctor test	
4.5 Field compaction test	
4.6 Factors affecting compaction	
5. Permeability	7 Hours
5.1 Introduction to permeability	
5.2 Description of factors affecting permeability.	
5.3 Darcy's Law.	
5.4 Laboratory permeability tests	
5.5 Field permeability tests	
6. Shear Strength of Soils.	6 Hours
6.1 Introduction to shear strength of soils.	
6.2 Coulomb's Law for shear strength of soil.	
6.3 Laboratory measurement of shear strength	
6.4 Factors affecting shear strength of soil	
6.5 Differentiate between cohesive and non-cohesive soil	
7. Stability of Slopes.	3 Hours
7.1 Necessity, types and failure of slopes	
7.2 Factors contributing to slope failure.	
7.3 Remedial measure to avoid slope failures.	
8. Bearing Capacity of Soils.	5Hours
8.1 Introduction to bearing capacity of soil.	
8.2 Factors affecting bearing capacity.	
8.3 SPT	
8.4 CBR	
9. Introduction to Development of Bridges	3 Hours
9.1 Definition of terms related to bridge engineering	
9.2 Structural parts of bridges	
9.3 Factors affecting the development of bridges	

10. Permanent Bridges	5 Hours
10.1 Permanent girder bridges, component parts and type – (R.C.C, steel and pre stress conc.)	
10.2 arch bridges-types (masonry, R.C.C, steel and prestressed concrete)	
10.3 suspension and Rigid Frame Bridge (R.C.C and Steel)	
10.4 Permanent big bridges – Abutment, wing walls, approaches, piers and their foundation.	
11. Culvert	3 Hours
11.1 Culvert and causeway	
11.2 Difference between culvert and causeway	
11.3 Types of culverts (pipe, box, arch and slab)	
11.4 Types of causeway	
12. Temporary Bridges	4 Hours
12.1 Introduction types (wooden, suspended, floating and moveable)	
12.2 Necessity and suitability	
13. Selection of Bridge Type and Site	4 Hours
13.1 Comparison of various types	
13.2 Characteristics of an ideal site for a bridge (River and Banks, foundation design and construction facilities, approaches)	
13.3 Location of an alignment and site	
13.4 Factor governing the choice of a bridge	
14. Maintenance of Bridge	4 Hours
14.1 Brief description of general maintenance	
14.2 Brief description of maintenance of steel, masonry, R.C.C. bridges	
14.3 Brief description of maintenance of causeways	

RECOMMENDED / REFERENCE BOOKS:

1. Soil Mechanics: **Jumikis**.
2. Soil Mechanics: **M.S. Smith**.
3. Soil Mechanics and Foundations: **B.C. Punmia**.
4. Soil Mechanics and Foundation Engineering : **P. Purushothama Raj**
5. Soil Mechanics & Foundation Engineering: **P. Purushothama Raj, [2009]**,

Pearson Education

6. Soil Mechanics: **Alfred R. Jumikis**, [2003], McGraw-Hill
 7. Soil Mechanics and Foundation Engineering: **K.R. Arora**, [2003], Standard Publishers, Delhi
 8. Bridge Engg. By Khattak
 9. Bridge Engg. By J.S Alagia
 10. Road, Railways, Bridges and Tunnels by Desh Pande and Antia.
 11. Soil Mechanics: B.C Punmia. [2002]Laxmi Publications, New Dehli.
 12. Geotechnical Engineering: Braja M.Das. [2000], Brooks/ Cole USA
- 9 Hours

INSTRUCTIONAL OBJECTIVES

1. Understand the Preliminary Definitions and Relationships.

- 1.1 Define the terms, solids, voids, voids-ratio, porosity, degree of saturation, percentage air voids and moisture contents.
- 1.2 Define specific gravity and various densities of soil.
- 1.3 Solve the numerical problems based on 1.1 to 1.2
- 1.4 Derive the various relationships

2. Understand the Classification Systems of Soil.

- 2.1 State classification of soil and its necessity.
- 2.2 Explain PRA classification system, particle size classification system and textural classification system.
- 2.3 Explain the particle size analysis for different soils.

3. Understand the Plasticity Variation of Soil.

- 3.1 State the consistency of soil
- 3.2 Describe the Atterberg limits.
- 3.3 Define the various indices
- 3.4 Explain the methods of determination of Atterberg limits.

4. Understand the Compaction Tests (Field And Lab).

- 4.1 State term compaction its significance and necessity.
- 4.2 Discuss the principles of compaction
- 4.3 Compare between compaction and consolidation.
- 4.4 List the procedure of standard proctor test and modified compaction test.
- 4.5 List the procedure of field compaction tests, core cutter method and sand replacement method.

4.6 State the factors affecting compaction.

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

- 5.1 Define permeability.
- 5.2 Describe factors affecting permeability.
- 5.3 State the Darcy's law of permeability.
- 5.4 Explain the method of determining the permeability of soil in the Lab
- 5.5 Explain the methods of determining the permeability of soil in the field.

6. Know the Shear Strength of Soil.

- 6.1 State the term shear strength of soil & its significance.
- 6.2 State Coloumb's law for shear strength of soil.
- 6.3 State and explain the shear box test
- 6.4 Describe the factors affecting shear strength of soil.
- 6.5 Differentiate between cohesive and non-cohesive soils.

7. Understand the Need of Stability of Slope.

- 7.1 State the necessity, types and failure of slope.
- 7.2 State the factors contributing to slope failure.
- 7.3 Explain the remedial measure to avoid slope failure.

8. Understand the Bearing Capacity of Soil.

- 8.1 Define bearing capacity, ultimate bearing capacity and safe bearing capacity of soil.
- 8.2 State the factors affecting bearing capacity of soil.
- 8.3 Explain the method for finding bearing capacity of soil by standard penetration test.
- 8.4 Explain the California Bearing Ratio (CBR) method for finding bearing capacity of soil.

9. Introduction To Development Bridges

- 9.1 Definition of terms related to Bridge Engineering
- 9.2 Structural parts of a Bridge
- 9.3 Factors Affecting the Development of Bridges

10. Permanent Bridges

- 10.1 Permanent girder bridges
- 10.2 components parts and type (RCC, steel and pre stress conc)

LIST OF PRACTICALS	HOURS
1. Determination of moisture content in a given soil sample by i) Speedy moisture content apparatus ii) Oven method in the lab	(96)
2. Determination of specific gravity of given soil sample by pycnometer	
3. Sieve analysis for a given soil sample in the lab.	
4. Atterberg's (Liquid, Plastic & Shrinkage) Limit determination	
5. Performing standard and modified Proctor test.	
6. Finding field density by i) Core cutter method ii) Sand replacement method	
7. Permeability test and problem solving relating to Permeability	
8. Direct shear test for determining shear strength of soil in the laboratory	
9. Performing standard penetration test and finding bearing capacity of the soil	
10. California bearing ratio (CBR) test for finding bearing capacity for soil	
11. Sketching bridges according to: i. function / purpose ii. materials of construction iii. Relative portion of permanent floor iv. types of super structures	
12. Drawing of R.C.C slab culvert	
13. Drawing of low level and high level causeways	
14. Drawing of R.C.C deck slab bridge having two span 10 m each	
15. Visit of a railway / highway bridges.	

DAE CIVIL TECHNOLOGY YEAR 3

CT-392

CIVIL ENGINEERING PROJECTS

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

AIM: Apply concepts of Civil Engineering on designing actual projects and schemes.

LIST OF PROJECTS

1. Design of Double storey R.C.C. frame structure building: Slab, beams, columns, lintels & foundation. Prepare structural drawings and report. (192)
2. Design under ground and over head R.C.C water reservoir (50,000 gallons - capacity) prepares structural drawing and report.
3. Layout, design, preparation of drawing and specification for a water supply scheme of a small Town (200 houses in 25 acres) for population of 1000 persons
4. Layout, design, preparation of drawing and specification for a sewerage scheme of a colony (200 houses in 25 acres) for population of 1000 persons.
5. Carry out high way project-layout, reconnaissance survey, selection of road alignment, topographic map and drawing longitudinal section and cross-section of a road (2 km long) and preparation of report.
6. Irrigation Project for 2 RD Canal Field work, topographic map, marking of alignment, detailed drawing, schedule of quantities and abstract of cost,

RECOMMENDED / REFERENCE BOOKS:

- 1- Civil Engineering Projects for Students : **Earl Bell**
- 2- Relevant Books on the subject relating to the project

INSTRUCTIONAL OBJECTIVES

To apply skills/knowledge gained on civil technology projects

LIST OF LABORATORIES [D.A.E CIVIL TECHNOLOGY]		
SUBJECT REFERENCE CODE	SUBJECT TITLE	NAME OF LABORATORY / WORKSHOP
Ch -112	– Chemistry	Chemistry Laboratory
Phy - 122	– Physics	Physics Laboratory
Shop -162	– Workshop Practice	Wood Works & Wiring Laboratory
CT-114 CT-224 CT-392	– Basic Surveying – Advanced Surveying – Civil Engineering Project	Surveying Laboratory
CT -133	– Basic Engineering Drawing	Drafting Laboratory
CT-244 CT-392	– Civil Engineering Drawing & AutoCAD – Civil Engineering Project	AutoCAD Laboratory
CT-323 CT-392	– Advanced Quantity Surveying – Civil Engineering Project	Computer Laboratory
CT-123 CT-233	– Engineering Materials & Construction – Building Construction	Construction & Building Laboratory
CT-253 CT-363 CT-392	– Mechanics of Structures – Concrete Tech., & RCC Design – Civil Engineering Project	Materials Testing Laboratory

CT-373	– Soil mechanics & Bridge Engineering	Soil Mechanics Laboratory
CT-392	– Civil Engineering Project	
CT-353	– Transportation Engineering	Transportation Laboratory
CT-344	– Hydraulics & Irrigation	Hydraulics & Irrigation Laboratory
CT-212	– Public Health Technology	Public Health Technology Laboratory

TOOLS & EQUIPMENT LIST		
WORKSHOP PRACTICE: ELECTRICAL WIRING (FOR A CLASS OF 25 STUDENTS)		
SR. #	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (NOS.)
1.	3-Phase Electric Motors	10
2.	3-Phase Energy Meter	10
3.	AVO Meters	15
4.	Clamp on Meter	15
5.	Cold Chisels 10" Long	10
6.	Combination Pliers 8"	15
7.	Electric Bells	50
8.	Fluorescent Tubes (with electric choke) Complete	50
9.	Hack Saws 15"	50
10.	Hand-Drill Machine Electric Two Speeds 3/4" Chuck Heavy Duty	10
11.	Kerosene Burners	10
12.	Long Nose Pliers 6"	25
13.	Megger/Insulation Tester	10
14.	Main Switch 3-Phase	50
15.	Main Switch Single Phase	50
16.	Masonry Drill Bit Set	50
17.	Masonry Hand Bit	25

18.	Phase Testers	25
19.	Plumb Bobs	12
20.	Rip Saw 12"	12
21.	Rough Cut File 12"	10
22.	Screw Driver Sets	30
23.	Screw Drivers 12"	30
24.	Side Cutter 6"	30
25.	Single-Phase Electric Motors	25
26.	Single-Phase Energy Meter	10
27.	Small Hammers	15
28.	Smooth Files 12"	10
29.	Spirit Levels 15"	25
30.	Two-way Switch	30
31.	Wiring Boards 3' x 5' Wall Mounted	20
32.	Wood Chisel 1"	5
33.	Work Benches 4' x 6' x 2.5'	15
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Air Conditioners	2
2.	Circuit Breakers	30
3.	Electric Ballasts (40 W)	50
4.	Panel Board	25

WOODWORKS LABORATORY		
SR. #	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (NOS.)
1.	Adjustable Wrench 8"	10
2.	Adze (Tessa) 1 kg	10
3.	Auger Bits 1/2"	15
4.	Block Plane	10
5.	C Clamps 10"	10
6.	Combination Square 12"	15
7.	Cross Cut Saw 18"	25
8.	Electric Drill Chuck Size 1/2" 220 V	10
9.	Flat Chisel 1/2"	25
10.	Hack Saw 15" With Handle	25
11.	Inside Calipers 8"	10
12.	Jack Plane (Stanley) 14"	25
13.	Jointer Plane	10
14.	Key Hole Saw 12"	15
15.	Mallets Wooden	25
16.	Marking Gauge	25
17.	Measuring Tapes 3 m	25
18.	Nail Puller 18"	10
19.	Oil Stone	20
20.	Outside Calipers 8"	10
21.	Pliers 8"	25

22.	Ratchet Brace	5
23.	Rebate Plane	10
24.	Rip Saw 18"	20
25.	Screw Drivers Flat 10"	20
26.	Smoother Plane 9"	20
27.	Surface Plate 24 x 18	5
28.	T Bevel 12"	10
29.	Tennon Saw 15"...	20
30.	Tri Square 30 cm. Steel	25
31.	Triangle File 5"	25
32.	Triangle File 6"	25
33.	Work Benches	10
34.	Bench Vices	25
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Electric Circular Saw	2
2.	Electric Planer	2
3.	Electric Hand Planer	2

WOOD WORKS LABORATORY		
SR.#	NAME OF ARTICLE	QUANTITY
1.	Deodaa Wood for Wooden Joints	50 ft
2.	Fire Fighting Safety Equipment (Fire Extinguishers and Safety Care, etc.)	1 Set
3.	Glue 5 Kg	6
4.	Kail Wood for Door & Frame	200 ft
5.	Kerosene Oil	10 Liter.
6.	Lubricating Oil / Grease	10 Liter.
7.	Nails 1", 1.5", 2", 3" (2 Kg each)	8 Kg
8.	Over all / Apron for Trainees	25
9.	Safety Shoes for Trainees	25 pairs
10.	Screw ¾", 1", 1½", 2" (2 Packets each)	12 packets
11.	Sheshum Wood	50 ft
12.	Veneer Board (4" x 8' x ¾")	10

CT-114: BASIC SURVEYING		
Wooden Pegs	1"x1"x4"	30 Nos.
Wooden Pegs	1"x1"x6"	30 Nos.
CT-123: ENGINEERING MATERIALS & CONSTRUCTION		
Bricks		2000 Nos.
Cement		20 Bags
Coarse Aggregates		500 Cft
Distemper		10 Liters
Knotting & Lashing Rope		50 Yards
Lime		100 Kg
Paint		10 Liters
Sand		500 Cft
COMP 111 COMPUTER APPLICATION		
Cartridge Ink		4 Set
CDs		50 Nos.
Paper	8 1/2"x11"	5 Reams
Paper	11"x17"	5 Reams
Paper	Legal	2 Reams
Ribbons LQ 2170		4 Nos.
Toners Printers		4 Nos.

CT-212: PUBLIC HEALTH TECHNOLOGY	
GI Pipe	100 Sq.ft
GI Pipe Special	12 Nos.
Lime	10 Kg
CT-224: ADVANCED SURVEYING	
Lime	40 Kg
Pegs	1"x1"x4" 30 Nos.
Pegs	1"x1"x6" 30 Nos.
CT-233: BUILDING CONSTRUCTION	
Bitumen	20 Kg
Bricks	2000 Nos.
Cement	20 bags
Chalk	5 Sq.ft
Luminous Slip	5 Sq. ft
Lime	10 Kg
Sand	200 Sq. ft
Sand Dust	1 Kg
Stone Crush	300 Sq.ft

CT-242: CIVIL ENGINEERING DRAWING & AUTO CAD		
Ammonium Liquid		2 Liters
Sensitized Paper		1 Ream
Tracing Paper		1 Ream
CT 253: MECHANICS OF STRUCTURES		
Aluminum Sheet	1 sq. ft x 1/8"	1 No
Mild Steel Sheet	1 sq. ft x 1/8"	1 No
Copper / Brass Plates	1 sq.ft x 1/8"	1 No
Steel Bars	1/2" Dia	3 Kg
Steel Bars	3/8" Dia.	2 Kg
CT-332: ENVIRONMENTAL TECHNOLOGY		
Cement		2 Bag
Jute		2 Kg
Lime		5 Kg
Rubber Rings		5 Kg
Sand		10 C. ft
CT-363: CONCRETE TECHNOLOGY AND RCC DESIGN		
Cement		10 Bag
Sand		100 Cft
Stone Crush		100 Cft

CT-383: SOIL MECHANICS & BRIDGE ENGINEERING		
Bitumen		5 Kg
Stone Crush	1- 1/2"	100 Cft
Stone Crush	3/4"	100 Cft
CT-392: CIVIL ENGINEERING PROJECT		
Limes		10 Kg
Papers	A4 & A3	4 Reams

SURVEYING LABORATORY		
SR. #	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (Nos.)
1.	Alidade	20
2.	Arrows	100
3.	Auto Set Level	10
4.	Computer P-4 Complete Set	5
5.	Cross Staff Wooden	10
6.	Current Meter	2
7.	Electronic Digital Theodolites	2
8.	Engineers Chain 100 ft	5
9.	French Cross Staff	5
10.	GPS Latest Model with all Accessories and Software	3
11.	Laser Level with all Accessories	5
12.	Laser Printers	2
13.	Leveling Staff	10
14.	Measuring Tape 20m Metallic	10
15.	Measuring Tape 20m Steel	5
16.	Measuring Tape Fiberglass 20m	5
17.	Metric Chains 20m	10
18.	Metric Chains 30m	5
19.	Metric Staff Collapsible	10

20.	Microp tic Theodolites	5
21.	Plane Table Standard Size with Tripod	20
22.	Plumb Fork	20
23.	Prismatic Compass with Tripod	10
24.	Ranging Rods Steel or Bamboo with Steel Shoes	40
25.	Sounding Rods	10
26.	Spirit Levels for Staff	20
27.	Steel Band	5
28.	Target Staff	4
29.	Tilting Level	5
30.	Total Station with all Accessories and Software	5
31.	Trough Compass	20
32.	Velocity Rods	10
33.	Vernier Theodolites	5
34.	Wooden Mallet	10
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Abney Clinometer	4
2.	Aneroid Barometer	2
3.	Bow Compass	5
4.	Clinometers	2
5.	Gunter's Chain	1
6.	Invar Tape	1

7.	Line Ranger	1
8.	Optical Square (Double Prism)	2
9.	Optical Square (Mirror Type)	5
10.	Optical Square (Single Prism)	5
11.	Pantographs	2
12.	Surveying Triangular Scale	5
13.	Target with Tripod Including Inter Changer Tribatch	5
14.	Telescopic Alidade	2

CONSTRUCTION & BUILDING LABORATORY		
SR.#	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (Nos.)
1.	Bar Bending Table with Accessories	1
2.	Brick Hammers	10
3.	Brooms	10
4.	Chisels for Dressing Stone	10
5.	Concrete Mixer Small	1
6.	Corner Floats	10
7.	Hammers Cross Penne 1 kg	10
8.	Hawks 12" x 12"	10
9.	Iron Rammers	5
10.	Kassi	10
11.	Mason Trowels	10
12.	Measuring Box Standard Size	5
13.	Measuring Tapes 6 m	10
14.	Mixing Plate Forms Steel 7'x10'x8"	4
15.	Mortar Pans. 18" Dia	10
16.	Paint Brush (Off sizes)	10
17.	Pick Axes	10
18.	Pliers	10
19.	Plumb Bobs	10

20.	Pointing Trowels	10
21.	Poker vibrator Electric or Gas Driven	2
22.	Rose Cane	5
23.	Shovel	10
24.	Spirit Levels 24"	10
25.	Steel Cribs	6
26.	Steel Floats	10
27.	Tampling Rods	10
28.	Tri Squares	5
29.	Wheel Barrows Rubber Tired	2
30.	Wire Brushes	10
31.	Wire Cutter	10
32.	Wooden Battens 7' x 2" x 2"	5
33.	Wooden Floats. 24"	10
34.	Wooden Floats. 9"	10
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Arch Centre	2
2.	Block Moulds for Making Blocks from Prepared Concrete	5
3.	Brick and Tile Cutter	1
4.	Curing Shower	2
5.	Differential Pulley Clock with Tripod	1
6.	Door Frame Steel	2

7.	Door Frame Wooden	2
8.	Floor Grinding Machine	1
9.	Hammers with Nail Pullers 2 Ibs	5
10.	Hydraulic Jack Heavy Duty	2
11.	Moulds of Battens, Blocks	2
12.	Paint Roller	5
13.	Paint Sprayer	2
14.	Plate Vibrator/Compactor	1
15.	Spade	5
16.	Steel Floats	5
17.	Straight Edges 10ft x 2" x 2"	5
18.	Wood Saws 24"	5

DRAFTING LABORATORY		
SR.#	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (NOS.)
1.	Drafting Tables/ Machines with Stools	25
2.	French Curves of Sorts	5
3.	Large Drawing Box for Chalk Board Use	2
4.	Lettering Stencils of Sizes	5
5.	Triangular Drafting Scales	25
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Architecture Templates	10
2.	Blue Printing Machine	1
3.	Drafting Machine with Stools	2
4.	Inking Pen (off sizes)	2 Sets
5.	Tracing Box	2

COMPUTER & AUTO CAD LABORATORY		
SR.#	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (Nos.)
1.	Computer P-IV with all accessories	50
2.	Computer Table with chair	50
3.	Multimedia Projector Complete Set	1
4.	Plotter	1
5.	Printer Dot Matrix	2
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Color Printer	1
2.	Digital Camera	1
3.	Printer Laser	1
4.	Scanner	1

PUBLIC HEALTH TECHNOLOGY / HYDRAULICS & IRRIGATION LABORATORY		
SR.#	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (NOS.)
1.	Adjustable Wrench 8"	6
2.	Bench Vice 6"	5
3.	Cast Iron Pipe	4
4.	Caulking Tool	6
5.	Center Punch	5
6.	Chain Wrench	2
7.	Cold Chisel 8"	10
8.	Concrete Pipe	10
9.	Crow Bar 3 ft	4
10.	Die Set 1/2" -2"	4
11.	Electric Hand Drill Machine 1/2" Chuck	2
12.	Flushing System High Level/Low Level	2 each
13.	Glass Beakers	20
14.	Graduated Cylinders 500 ml	24
15.	Hack Saw 18"	6
16.	Hammer Ball Pin 1/2 kg	10
17.	Hand Bits of different sizes	10
18.	Hand Wash Basin	2
19.	Kassi	4

20.	Kerosene Stoves	4
21.	Ladle	4
22.	Measuring Tape 3 m	10
23.	Mixing Pane 18" Dia	4
24.	Mixing Trowel	4
25.	Pick Axe	4
26.	Pipe Bender of Sizes	3
27.	Pipe Cutter 1/2" -3/4"	4
28.	Pipe Vice	10
29.	Pipe Wrench 18"	6
30.	Plumb Bobs	4
31.	Plumbing Specials off Size	10 each
32.	Sanitary/Bath Room Fixtures	2 each
33.	Sewer Cleaning Rods with Accessories	2 sets
34.	Single Acting Reciprocating Pump	1
35.	Small Chisels of Sizes	5
36.	Spirit Level of 18"	4
37.	Taps/Cocks (Bid, Pillar, Stop)	5 each
38.	Threading Tapes with Handle 1/2" & 3/4"	4 each
39.	Traps (Floor, P, S, Gully)	2 each
40.	Urinal	2
41.	Valves (Gate, Ball, Floating, Ferrule, Check, Foot Valves)	2 each
42.	Water Closet (English , Indian Pattern)	2 each

43.	Wheel Barrows	4
44.	Work Benches	5
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Bath Tub	1
2.	Boring System with Tripod, Pully Block, Cutter, etc	2
3.	Centrifugal Pump	1
4.	Discharge Meter	1

MATERIALS TESTING LABORATORY		
SR.#	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (NOS.)
1.	Beam Mould for Flexure Test	3
2.	Boiling chambers for above water tubes	2
3.	Briquette Moulds Set of 3	5
4.	Briquette Testing Machine	1
5.	Compacting Factor Testing Apparatus with Accessories	5
6.	Compression Testing Machine Portable Type with Accessories	1
7.	Cube Moulds 6x6x6 in.	10
8.	Cubes Moulds 2x2x2 Set of 3	5
9.	Curing Chamber	1
10.	Cylinder Moulds 6"x12" Steel	10
11.	Electronic Balance 1000kg Capacity.1 gr	5
12.	Elongation Index Gauge	10
13.	Flakiness Index Gauge	10
14.	Graduated Cylinders 1000ml	10
15.	Graduated Cylinders 500 ml	10
16.	Laboratory Concrete Mixer	1
17.	Le- Chatelier's Moulds with Accessories	10
18.	Material Containers for Laboratory	5

19.	Mechanical Sieve Shaker	1
20.	Mixing Pans 18" Dia	10
21.	Mixing plate form 24"x18"x14" Steel	5
22.	Mixing Trowels 8"	10
23.	Scoops	10
24.	Sieve Cleaning Gauge	5
25.	Sieve Set 3", 1-1/2, 3/4, 3/16, 7,14,25,52,100,200 No. Sieves	5 Sets
26.	Slump Cone with Accessories	10
27.	Steel Plates as Base Plate	1
28.	Table Viberator	1
29.	Tamping Rods 3/4" Dia	5
30.	Triple Beam Balance	5
31.	Vicat Apparatus	10
32.	Water Containers for Laboratory	1
ADDITIONAL EQUIPMENT REQUIREMENT (OPTIONAL)		
1.	Brinnels Hardness Testing Machine	1
2.	Deflection of Beam Apparatus	1
3.	Rockwell Hardness Testing Machine	1
4.	Universal Testing Machine with Fleural Testing Attachments including Roller Support	1

SOIL MECHANICS LABORATORY		
SR.#	EQUIPMENT / INSTRUMENT	QUANTITY REQUIRED (NOS.)
1.	Chisel (off sizes)	5
2.	Container with Lid	50
3.	Core Cutter Apparatus	10
4.	Density Bottle (Glass Pyrex) 25 ml with Capacity	10
5.	Desiccator	1
6.	Electronic Balance 0.1gms -500g	1
7.	Electronic Balance 1gms to 1000gms	2
8.	Electronic Balance 50 kg Capacity	2
9.	Electronic Oven 300 C	1
10.	G.I Mixing Troy 36" x 36" x 4, 18 Guage	10
11.	Glass measuring cylinder 100ml capacity	5
12.	Graduated Glass Cylinder 500 ml Capacity	10
13.	Hammer 1 kg	5
14.	Modified Proctor Mould with Hammer 18" Fall	10
15.	Pan 18" (Stainless Steel)	5
16.	Pick-Axe	10
17.	Rammer for Core Cutter	10
18.	Sand -Cone Test Apparatus	10
19.	Scoop	10

20.	Shear Box Test Apparatus Complete with all Accessories	1 sets
21.	Sieve set ASTM Standard Sieve 4,7,14,25,50,100,200 with Pan and Lid	5 sets
22.	Spatula Liquid Limit Apparatus with Spatula (Stainless Steel)	10
23.	Speedy Moisture Tester Complete with all Accessories	2 sets
24.	Standard Hammer 12" fall	10
25.	Standard Penetration Testing with Standard Weight, Equipment completer with all Accessories.	1 sets
26.	Standard Proctor Mould Complete	10
27.	Triple Beam Balance 2.50 kg Capacity	10
28.	Trowel 8" for Mixing	10
29.	Wooden Block	10

APPARATUS AND CHEMICALS LIST (DAE CHEMISTRY PRACTICALS)		
CHEMISTRY LABORATORY (FOR 25 STUDENTS)		
SR.#	APPARATUS	QUANTITY
1.	Ammeter	5
2.	Analytical / Electronic Balance	4
3.	Battery(6V) D.C/Adapter	5
4.	Beakers 100 ml	50
5.	Beakers 250 ml	25
6.	Burette (50ml)	25
7.	Capillary Tubes	5 Packs
8.	China Dish	25
9.	Conical Flask (250 ml)	25
10.	Connecting Wires	10 Meters
11.	Copper Foils (5cmx3cm)	5
12.	Cork with Hook	25
13.	Desicator	1
14.	Distilled Water Plant.(Gas or Electric)	1
15.	Dropper	10
16.	Filter Paper Sheets	10 Sheets
17.	Funnel	25
18.	Glass Rod	25

19.	Glass Stirrer	25
20.	Hoffman's Voltmeter	5
21.	Hot Plate	1
22.	Iron Stand with Clamps	25
23.	Kipps Apparatus	2
24.	Measuring Cylinder (100ml)	10
25.	Measuring Flask	10
26.	Measuring Flask (1 Liter)	10
27.	Measuring Flask (250 ml)	10
28.	Measuring Flask (500 ml)	10
29.	Oswald Viscometer	25
30.	Pestal and Mortar	1
31.	Pinch Cock	25
32.	Pipette (10ml)	25
33.	Pipette 20 ml	25
34.	Platinum Wire	25
35.	Rubber Tubes	25
36.	Specific Gravity Bottle	25
37.	Spirit Lab or Bunsen Burner	25
38.	Stalagmometer	25
39.	Steel Spatulla	25
40.	Stop Watch	10
41.	Test Tube Holder	25
42.	Test Tubes	300

43.	Test Tube Stands	25
44.	Thermometer (110 C°)	25
45.	Tripod Stand	25
46.	Test Tube Brush	25
47.	Two Liters Measuring Cylinder or a Bell Jar or a Long Form Beaker Chromatograph Tank.	25
48.	Universal pH Paper Rang e: (1-14)	10 Packs
49.	Wash Bottle	10
50.	Watch Glass	25
51.	Water Bath	2
52.	Watt Man Filter Paper (No I)	50
53.	Weight Box (in case of Analytical Balance)	4
54.	Wire Gauze	25
55.	Wooden Stand	25

LIST OF CHEMICALS

SR. #	APPARATUS	QUANTITY
1.	Acetic Acid	2 ½ Liter
2.	Acetone	2 ½ Liters
3.	Aluminum Sulphate	500 gms
4.	Ammonia	2 ½ Liters
5.	Ammonium Acetate	500 gms
6.	Ammonium Carbonate	500 gms
7.	Ammonium Chloride	500 gms
8.	Ammonium Molybdate	500 gms

9.	Ammonium Oxalate	500 gms
10.	Ammonium Sulfate	500 gms
11.	Ammonium Sulfo cyanide	500 gms
12.	Antimony Chloride	500 gms
13.	Barium Chloride	500 gms
14.	Barium Chloride	500 gms
15.	Barium Nitrate	500 gms
16.	Benzene	2 ½ Liters
17.	Bismuth Chloride	500 gms
18.	Borax	500 gms
19.	Butanol	2 ½ Liters
20.	Cadmium Sulphate	500 gms
21.	Calcium Chloride	500 gms
22.	Carbon Tetra Chloride	2 ½ Liters
23.	Cobalt Nitrate	500 gms
24.	Copper Sulphate	500 gms
25.	Dimethyl Glyoxime (DMG)	1kg
26.	Diphenyl Amine	500 gms
27.	Disodium Hydrogen Phosphate	500gms
28.	Ethanol	2 ½ Liters
29.	Ether	2 ½ Liters
30.	Ferric Chloride	500 gms
31.	Ferric Sulphate	500 gms
32.	Ferrous Chloride	500 gms

33.	Ferrous Sulphate	500 gms
34.	Hydro Chloric Acid	2 ½ Liters
35.	Inks Black, Red, Green, Blue	1 Bottle each
36.	Lead Acetate	500 gms
37.	Liquid Hydrogen Sulphide	1 Liter
38.	Magnesium Sulphate	500 gms
39.	Manganese Sulphate	500 gms
40.	Mercuric Chloride	500 gms
41.	Methylated Spirit	2 ½ Liters
42.	Methyle Orange	1 Pack
43.	Naphthalene	500 gms
44.	Nessler's Reagent	500 gms
45.	Nickel Sulphate	500 gms
46.	Nitric Acid	2 ½ Liters
47.	Parafin (Wax)	1kg
48.	Phenolphthalene	500 gms
49.	Picric Acid	500 gms
50.	Plumbic Chloride	500 gms
51.	Potassium Chromate	500 gms
52.	Potassium Nitrate	500 gms
53.	Potassium Pyroantimonate	500 gms
54.	Potassium Uranal Sulphate	500 gms
55.	Potassium Dichromate	500 gms
56.	Potassium Ferro cyanide	500 gms

57.	Potassium Hydroxide	500 gms
58.	Potassium Iodide	500 gms
59.	Potassium Permanganate	500 gms
60.	Sand Paper	10
61.	Silver Nitrate	100 gms
62.	Sodium Bicarbonate	500 gms
63.	Sodium Carbonate	500 gms
64.	Sodium Chloride	(500gms) Pack
65.	Sodium Cobalt Nitrate	500 gms
66.	Sodium Hydroxide	500 gms
67.	Sodium Phosphate	500 gms
68.	Sodium Statnate	500 gms
69.	Sodium Sulphide	500 gms
70.	Sodium Thiosulphate	500 gms
71.	Stannous Chloride	500 gms
72.	Starch (Powder)	500 gms
73.	Sulphuric Acid	2 ½ Liters
74.	Tartaric Acid	500 gms
75.	Yellow Ammonium Sulphide	1 Liter

PHYSICS LABORATORY		
SR #	APPARATUS	QUANTITY
1.	Optical Bench	12 Nos.
2.	Balance (Physical)	6 Per Lab
3.	Battery	• Nos
4.	Beaker (250ml)	25 Nos.
5.	Beakers 100 graduated with Spout.	25 Nos.
6.	Blotting Paper	10 Sheets.
7.	Calculator	6 Nos
8.	Calorimeter (Copper material with wooden lid)	25 Nos.
9.	Concave Mirror (Different dia) (Focal length 150mm) (Focal length 250mm)	25 Each
10.	Connecting Wires	50 Nos
11.	Convex lens (Focal Length 150 mm) (Focal Length 250 mm)	25 Each
12.	Drawing Boards	25 Nos.
13.	Electrical lamp (Table lamp type adjustable Height and direction)	6 Per Lab
14.	Electromagnet	5 Nos
15.	Expansion Apparatus (Complete set with	6 Per Lab

	spherometer arrangement)	
16.	Fletcher's Trolley (With all accessories)	12 Nos.
17.	Fly wheel	5 Nos
18.	Galvanometer 3 mA	25 Nos.
19.	Gas Burner/Spirit lamps	25 Nos.
20.	Glass- Slabs	25 Nos.
21.	Gravesand's apparatus (with pulleys, spirit level, plumb line).	25 Each
22.	Half Meter Rod	3 Nos
23.	Hanger and Slotted weights 10 x5=50gm 20x5=100gm 50x5=250gm	25 Each
24.	Helical Spring with pointer	25 Nos.
25.	Hypsometer	25 Nos.
26.	Index rod	25 Nos.
27.	Iron Stand (Tripod Base)	25 Nos.
28.	Iron Stand with clamps	25 Nos.
29.	Kundt Tube (Complete)	6 Per Lab
30.	Lead Shots (1 kg packet)	6 Nos.
31.	Lycopodium Powder	1 Kg
32.	Magnifying Glass	25 Nos.
33.	Measuring Tape	06 Nos.
34.	Meter Strips/rod (Wooden)	25 Nos.
35.	Micrometer (Screw Gauge)	25 Nos.

36.	Microscope Vernier (Traveling Type)	4 Per Lab
37.	Mirror Strips	50 Nos.
38.	One Way Keys	10 Nos
39.	Pan (50 gm)	25 No's
40.	Pan with Pointer (Usable with helical Spring)	25 Nos.
41.	Pin Hole Camera (kit complete made of card Board)	25 Nos.
42.	Plane Mirror Strip	10 Nos
43.	Plumb Line	6 Nos
44.	Point Source Adjustment (Wooden Box Type)	06 Nos.
45.	Power supply 0-10 volts Variable	6 Per Lab
46.	Prism	25 Nos.
47.	Protractor	5 Nos
48.	Resined Flannel	1 Meter
49.	Resonance Apparatus (Complete.)	6 Per Lab
50.	Resistance Box	8 Nos
51.	Rheostat	10 Nos
52.	Rubber Pad (Striking hammer rubber type)	25 Nos.
53.	Sand Paper	25 Nos
54.	Screen Metal 300rnrnx300rnrn painted white	25 Nos.
55.	Searle's Apparatus/Young's Modulus Apparatus	06 Per Lab
56.	Set Square	25 Sets
57.	Sextant (Educational Model)	6 Per Lab
58.	Screw Gauge	6 Nos
59.	Slotted Weights with hangers (For Searle's apparatus)	25 Each

	$\frac{1}{2} \times 5\text{KG} = 2.5\text{KG}$ $1 \times 5\text{KG} = 5\text{KG}$ $2 \times 5\text{KG} = 10\text{KG}$	
60.	Small solid sphere	6 Nos
61.	Sodium Lamp (18 Watt)	8 Nos.
62.	Solid Cylinders (Brass)	25 Nos.
63.	Sonometer (Wooden resonance Box)	6 Per Lab
64.	Spectrometer (Complete Set)	4 Per Lab
65.	Spherical Ball (Different diameter 76mm) (with hook 19mm)	25 Each
66.	Spirit Level (Horizontal bubble)	25 Nos.
67.	Spring Balance 100gm, 250gm, 500gm	25 Each
68.	Steam generator (complete with delivery tube and water trap system)	6 Per Lab.
69.	Steel Wires 0.45mm dia Swg 26 Steel 0.36mm dia Swg 29 Steel 0.45mm dia Swg 26 Brass	25 each
70.	Step down Transformer	5 Nos
71.	Stop watch	8 Nos
72.	Switches	30 Nos
73.	Thermometer $\frac{1}{2}$ degree up to 110°C $\frac{1}{2}$ degree up to nearly 250°F	25 Each
74.	Tripod with wire gauze	25 Nos.

75.	Tuning Forks (consisting forks of frequency Approx: 440 Hz, 512 Hz, and 480 Hz)	2 Set of 8 Forks
76.	Up rights for lens holding	50 Nos.
77.	Up rights with needles	50 Nos.
78.	Vernier Calipers	25 Nos.
79.	Wedges (Wooden)	25 Nos.
80.	Weight boxes 0.1 mg to 100g	06 Nos.
81.	Wet and dry bulb hydrometer	6 Nos.
82.	Wire Pieces (Iron made) 10 cm long 2mm dia.	25 Nos.

APPARATUS LIST		
PHYSICS LABORATORY (FOR 25 STUDENTS)		
SR. #	APPARATUS	QUANTITY
1.	Optical Bench	12
2.	Balance (Physical)	6 Per Lab
3.	Beaker (250ml)	25
4.	Beakers 100 graduated with spout.	25
5.	Blotting Paper	10 Sheets.
6.	Calorimeter (Copper type with wooden lid)	25
7.	Concave Mirror (Different dia) (Focal length 150mm) (Focal length 250mm)	25 Each
8.	Convex Lens (Focal Length 150 mm) (Focal Length 250 mm)	25 Each
9.	Drawing Boards	25
10.	Electrical Lamp (Table Lamp type adjustable Height and Direction)	6 Per Lab
11.	Expansion Apparatus (Complete Set with Spherometer Arrangement)	6 Per Lab
12.	Fletcher's Trolley (With all accessories)	12
13.	Galvanometer 3 mA	25
14.	Gas Burner/Spirit Lamps	25

15.	Glass- Slabs	25
16.	Gravesand's apparatus (with Pulleys, Spirit Level, Plumb Line).	25 Each
17.	Hanger and Slotted Weights 10 x5=50grn 20x5=100gms 50x5=250gms	25 Each
18.	Helical Spring	25
19.	Hypsometer	25
20.	Index Rod	25
21.	Iron Stand (Tripod Base)	25
22.	Iron Stands	25
23.	Kundt Tube (Complete)	6 Per Lab
24.	Lead Shots (1 kg Packets)	6
25.	Lycopodium Powder	1 Kg
26.	Magnifying Glass	25
27.	Measuring Tape	6
28.	Meter Strips/rod (Wooden)	25
29.	Micrometer (Screw Gauge)	25
30.	Microscope Vernier (Traveling Type)	4 Per Lab
31.	Mirror Strips	50
32.	Pan (50 gms)	25 Nos.
33.	Pan with Pointer (Usable with Helical Spring)	25
34.	Pin Hole Camera (Kit Complete made of Card Board)	25
35.	Point Source Adjustment (Wooden Box Type)	6

36.	Power Supply 0-10 Volts Variable	6 Per Lab
37.	Prism	25
38.	Resined Flannel	1 Meter
39.	Resonance Apparatus (Complete.)	6 Per Lab
40.	Rubber Pad (Striking Hammer Rubber Type)	25
41.	Screen Metal 300mmx300mm painted white	25
42.	Searle's Apparatus/young's Modulus Apparatus	6 Per Lab
43.	Set Square	25 Sets
44.	Sextant (Educational Model)	6 Per Lab
45.	Slotted Weights with hanger (For Searle's apparatus) $\frac{1}{2} \times 5\text{KG} = 2.5\text{KG}$ $1 \times 5\text{KG} = 5\text{KG}$ $2 \times 5\text{KG} = 10\text{KG}$	25 Each
46.	Sodium Lamp (18 Watt)	8
47.	Solid Cylinders (Brass)	25
48.	Sonometer (Wooden Resonance Box)	6 Per Lab
49.	Spectrometer (Complete Set)	4 Per Lab
50.	Spherical Ball (Different diameter 76mm) (with hook 19mm)	25 Each
51.	Spirit Level (Horizontal bubble)	25
52.	Spring Balance 100gms, 250gms, 500gms	25 Each
53.	Steam Generator (Complete with Delivery Tube and Water Trap System)	6 Per Lab.
54.	Steel Wires 0.45mm dia Swg 26 Steel	25 each

	0.36mm dia Swg 29 Steel 0.45mm dia Swg 26 Brass	
55.	Thermometer ½ Degree up to 110°C ½ Degree up to nearly 250°F	25 Each
56.	Tripod with Wire Gauze	25
57.	Tuning Forks (Consisting Forks of Frequency Approx). (440 Hz, 512 Hz, 480 Hz)	2 Set of 8 Forks
58.	Up Rights for Lens Holding	50
59.	Up Rights with Needles	50
60.	Vernier Calipers	25
61.	Wedges (Wooden)	25
62.	Weight boxes 0.1 mg to 100g	6
63.	Wet and Dry Bulb Hydrometer	6
64.	Wire Pieces (Iron made) 10 cm long 2mm dia.	25

ELECTRICAL WIRING LABORATORY		
SR.#	NAME OF ARTICLE	QUANTITY
1.	3 Pin Sockets (Concealed)	60
2.	Bell Push Button (Piano type)	150
3.	Bulb 100W	50
4.	Bulb 200 W	30
5.	Cable 4 Core 1/.44	2 coils
6.	Cable 4 Core 3/.29	2 coils
7.	Circuit Breaker 10A	60
8.	Clock Switch/ Time Switch	4
9.	Colored Chalk	6 pkts.
10.	Connector Bar 6A	2 boxes
11.	Distribution Board	10
12.	Fuse-10 A	60
13.	Insulation Tape ¾ Inch (Nitto)	30
14.	Lamp Holder	200
15.	Multi Circuit Switch	50
16.	Power Plug 15A	20
17.	PVC Saddle ½ Inch	150
18.	PVC Bend ½ Inch	120
19.	PVC Junction Box 4 way ½ Inch	120
20.	PVC Pipe ½ Inch	1000 ft.

21.	Round Block Plastic 4 Inch	400
22.	Single Pole Switch (Piano Type)	150.
23.	Trembler Bell (buzzer)	50
24.	Two Pin Plug	30
25.	Two Pin Sockets (Piano Type)	60
26.	Two Pole Main Switch 15 A	60
27.	Two Way Switch (Piano Type)	120.
28.	White Board Marker (Color)	10
29.	Win Board (size 1200 x 800mm)	30
30.	Wire PVC 1/.44	15 coils
31.	Wire PVC 3/.29	10 coils
32.	Wooden Board 10inch X 12 Inch	50
33.	Wooden Board 4 X 4 Inch	60
34.	Wooden Board 7 X 4 Inch	50
35.	Wooden Screw $\frac{3}{4}$ Inch	10 pkts.
36.	Wooden Screw $1 \frac{1}{2}$ Inch	10 pkts.
37.	Wooden Screw 1 Inch	10 pkts.
38.	Wooden Screw 2 Inch	10 pkts.
39.	Wooden Screws $\frac{1}{2}$ Inch	10 pkts.