

CURRICULUM
OF
DIPLOMA OF ASSOCIATE ENGINEER
GIS & RS in Land & Mine Surveying
(03-Years)

36AGILM2024E1

Evaluated (August, 2024)

Curriculum Section, TEVTA

Diploma of Associate Engineer (DAE) having 3-Years duration, offered in various technologies, are equivalent to Higher Secondary School Certificate (HSSC / Intermediate/ F.Sc. (Pre-Engineering), whose assessment and certification awarding body is “Punjab Board Technical Education” (PBTE).

SCHEME OF STUDIES

DAE GIS & RS in Land & Mine Surveying

1-Theory Contact Hour= 1 credit Hour, 3-Practical Contact Hours, =1 Credit Hour

Subject Code	Subject	Contact Hours		Credit Hours
		T	P	C
Eng-112	English	2	0	2
Gen-111	Islamiat & Pak Studies	1	0	1
TTQ-111/ Civic-111	Tarjumat-ul-Quran/ Civics	1	0	1
Math-113	Mathematics-I	3	0	3
MT-133	Civil Drawing	1	6	3
Comp-162	Computer Applications	1	3	2
Phy-133	Applied Physics	2	3	3
Ch-143	Applied Chemistry	2	3	3
GIS-113	Introduction to GIS & R.S	2	3	3
GIS-122	Climatology and Geomorphology	2	0	2
MGM-132	Communication Skills	2	0	2
	Total	19	18	25
SECOND YEAR				
Subject Code	Subject	ContactHours		Credit Hours
		T	P	C
GEN-201	Islamiat & Pak Studies	1	0	1
TTQ-211/ Civic-211	Tarjumat-ul-Quran / Civics	1	0	1
Math-212	Mathematics-II	2	0	2
GIS-212	Fundamentals of Mining	2	0	2
GIS-223	Geodesy and Global Positioning System	2	3	3
GIS-234	Surveying-I	2	6	4
GIS-243	Introduction to Construction Techniques	2	3	3
GIS-254	Cartographic Techniques	2	6	4
GIS-263	Spatial Analysis & GIS Programming	2	3	3
GIS-273	Fundamentals of Digital Image Processing	2	3	3
GIS-282	Report Writing	2	0	2
	Total	20	24	28
THIRD YEAR				
Subject Code	Subject	Contact Hours		Credit Hours
		T	P	C
GEN-301	Islamiat & Pak-Studies	1	0	1
GIS-314	Surveying-II	2	6	4
GIS-324	GIS and RS Application in Earth Sciences	2	6	4
GIS-333	Spatial Database Management	2	3	3
GIS-344	Drone Mapping and Aerial Photography & Photogrammetry	2	6	4
GIS-354	GIS & RS Based Project / Field survey Camp	0	12	4
	Total	9	33	20

ٹی پی سی
1 0 1
کل وقت: 20 گھنٹے

GEN III

سال اول

حصہ اول اسلامیات

حصہ دوم مطالعہ پاکستان

موضوعات حصہ اول اسلامیات

کتاب و سنت

(ا) قرآن مجید

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

- 1.1 تنالوا البر حتی تنفقوا مما تحبون
- 1.2 واعتصموا بحبل اللہ جمیعاً ولا تفرقوا
- 1.3 ولا یجر منکم شنان 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 الصلوٰتہ تنہی عن الفحشاء وامنکر
- 1.7 لقد کان لکم فی رسول اللہ سوة حسنتہ
- 1.8 ان اکرمکم عند اللہ اتقاکم
- 1.9 وما آتاکم الرسول فخرزو وما نہی عنہا نہوا
- 1.10 واولفوا بالعہد
- 1.11 وما شروہن بالمعروف
- 1.12 یمحق اللہ الربو ویربب الصمدقات
- 1.13 واصبر علی ما اصابک
- 1.14 وقولوقولا سدیداً
- 1.15 ان الدین عند اللہ السلام

(ب) سنت

- 1- سنت کی اہمیت
- 2- دس منتخب احادیث مع ترجمہ و تشریح

- 1 انما الاعمال بالنيات
- 2 اما بنت لا تم مكارم الاخلاق
- 3 لا يومن احدكم حق يحب الاخيه ما يحب نفسه
- 4 المسلم من سلم المسلمون من سلم المسلمون من النسانه ويده
- 5 قل امننت بالله سلم استقم
- 6 خيركم خيركم لاله
- 7 سباب المسلم فسوق وقتاله كفر
- 8 المومن اخو المومن
- 9 كل المسلم على المسلم حرام بمعه وماله وفرقه
- 10 ايتيه المنافق ثلاث اذا حديث كذب و افا او تمن خان واذا وفدا خلف

دين اسلام

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

-1 توحيد

-2 رسالت

-3 آخرت

-4 ملائکہ

-5 آسمانی کتب

2.2 عبادات

-1 نماز 2- روزہ 3- حج 4- زکوٰۃ

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

تدریسی مقاصد

1- قرآن مجید

- عمومی مقصد: طالب علم یہ سمجھنے کے قابل ہو کہ اسلام کی تعلیمات کا اصل سرچشمہ قرآن مجید ہے
 خصوصی مقاصد: طالب علم اس قابل ہو جائے گا کہ
- ☆ قرآن مجید کی تعریف کر سکے گا
 - ☆ قرآن مجید کے نزول کی صورت بیان کر سکے
 - ☆ قرآن مجید کی کئی و مدنی سورتوں کی پہچان کر سکے
 - ☆ منتخب آیات کا ترجمہ و تشریح کر سکے
- عمومی مقصد: یہ سمجھنے کے قابل ہو جائے گا کہ منتخب قرآنی آیات کے ذریعے اسلامی تعلیمات کا مفہوم کیا ہے
- ☆ قرآنی آیات کا ترجمہ تشریح کر سکے
 - ☆ قرآنی تعلیمات کی روشنی میں اپنی اور معاشرتی اصلاح کر سکے

2- سنت

- عمومی مقصد: طالب علم سنت نبوی کی اہمیت اور ضرورت کو اچھی طرح سمجھنے کے قابل ہو جائے گا
 خصوصی مقصد:
- ☆ سنت کی تعریف بیان کر سکے
 - ☆ سنت کی اہمیت و ضرورت کی وضاحت کر سکے
 - ☆ سنت کی روشنی میں اسوہ حسنہ پر عمل کر سکے
- 3- منتخب احادیث نبویہ

- عمومی مقصد: احادیث کی روشنی میں اخلاقی اقدار سے آگاہی حاصل کر سکے
 خصوصی مقصد: احادیث کا ترجمہ و تشریح کر سکے
- رسول اللہ ﷺ کے اسوہ حسنہ کی پیروی کا جذبہ پیدا ہو سکے

عمومی مقاصد: دین اسلامی کے بنیادی مقاصد اور عبادات کے بارے میں جان سکے اور بیان کر سکے
 خصوصی مقاصد
 لفظ دین اسلام کے لغوی اور اصطلاحی معنی بیان کر سکے
 اسلام کے بنیادی مقاصد کی اہمیت بیان کر سکے
 اسلام کے بنیادی مقاصد سے انسان کی انفرادی و اجتماعی زندگی پر پڑنے والے اثرات بیان کر سکے
 عبادت کے لفظی و اصطلاحی معنی بیان کر سکے
 عقیدے اور عبادت کا فرق بیان کر سکے
 عبادات (نماز، روزہ، حج، زکوٰۃ) کے فوری احکامات اور انسانی زندگی پر ان کی اثرات بیان کر سکے
 اسلامی مقاصد و عبادت کے مطابق اپنی زندگی ڈھال کر ایک اچھا مسلمان بن سکے

(غیر مسلم طلباء کے لئے)

GEN III

نصاب اخلاقیات سال اول
حصہ دوم مطالعہ پاکستان

ٹی بی سی
1 0 1
کل وقت: 20 گھنٹے

موضوعات

اخلاقیات کی تعریف اور اہمیت
اخلاقیات کا معیار (قانون، عقل، الہمی کتب)
مندرجہ ذیل اخلاق کی وضاحت

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

نصاب اخلاقیات (سہل اول)

تدریسی مقاصد

عمومی مقاصد: اعلیٰ اخلاق کی وجہ سے ملکی ترقی میں قتل قدر اٹانہ کر کے

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

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

(غیر مسلم طلباء کے لئے)

GEN III

ٹی بی سی
1 0 1
کل وقت: 20 گھنٹے

موضوعات

نصاب اخلاقیات سال اول
حصہ دوم مطالعہ پاکستان

اخلاقیات کی تعریف اور اہمیت
اخلاقیات کا معیار (قانون، عقل، الہمی کتب)
مندرجہ ذیل اخلاق کی وضاحت

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

نصاب (سال اول) Gen III

کل وقت 12 گھنٹے

مطالعہ پاکستان

حصہ دوم

موضوعات

- ☆ حریت فکر: مسلمان قوم میں آزادی فکر کی تاریخ - مسلمانوں میں سیاسی آزادی کی اہمیت اور ضرورت - ذہنی و جسمانی غلامی کے نقصانات
- ☆ نظریہ پاکستان
- ☆ قیام پاکستان کی اساس (دین اسلام) قیام پاکستان کی غرض و غایت نظریہ پاکستان کی وضاحت - نظریہ پاکستان اور علامہ اقبال اور قائد اعظم کے ارشادات کی روشنی میں
- ☆ نظریہ پاکستان کا تاریخی پہلو
- ☆ محمد بن قاسم کی آمد: مجدد الف ثانی اور شاہ ولی اللہ کی تبلیغی خدمات سید احمد شہید کی تحریک مجاہدین
- ☆ تعلیمی تحریکیں
- ☆ علی گڑھ - ندوت العلماء - دیوبند - مدرسۃ الاسلام - (سندھ) اسلامیہ کالج (پشاور) انجمن حمایت اسلام (لاہور)

مطالعہ پاکستان (حصہ دوئم)
تدریسی مقاصد
حریت فکر:

- عمومی مقصد
- طالب علم یہ جان لے کہ اسلام میں اور مسلمان قوم میں آزادی فکر کی کیا اہمیت ہے
- خصوصی مقاصد
- ☆ حریت فکر کا معنی و مفہوم بیان کر سکے
- ☆ آزادی فکر کی اہمیت بیان کر سکے
- ☆ خصوصاً "اسلام میں آزادی اظہار رائے کی اہمیت بیان کر سکے
- ☆ ذہنی غلامی کے قومی سطح پر نقصانات کے بیان کر سکے
- ☆ جسمانی غلامی قومی سطح پر نقصانات بیان کر سکے
- نظریہ پاکستان
- عمومی مقصد:
- نظریہ پاکستان (دین اسلام) سے پوری طرح واقفیت ہو جائے
- خصوصی مقاصد:
- ☆ نظریہ کی تعریف بیان کر سکے اور اس کی وضاحت کر سکے
- ☆ نظریہ پاکستان کی تعریف کر سکے اور اس کا مفہوم بیان کر سکے
- ☆ علامہ اقبال اور قائد اعظم کے فرمودات کی روشنی میں نظریہ پاکستان بیان کر سکے
- نظریہ پاکستان کا تاریخی پہلو
- عمومی مقصد
- ☆ نظریہ پاکستان کے تاریخی پس منظر سے واقفیت حاصل کر سکے
- خصوصی مقاصد:
- ☆ محمد بن قاسم کے بارے میں بیان کر سکے

TTQ 111

TARJAMA TUL QURAN / CIVICS

T	P	C
1	0	1
Total Contact Hours:		
Theory:		32
Practical:		0

(As per Syllabus prescribed by BISE)

SYLLABI AND COURSES OF READING

اخلاقیات لازمی (ETHICS)
(غیر مسلموں کیلئے متبادل اسلامیات لازمی)

Eng-112 ENGLISH**Total Contact Hours**

Theory	64	T	P	C
Practical	0	2	0	2

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

COURSE CONTENTS
ENGLISH PAPER "A"

1. PROSE/TEXT **16 Hours**

1.1 First eight essays of Intermediate. English Book-II

2. CLOZE TEST **4 Hours**

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

ENGLISH PAPER "B"

3. GRAMMAR **26 Hours**

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

4. COMPOSITION **8 Hours**

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

5. TRANSLATION **6 Hours**

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

Reference Books:

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

ENG-112 ENGLISH**INSTRUCTIONAL OBJECTIVES****PAPER-A****1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY**

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

2. UNDERSTAND FACTS OF THE TEXT

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

PAPER-B**3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING**

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

4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICAL SITUATIONS

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

5. APPLIES RULES OF TRANSLATION

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

Math-113 APPLIED MATHEMATICS

Total contact hours	96	T	P	C
Theory		3	0	3

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

Learning Outcomes: After completing the course the students will be able to

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

COURSE CONTENTS

1	QUADRATIC EQUATIONS	6 Hrs
1.1	Standard Form	
1.2	Solution	
1.3	Nature of roots	
1.4	Sum & Product of roots	
1.5	Formation	
1.6	Problems	
2	ARITHMETIC PROGRESSION AND SERIES	3Hrs
2.1	Sequence	
2.2	Series	
2.3	nth term	
2.4	Sum of the first n terms	
2.5	Means	
2.6	Problems	
3	GEOMETRIC PROGRESSION AND SERIES	3Hrs
3.1	nth term	
3.2	sum of the first n terms	
3.3	Means	
3.4	Infinite Geometric progression	
3.5	Problems	
4	BINOMIAL THEOREM	6 Hrs
4.1	Factorials	
4.2	Binomial Expression	
4.3	Binomial Co-efficient	
4.4	Statement	
4.5	The General Term	
4.6	The Binomial Series	
4.7	Problems	
5	PARTIAL FRACTIONS	6 Hrs
5.1	Introduction	
5.2	Linear Distinct Factors	Case I
5.3	Linear Repeated Factors	Case II

5.4	Quadratic Distinct Factors Case III	
5.5	Quadratic Repeated Factors Case IV	
5.6	Problems	
6	FUNDAMENTALS OF TRIGONOMETRY	6 Hrs
6.1	Angles	
6.2	Quadrants	
6.3	Measurements of Angles	
6.4	Relation between Sexagesimal & circular system	
6.5	Relation between Length of a Circular Arc & the Radian Measure of its central Angle	
6.6	Problems	
7	TRIGONOMETRIC FUNCTIONS AND RATIOS	6 Hrs
7.1	trigonometric functions of any angle	
7.2	Signs of trigonometric Functions	
7.3	Trigonometric Ratios of particular Angles	
7.4	Fundamental Identities	
7.5	Problems	
8	GENERAL IDENTITIES	6 Hrs
8.1	The Fundamental Law	
8.2	Deductions	
8.3	Sum & Difference Formulae	
8.4	Double Angle Identities	
8.5	Half Angle Identities	
8.6	Conversion of sum or difference to products	
8.7	Problems	
9	SOLUTION OF TRIANGLES	6 Hrs
9.1	The law of Sine's	
9.2	The law of Cosines	
9.3	Measurement of Heights & Distances	
9.4	Problems	
10	MENSURATION OF SOLIDS	30 Hrs
10.1	Review of regular plane figures and Simpson's Rule	
10.2	Prisms	
10.3	Cylinders	
10.4	Pyramids	
10.5	Cones	
10.6	Frusta	
10.7	Spheres	
11	VECTORS	9 Hrs
11.1	Scalars & Vectors	
11.2	Addition & Subtraction	
11.3	The unit Vectors i, j, k	
11.4	Direction Cosines	
11.5	Scalar or Dot Product	
11.6	Deductions	
11.7	Dot product in terms of orthogonal components	
11.8	Deductions	
11.9	Analytic Expression for $a \times b$	
11.10	Problems	
12	MATRICES AND DETERMINANTS	9 Hrs
12.1	Definition of Matrix	

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

REFERENCE BOOKS

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

INSTRUCTIONAL OBJECTIVES

1 USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATIONS

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

2 UNDERSTAND APPLY CONCEPT OF ARITHMETIC PROGRESSION AND SERIES

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

3 UNDERSTAND GEOMETRIC PROGRESSION AND SERIES

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

4 EXPAND AND EXTRACT ROOTS OF A BINOMIAL

- 4.1 State binomial theorem for positive integral index
- 4.2 Explain binomial coefficients: $(n,0), (n,1), \dots, (n,r), \dots, (n,n)$
- 4.3 Derive expression for the general term
- 4.4 Calculate the specified terms
- 4.5 Expand a binomial of a given index
- 4.6 Extract the specified roots
- 4.7 Compute the approximate value to a given decimal place
- 4.8 Solve problems involving binomials

5 RESOLVE A SINGLE FRACTION INTO PARTIAL FRACTIONS USING DIFFERENT METHODS

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

6 UNDERSTAND SYSTEMS OF MEASUREMENT OF ANGLES

- 6.1 Define angles and the related terms
 - 6.2 Illustrate the generation of angle
 - 6.3 Explain sexagesimal and circular systems for the measurement of angles
 - 6.4 Derive the relationship between radian and degree
-

- 6.5 Convert radians to degrees and vice versa
 - 6.6 Derive a formula for the circular measure of a central angle
 - 6.7 Use this formula for solving problems
 - 7 APPLY BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRIC FUNCTIONS**
 - 7.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sides of a right triangle
 - 7.2 Derive fundamental identities
 - 7.3 Find trigonometric ratios of particular angles
 - 7.4 Draw the graph of trigonometric functions
 - 7.5 Solve problems involving trigonometric functions
 - 8 USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICAL PROBLEMS**
 - 8.1 List fundamental identities
 - 8.2 Prove the fundamental law
 - 8.3 Deduce important results
 - 8.4 Derive-sum and difference formulas
 - 8.5 Establish half angle, double angle & triple angle formulas
 - 8.6 Convert sum or difference into product& vice versa
 - 8.7 Solve problems
 - 9 USE CONCEPTS, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES**
 - 9.1 Define angle of elevation and angle of depression
 - 9.2 Prove the law of sines and the law of cosines
 - 9.3 Explain elements of a triangle
 - 9.4 Solve triangles and the problems involving heights and distances
 - 10 USE PRINCIPLES OF MENSTRUATION IN FINDING SURFACES, VOLUME AND WEIGHTS OF SOLIDS.**
 - 10.1 Define menstruation of plane and solid figures
 - 10.2 List formulas for perimeters & areas of plane figure
 - 10.3 Define pyramid and cone
 - 10.4 Define frusta of pyramid and cone
 - 10.5 Define a sphere and a shell
 - 10.6 Calculate the total surface and volume of each type of solid
 - 10.7 Compute weight of solids
 - 10.8 Solve problems of these solids
 - 11. USE THE CONCEPT AND PRINCIPLES OF VECTORS IN SOLVING TECHNOLOGICAL PROBLEMS.**
 - 11.1 Define vector quantity
 - 11.2 Explain addition and subtraction of vector
 - 11.3 Illustrate unit vectors I, j, k
 - 11.4 Express a vector in the component form
 - 11.5 Explain magnitude, unit vector, direction consines of a vector
 - 11.6 Derive analytic expression for dot product and cross product of two vector
 - 11.7 Deduce conditions of perpendicularly and parallelism of two vectors.
 - 11.8 Solve problems
 - 12. USE THE CONCEPT OF MATRICES & DETERMINANTS IN SOLVING TECHNOLOGICAL PROBLEMS**
 - 12.1 Define a matrix and a determinant
 - 12.2 List types of matrices
 - 12.3 Define transpose, ad joint and inverse of a matrix
-

- 12.4 State properties of determinants
 - 12.5 Explain basic concepts
 - 12.6 Explain algebra of matrices
 - 12.7 Solve linear equation by matrices
 - 12.8 Explain the solution of a determinant
 - 12.9 Use Cramm's Rule for solving linear equations
-

Ch- 143

APPLIED CHEMISTRY

Total Contact Hours

T P C

Theory 64

2 3 3

Practical 96

OBJECTIVES

This course has been designed to impart through understanding of the subject with special application of theoretical knowledge and practical problem.

DESCRIPTION

Review of Basic Chemistry, Water, Acid, Bases and Salt, Chemical Bonding, Chemistry of Building Materials, Chemistry of Carbon, Corrosion, Refractory Materials and Abrasives.

Sr.No	Contents	Hours
1	i) Review of basic chemistry:- Matter, mixture, compound, element, Radical, Valency formula, atom, atomic weight, atomic number, Structural formula weight, Periodic Table, Numerical problems. ii) Define Chemistry, state units of measurements, Define SI system measurement of mass length, time and other physical quantities, Metal, Non-Metals Symbol, Atoms and Molecules, Atomic mass, Molecular, Mass, Gram Atomic Mass, Gram Molecular Mass, Avogadro's number, Law of constant composition, Percentage composition. i) Chemical equation, how to write it. iii) Characteristics and balancing, chemical reaction and its types.	Total 64
2	Water:- Sources of water. Impurities of water, their removal. Hard and soft water. Causes and effects of hard water.	
3	Removal of hardness of water. Composition of water and its structure. Water as solvent. Hydration. Hydrolysis.	
4	Practical on removal of hardness and water solvent Factors affecting solubility Saturated, unsaturated and super saturated solutions. Acids, bases and salt	
5	i) Definition of Acids bases and salts. ii) Manufacturing of H_2SO_4 , HCl and HNO_3 iii) Properties of acid bases salts and their uses. Action of acids on alkalies, Metal and non Metals.	
6	CHEMICAL BONDING i) Chemical bonding Types of chemical bonds, e.g. Ionic, bonds, Covalent bonds, (Polar and non-polar. i) Chemistry of building materials, e.g. Cement, glass, plastic and polymers, Steel, and Fiber Glass; Their Extraction, composition, properties and uses.	
7	CHEMISTRY OF CARBON i) Allotropic forms of carbon ii) Minerals bases on carbon e.g. diamond, graphite, coal. iii) Their properties and uses Analysis of coal.	
8	CORROSION i) Causes and effects of Corrosion ii) Protective measures against corrosion.	

	iii) Rusting of Iron. Types of corrosion. Refractory Materials and Abrasives	
9	i) Introduction to Refractories ii) Classification of Refractories iii) Properties and Uses. iv) Introduction to Abrasives. Artificial and Natural Abrasives and their uses.	

CHEMISTRY (PRACTICAL)

Sr.No	Practicals	96 Hrs.
1	To prepare standard solution of Oxalic acid and with its help standardize a solution of NOH.	
2		
3	Prepare approximate N/10 solution of H ₂ SO ₄ and determine its exact normality by titration it against standard N/10 NaOH	
4		
5	To determine the heat of Neutralization of strong base (NaOH) To separate a mixture of various inks by	
6	paper chromatography	
7	To construct the ball and spring models of some simple chemical compounds	
8	To construct the model of NaCl crystal	
9	To determine the molecular weight by observing the depression in the freezing point by cryoscopy	
10		
	Qualitative analysis of salts	
11	Detection of elements in organic compounds i.e. C, H ₂ , N ₂ , S and Halogens	
12	Identification of different solutions using	
	(a) litmus (paper/solution) (b)PH paper	
	Temporary and permanent hard water and its removal	
	To determine the number of molecules of water of crystallization in sodium carbonate (washing soda) crystals	

Total Contact Hours

Theory 64

Practical 96

OBJECTIVES

This course is designed to impart knowledge on the physical properties of bodies with particular reference to the engineering application.

DESCRIPTION

Measurements, Scalars and Vectors, Motion and Force, Gravitation, Equilibrium, Friction, Work, Energy and Power, Machines, Heat and Temperature, Motion in two Dimensions, Lights, Geometrical Optics, Electronics.

Sr.No.	Contents	Hours
1	Measurements. 1.1 Fundamental units and derived units. 1.2 Various systems of units and S.I. Units. 1.3 Concept of dimension/dimensional formula 1.4 Conversation from one system to other significant figures.	06
2	Scalars and Vectors. Vectors representations, addition, subtraction and multiplication, parallelogram law of forces, composition and resolution of vectors, diagrams. Rectangular component of a vector, dot product and cross product. Solution of numerical examples.	06
3	Motion and Force. Rest and motion, velocity, acceleration and deceleration. Equations of uniformly acceleration rectilinear motion. Motion under gravity, Newton's laws of motion, mass and weight, momentum and impulse, law of conservation of momentum and impulse, law of conservation of momentum. Numerical example on the above topics.	06
4	Gravitation. 4.1 Gravitation and gravity. 4.2 Law of universal gravitation. 4.3 Determination of mass of earth. 4.4 Variation of "g" with altitude and depth. 4.5 Numerical examples on the above topics.	04
5	Equilibrium. 5.1 Concurrent and non-concurrent forces. 5.2 Conditions of equilibrium for :- i. Concurrent forces. ii- Non-concurrent forces. 5.3 Equilibrium of objects supported by wires and ropes. 5.4 Centre of gravity, couples. 5.5 Torque and moment of couples. 5.6 Beam and ladders in equilibrium. 5.7 Numerical examples on the above topics.	04
6	Friction. 6.1 Co-efficient of friction, angle of friction, angle of contact of friction. 6.2 Laws of friction. 6.3 Motion of a body on a rough inclined plane. 6.4 Methods of reducing friction. 6.5 Numerical example on the above topics.	04
7	Work, Energy and Power. 7.1 Units of works. 7.2 Works done by a body moving in the gravitational field or work done by a variable force. 7.3 Power and its units. 7.4 Energy and its units.	

	7.5	Kinds of energy i.e. Kinetic and potential energy.	
	7.6	Inter conservation of K.E. and P.E.	
	7.7	Conservation of energy.	
	7.8	Numerical examples on the above topics.	06
8		<i>Machines.</i>	
	8.1	Definition of machine. Purpose of machines.	
	8.2	Mechanical advantage.	
	8.3	Efficiency. Kinds of simple machines.	
	8.4	Principle of work.	
	8.5	Mechanical applications.	
		i. Lever	
		ii. Screw.	
		iii. Differential Pulley.	
		iv. Pulley Block.	
	8.6	Numerical examples on the above mentioned top	<i>04</i>
9		Heat and Temperature.	
	9.1	Specific heat and its measurements.	
	9.2	Thermal expansion, Relation between three types of expansions.	
	9.3	Modes of transfers of heats.	
	9.4	Thermodynamics.	
	9.5	Laws of thermodynamics.	
	9.6	Carnot's cycle (heat engine).	
	9.7	Entropy.	
	9.8	Numerical examples on the above topics.	
	9.9	Three tests in one year of each of one hours duration.	<i>04</i>
10		Motion in two Dimensions	
		Projectile motion, motion in a circle, centripetal force, centrifugal force, angular displacement, angular velocity, radian degree, relation between linear & angular motion. Numerical examples on the above topics.	<i>10</i>
11		Lights.	
	11.1	Review laws of reflection and refraction.	
	11.2	Image formation by mirrors and lenses. Wave theory of light.	
	11.3	Nature of light.	
	11.4	Quantum theory of light.	
	11.5	Ordinary light and monochromatic light.	
	11.6	Dispersion of light.	
	11.7	Rainbow, Electromagnetic spectrum.	
	11.8	Emission of light by an atom.	
	11.9	Velocity of light.	
	11.10	Polarization of light waves.	10
12		<i>Geometrical Optics.</i>	
	12.1	Geometrical optics lens.	
	12.2	Types of lenses.	
	12.3	Centre of curvature.	
	12.4	Radius of curvature.	
	12.5	Principal axis.	
	12.6	Principal focus.	
	12.7	Focal length.	
	12.8	Optical Centre.	
	12.9	Power of a lens.	
	12.10	Rules for geometrical construction of image.	
	12.11	Deviation of lens formula.	
	12.12	Linear magnification.	
	12.13	Angular magnification.	
	12.14	Convex lens and image positions formed by it.	
	12.15	Derivation of formula for magnifying power in optical instruments.	
	12.16	Near and far points important lens defects.	
	12.17	How can these defects be removed.	

13**Electronics:**

Matter Atomic Number, Mass Number, Normal/Ground state of an atom,,
Excited and Ionized atom, Energy Bands in Solids, Conductors. Semi-
Conductors and Insulator, Intrinsic and Extrinsic Semi Conductors (N Types
and P Types Semi Conductor), P-N Junction, Forward Biased and Reverse
Biased of P-N Junction, Semi Conductors diodes, PNP and NPN Transistor
and their functions.

06

PHYSICS (PRACTICALS)

Sr.No.	Practicals	96 Hrs.
1	Volume of a solid cylinder using a vernier calipers	
2	Capacity of a test tube using vernier calipers	
3	Volume of a small sphere using a micrometer screw-gauge	
4	Area of cross section of a wire using a micrometer screw gauge	
5	Radius of curvature of spherical mirror using a spherimeter and calculation of its focal length	
6	Addition of vectors by Rectangular components	
7	Value of „g“ by free fall method	
8	Conditions of equilibrium	
	„g“ by simple pendulum and length of Second’s pendulum	
9	Verification of the following relations of the simple pendulum	
	i) Time period is independent of mass	
	ii) Time period is directly proportional to Sqrt of displacement and length	
10	Surface tension of a liquid by capillary rise method	
11	Young’s Modulus of a wire by Searle’s Apparatus	
12	Determine specific heat of a solids by calorimeter	
13	Determine moment of inertia	
14	Determine mechanical advantage of included plane	
15	Velocity of periodic waves by ripple tank	
16	Frequency by Melde’s Apparatus	
17	Laws of vibration of stretched strings	
	Velocity of sound in air at 0°C by resonance tube apparatus using first resonance position and applying end correction	
18		
19	Velocity of sound in air at 0°C by resonance tube using two resonance positions	
20	Focal length of a convex lens by parallax method	
21	Focal length of a convex lens by displacement method	
22	Focal length of a concave lens by using a concave mirror	
23	Focal length of a concave lens by using a convex lens	
24	Refractive index of the material of a prism by critical angle method	
25	Refractive index of a liquid using a concave mirror	
26	Refractive index of glass using a spectrometer	
27	Wave length of sodium light by Newton’s Rings	
28	Wave length by diffraction grating	
29	Setting up of a compound microscope : determination of its magnifying power	

MT-133: Civil Drawing

Total Contact Hours	224			
Theory	32	T	P	C
Practical	192	1	6	3

Learning Outcomes: Understand the techniques of drawing buildings, roads, irrigation structure and methods of inking and ferro printing.

COURSE CONTENTS

- | | |
|--|----------------|
| 1 Civil Drawing Components | 9 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 Use of AutoCAD | |
| 2 Frame structure buildings | 6 Hours |
| 2.1 Definition of frame structure | |
| 2.2 Instruction on drawing Raft foundation with steel reinforcement | |
| 2.3 Instruction for detailed drawing of frame structure showing all components | |
| 2.4 Use of AutoCAD | |
| 3 Drawing of Road structures | 7 Hours |
| 3.1 Instruction for drawing of x-section of Roads | |
| 3.2 Instructions for drawing of R.C.C. Road culvert 5ft span | |
| 3.3 Instructions for detailed drawing of high level two span R.C.C. deck bridge with 25' span each | |
| 4 Drawing of Irrigation Structures | 6 Hours |
| 4.1 Instructions for detailed drawing of high level two span R.C.C. deck bridge with 25' span each | |
| 4.2 Instructions for drawing typical section of Irrigation Channel in cutting and filling | |
| 4.3 Instruction for drawings of A.P.M. out-let, masonry flume | |
| 5. Inking and Ferro Printing | 4 Hours |
| 5.1 Introduction to inking and Ferro printing | |
| 5.2 Introduction for link tracing including materials and apparatus used | |
| 5.3 Sensitizing paper, taking out prints | |

Reference Books:

1. Civil Engineering Drawing and AutoCAD (Civil-243) written by Engr. Shiekh Muhammad Asif and Rana Muhammad Ashraf Khan
2. Engg. Drawing by A.C Parkinson
3. Engg. Drawing by N.D Bhatt

INSTRUCTIONAL OBJECTIVES

1 Civil Drawing Components

Students should learn how to draw building components and definitions related to them:-

- 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 Use of AutoCAD

2 Frame Structure Buildings

Students should learn in detail about frame structure buildings and terms related to them:-

- 2.1 Definition of frame structure
- 2.2 Instruction on drawing Raft foundation with steel reinforcement
- 2.3 Instruction for detailed drawing of frame structure showing all components
- 2.4 Use of AutoCAD

3 Drawing of Road Structures

Students should learn about road structure drawings and terms related to them:-

- 3.1 Instruction for drawing of x-section of Roads
- 3.2 Instructions for drawing of R.C.C. Road culvert 5ft span
- 3.3 Instructions for detailed drawing of high level two span R.C.C. Deck Bridge with 25' spans each

4 Drawing of Irrigation Structures

Student should learn about:-

- 4.1 Instructions for drawing typical section of Irrigation Channel in cutting and filling
- 4.2 Instruction for drawings of A.P.M. out-let, masonry flume

5 Inking and Ferro Printing

Student should learn about:-

- 5.1 Introduction to linking and Ferro printing
- 5.2 Introduction for link tracing including materials and apparatus used
- 5.3 Sensitizing paper, taking out prints

List of Practicals**192 Hours**

- 1. Introduction to Drafting Tools and Techniques**
Understanding and using drafting tools: T-square, set squares, protractor, compasses, and drafting machine
 - 2. Drawing Simple Structures**
Drawing plans, elevations, and sections of simple structures like single-room buildings. Understanding scale and dimensions
 - 3. Drawing of Building Components**
Draw foundational elements, walls, roofs, doors, and windows, showing detailed construction components
 - 4. Drawing of a Residential Building Plan**
Draw the floor plan, elevations, and sections of a small residential building, including room layouts, and dimensions
 - 5. Drawing of Frame Structure Building with Reinforcement Details**
Create basic plans and sections of a frame structure building, focusing on reinforcement details for beams, columns, and slabs
 - 6. Drawings of Road Structures**
Draw basic road layouts, cross-sections, and drainage systems, including culverts and side drains
 - 7. Drawings of Irrigation Structures**
Create basic drawings of canals, irrigation channels, weirs, and sluice gates
 - 8. Detailed Drawings of Bridges**
Draw the basic plan, elevation, and sections of a simple bridge, focusing on the structural elements like beams, supports, and foundations
 - 9. Ink Tracing of a Given Drawing and Taking Its Prints**
Trace provided technical drawings using ink and produce high-quality prints.
 - 10. Application of AutoCAD Software in Civil Drafting**
Introduction to CAD software for basic drawing. Use AutoCAD to create basic geometric shapes, floor plans, elevations, and structural details
- 4.

COMP-162**COMPUTER APPLICATIONS**

Total Contact Hours		T	P	C
Theory:	32 Hrs	1	3	2
Practical:	96 Hrs			

Pre-requisites: None

Learning Outcomes: This subject will enable the student to be familiar with the basic daily life applications of computer. Trainee will also learn computer applications and other information according to profession at elementary level. Trainee will learn the knowledge and skills regarding EDP, Windows OS, MS-Word, C++, Spread Sheets (Excel), Power Point & Internet.

COURSE CONTENTS:

- 1. ELECTRONIC DATA PROCESSING (E.D.P.) 4 Hours**
 - 1.1 Basic Terms of Computer Science Data & its types, Information, Hardware, Software
 - 1.2 Computer & its types
 - 1.3 Generations of Computers
 - 1.4 Block diagram of a computer system
 - 1.5 BIT, Byte, RAM & ROM
 - 1.6 Input & Output devices
 - 1.7 Secondary storage devices
 - 1.8 Types of Software
 - 1.9 Programming Languages
 - 1.10 Applications of computer in different fields
 - 1.11 Applications in Engineering, Education & Business
- 2. MS-WINDOWS 6 Hours**
 - 2.1 Introduction to Windows
 - 2.2 How to install Drivers & Windows
 - 2.3 Loading & Shut down process
 - 2.4 Introduction to Desktop items (Creation of Icons, Shortcut, Folder & modify Taskbar)
 - 2.5 Desktop properties
 - 2.6 Use of Control Panel
 - 2.7 Searching a document
- 3. MS-OFFICE 7 Hours**
 - 3.1 Introduction to MS-Office
 - 3.2 Introduction to MS-Word & its Screen
 - 3.3 Create a new document
 - 3.4 Editing & formatting the text
 - 3.5 Saving & Opening a document
 - 3.6 Page setup (Set the Margins & Paper)
 - 3.7 Spell Check & Grammar

- 3.8 Paragraph Alignment
- 3.9 Inserting Page numbers, Symbols, Text box & Picture in the document
- 3.10 Use the different Format menu drop down commands(Drop Cap, Change Case, Bullet & Numbering and Border & Shading)
- 3.11 Insert the 'Table and it's Editing
- 3.12 Printing the document
- 3.13 Saving a document file as PDF format
- 4. MS-OFFICE 4 Hours**
 - 4.1 Introduction to MS-Excel & its Screen
 - 4.2 Entering data & apply formulas in worksheet
 - 4.3 Editing & Formatting the Cells, Row & Column
 - 4.4 Insert Graphs in sheet
 - 4.5 Page setup, Print Preview & Printing
 - 4.6 Types & Categories of Charts
- 5. MS-OFFICE 4 Hours**
 - 5.1 Introduction to MS-Power point
 - 5.2 Creating a, presentation
 - 5.3 Editing & formatting a text box
 - 5.4 Adding pictures & colors to a slide
 - 5.5 Making slide shows
 - 5.6 Slide Transition
- 6. INTRODUCTION TO PROGRAMMING 4 Hours**
 - 6.1 Introduction to computer programming and languages
 - 6.2 Introduction to C++
 - 6.3 Arithmetical operations
 - 6.4 Logical operations
 - 6.5 Looping
 - 6.6 Flow chart
- 7. INTERNET & E-MAIL 3 Hours**
 - 7.1 Introduction to Internet & browser window
 - 7.2 Searching, Saving and Print a page from internet
 - 7.3 Creating, Reading & Sending E-Mail
 - 7.4 File Attachment
 - 7.5 Uploading and downloading file(s) and software(s)
 - 7.6 Explain some advance features over the internet and search engines
 - 7.7 Difference between Internet, Intranet and Extranet

RECOMMENDED BOOKS

1. Gottfrid. R. S., (1 May 1986). Schaum's Outline of Programming with BASIC. New York: McGraw-Hill.
2. Any Word Processor Latest Release (e.g., Word, Word-Perfect etc).
3. Miller. A.R., (1993). The ABC's of DOS 6. Hoboken; Sybex.

Instructional Objectives:

1. UNDERSTAND ELECTRONIC DATA PROCESSING (E.D.P)

- 1.1. Describe Basic Terms of Computer Science. Data & its Types, Information, Hardware, Software
- 1.2. Explain Computer & its types
- 1.3. Generations of Computers
- 1.4. Explain Block diagram of a computer system
- 1.5. State the terms such as BIT, Byte, RAM & ROM
- 1.6. Identify Input & Output devices
- 1.7. Describe Secondary Storage devices
- 1.8. Explain Types of Software
- 1.9. Introduction to Programming Language
- 1.10. Explain Applications of computer in different fields
- 1.11. Application in Engineering, Education & Business

2. UNDERSTAND MS-WINDOWS

- 2.1 Explain Introduction to Windows
- 2.2 How to install Drivers & Windows
- 2.3 Describe Loading & Shut down process
- 2.4 Explain Introduction to Desktop items(Creation of Icons, Shortcut, Folder & modify Taskbar)
- 2.5 Explain Desktop properties
- 2.6 Describe Use' of Control Panel (add/remove program, time & date, mouse and create user account)
- 2.7 Explain the method of searching a document

3. UNDERSTAND MS-OFFICE

- 3.1 Explain Introduction to MS-Office
- 3.2 Describe -Introduction to MS-Word & its Screen
- 3.3 Describe create a new document
- 3.4 Explain Editing & formatting the text
- 3.5 Describe saving & Opening a document
- 3.6 Explain Page setup, (Set the Margins & Paper)
- 3.7 Describe Spell Check & Grammar
- 3.8 Explain Paragraph Alignment
- 3.9 Explain Inserting Page numbers, Symbols, Text box & Picture in the document
- 3.10 Describe Use the different Format menu drop down commands(Drop Cap, Change Case, Bullet & Numbering and Border & Shading)
- 3.11 Explain Insert the Table and its Editing and modifying
- 3.12 Describe printing the document
- 3.13 Describe the method of file saving as a PDF Format

4. UNDERSTAND MS-OFFICE

- 4.1 Explain Introduction to MS-Excel & its Screen
- 4.2 Describe Entering data & apply formulas in worksheet
- 4.3 Describe Editing & Formatting the, Cells, Row & Column
- 4.4 Explain Insert Graphs in sheet
- 4.5 Describe Page setup, Print preview & Printing
- 4.6 Explain in details formulas for sum, subtract, multiply, divide, average

4.7 Explain in details the types of charts e.g pie chart, bar chart

5. UNDERSTAND MS-OFFICE

5.1 Describe Introduction to MS-Power point

5.2 Explain creating a presentation

5.3 Describe Editing & formatting a text box

5.4 Explain Adding pictures & colors to a slide

5.5 Describe Making slide shows

5.6 Explain Slide Transitions

6. UNDERSTAND LANGUAGE

6.1 Define program, programming, programmer , and programming languages

6.2 Classify computer programming languages

6.3 Describe briefly computer languages

6.4 Describe C++ programming language and its advantages

6.5 Explain arithmetic operations (addition, multiplication, subtraction, division etc.)

6.6 Explain logical operations (AND, OR, NOT, Equal to, etc.)

6.7 Explain the basics of loops for repetitive operations

6.8 Explain the components of Flow-Charts for simple computer program

7. UNDERSTAND INTERNET & E-MAIL

7.1 Explain Introduction to Internet and browser window

7.2 Explain Introduction to Internet and browser window

7.3 Explain Searching, Saving and Print a page from internet

7.4 Describe Creating, Reading & Sending E-Mail

7.5 File attachment.

7.6 Uploading and downloading file(s) and software(s)

7.7 Explain some advance features over the internet and how to search topics on different search engines

7.8 Difference between Internet, Intranet and Extranet

List of Practicals:**96 Hours**

1. Identify key board, mouse, CPU, disk drives, disks, monitor, and printer, Speakers, microphone, scanner, digital camera, card reader, DSL Modem and other magnetic elements
2. **MS WINDOWS**
 - 2.1 Practice of loading and shutdown of operating system
 - 2.2 How to install Drivers & Windows
 - 2.3 Creating items (icons, shortcut, folders etc) and modifying taskbar
 - 2.4 Changing of wallpaper, screensaver, and resolution
 - 2.5 Practice of control panel items (add/remove, time and date, mouse, and create user account)
3. **MS OFFICE**
 - 3.1 Identifying the MS Word Screen and its menu
 - 3.2 Practice of create a new document, saving and re-opening it from the location and spell check & grammar
 - 3.3 Practice of Page Formatting (Borders, Character Spacing, Paragraph, Bullets & Numberings and Fonts)
 - 3.4 Practice of different tool bars like standard, format& drawing tool bars
 - 3.5 Practice of Insert pictures, clipart, and shapes
 - 3.6 Practice of header and footer
 - 3.7 Practice of insert table and also format of table
 - 3.8 Practice of page setup, set the page margins, and printing documents
4. **MS OFFICE**
 - 4.1 Identifying the MS EXCEL Screen and its menu
 - 4.2 Practice of create a new sheet, saving and re-opening it from the location and spell check
 - 4.3 Practice of insert and delete of row and columns (format of cell)
 - 4.4 Practice of entering data and formulas in worksheet(Add, Subtract, Multiplying, and Divide & Average)
 - 4.5 Repeating practical serial number04
 - 4.6 Practice of insert chart and its types
 - 4.7 Practice of page setup, set the page margins, and printing
5. **MS OFFICE (MS-POWER POINT)**
 - 5.1 Identifying the MS POWER POINT Screen and its menu
 - 5.2 Practice of create a new presentation and save
 - 5.3 Practice of open saves presentations
 - 5.4 Practice of inset picture and videos
6. **INTRODUCTION TO PROGRAMMING LANGUAGE**
 - 6.1 Practice on C++ for addition, multiplication, subtraction, division etc.
 - 6.2 Practice on C++ using loop statements.
 - 6.3 Practice on C++ using logical operations (AND, OR, NOT, Shift, Equal to etc)
 - 6.4 Practice on C++ using incremental statement.
 - 6.5 Practice of making flow chart (Prepare a flow chart to find the sum of 529 and 256)
7. **INTERNET & E-MAIL**
 - 7.1 Identifying internet explorer

- 7.2 Practice of searching data from any search engine
- 7.3 Practice of create an E-Mail account and how to send and receive mails, download attachments
- 7.4 File attachment.
- 7.5 Uploading and downloading file(s) and software(s)

GIS-113-INTRODUCTION TO GIS & RS

Total Hours	160	T	P	C
Theory	64	2	3	3
Practical	96			

Learning Outcome: Practical learning and application in GIS and RS. This practical component involves the use of ESRI's GIS modules. In this course students will investigate a GIS application in depth using different software based on the concepts and techniques learned in class.

COURSE CONTENTS

1. Geographic Information System 32 Hours

- 1.1 Introduction to GIS
(Definition, Components, Functional Subsystems)
- 1.2 Evolution and Applications of GIS
- 1.3 Data Acquisition Techniques
(Conventional Methods, GPS, Satellite Imageries, Aerial Photographs etc.)
- 1.4 Data Format in GIS
(Vector and Raster)
- 1.5 GIS Data Models
- 1.6 Data Classification

2. Remote Sensing 32 Hours

- 2.1 Introduction to remote sensing
- 2.2 Applications of remote sensing
- 2.3 Electromagnetic energy and remote sensing
- 2.4 Active and passive remote sensing
- 2.5 Sensors and platforms
- 2.6 Aerial cameras
- 2.7 Multispectral, scanners
- 2.8 Radar
- 2.9 Remote Sensing below the ground surface

Reference Books:-

Reference Books for GIS

1. Aronoff, S. (2004), Geographic Information Systems, A Management Perspective WDL Publications, Ottawa.
2. Burrough, P. (2002), Principles of Geographic Information Systems for Land Resources Management., Oxford University Press, Oxford,
3. Bolstad, P. (2007), GIS Fundamentals: A First Text on Geographic Information Systems. Third Edition. Eider Press, 620pp
4. Carey, H. H. (1983), How to Use Maps and Globes, Franklin Watts, London New York.
5. Clarke, K. (2004), Getting started with Geographic Information System, Prentice Hall , New York,

6. Demers, M. N. (2008). Fundamentals of Geographical Information Systems. Fourth Edition. John Wiley & Sons, New York.
7. Foresman, T. (1997), History of Geographic Information System, Prentice Hall, New York.
8. Heywood, I., Cornelius, S., and Carver, S. (2011). An Introduction to Geographical Information System. Fourth Edition. Prentice hall, New Delhi.
9. Kimerling, J., Buckley, A.R., Muehrcke, P.C., & Muehrcke, J.O. (2011), Map Use: Reading, Analysis, Interpretation. ESRI Press. New York.
10. Krygier, J., & Wood, D. (2011), Making Maps: A Visual Guide to Map Design for GIS. Second Edition. The Guilford Press, New York.

Reference Books for RS

1. Panda, B.C. Introduction to latest technologies in Remote Sensing. Remote Sensing Principles
2. Lillesand, Kiefer, Chipman. Remote Sensing and Image interpretation, 6th edition.
3. Lillesand, T.M & Kiefer, R.W. Remote Sensing and Image Interpretation, 4th edition.
4. Claude, M., Girard, M., & Girard, M. Processing of Remote Sensing Data.
5. Campbell, James B. (2011). Introduction to Remote Sensing, 5th Ed. The Guilford Press. 23
6. Foody, G.M. & Curran, P.J. (1994). Environmental Remote Sensing from Regional to Global scales. John, Wiley & Sons. Inc. 250 p.
7. Gibson, P. J (2000). Introductory Remote Sensing: Principles and Concepts Rutledge.
8. Lillesand, T. M. & Kiefer, R. W. (2010). Remote Sensing and Image Interpretation, 6th edition. John Wiley and Sons Inc.
9. Lulla, K. & Dessinov, L.V. (2000). Dynamic Earth Environmental: Remote Sensing Observations from shuttle Mir Mission John, Wiley & Sons. Inc.288 p.
10. Rancez, A.N. (1999). Remote Sensing for the Earth Sciences. John Wiley & Sons. Inc. 728 p.

INSTRUCTIONAL OBJECTIVES

Geographic Information System

1. Define the terms of Geography Information System and Remote Sensing
2. Learn the practical methods involved in GIS and RS
3. Define practical component involves in use of ESRI's GIS modules
4. Describes ArcGIS Spatial Analyst
5. Learn ArcGIS Geo Statistical Analyst and other analysis tools
6. Investigate GIS application using different software
7. Learn basic concepts and principles of Remote Sensing
8. Provide an overview of the application of Remote Sensing in different fields
9. learn how to use GIS and RS technologies
10. Understand the basic principles of GIS and Remote Sensing
11. Understands the GIS concepts and RS techniques in an interdisciplinary setting.
12. Learn the applications of GIS and Remote Sensing in various disciplines
13. Discuss application of various software for spatial data preparation
14. Discuss application of various software for analysis
15. Learn visualisation with sophisticated skills of vector and raster processing
16. Introduce remote sensing techniques as tool for data collection in mining
17. Introduce remote sensing techniques as tool for data analysis in mining

Remote Sensing

1. Define the terms Remote Sensing
2. Learn the practical methods involved in RS
3. Learn basic concepts and principles of Remote Sensing
4. Provide an overview of the application of Remote Sensing in different fields
5. learn how to use Remote Sensing technology
6. Understand the basic principles of Remote Sensing
7. Understands the concepts of Remote Sensing techniques in an interdisciplinary setting
8. Learn the applications of Remote Sensing in various disciplines
9. Discuss application of various software for spatial data preparation
10. Discuss application of various software for analysis
11. Learn visualisation with sophisticated skills of vector and raster processing
12. Introduce remote sensing techniques as tool for data collection in mining
13. Introduce remote sensing techniques as tool for data analysis in mining

List of Practical**96 Hours****Geographic Information System**

1. Introduce Coordinate Systems
2. Introduce Geo-workspace
3. Learn Geo-referencing
4. Learn to Plot a geographic grid of graph paper (manual)
5. Survey Handheld GPS based field work
6. Incorporate spreadsheet data with GIS
7. Create shape file and spatial database files
8. Digitize and preparation of Land-use Map
9. Generate Maps in form of PDF/Jpeg
10. Learn Practical methods involved in GIS
11. Learn practical component involves in use of ESRI's GIS modules
12. Practice ArcGIS Spatial Analyst
13. Practice ArcGIS Geo Statistical Analyst and other analysis tools
14. Practice to investigate a GIS application in depth using different software

Remote Sensing

1. Develop the understanding of remote sensing
2. Define electromagnetic energy and remote sensing
3. Describe and differentiate active and passive remote sensing
4. Explain sensors and platforms
5. Learn the practical uses of aerial cameras
6. Practice multispectral, scanners
7. Develop the understanding of Radar
8. Practice Remote Sensing below the ground surface
9. Learn Practical methods involved in Remote Sensing
10. Perform the application of Remote Sensing in different fields
11. Perform Remote Sensing techniques as tool for data collection in mining
12. Perform Remote Sensing techniques as tool for data analysis in mining

GIS-122 Climatology and Geomorphology

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

Learning Outcomes: To determine the subject of Geography by its atmospheric condition, weather phenomenon, earth's distinctive features and geomorphic processes.

COURSE CONTENTS**Climatology** **32 Hours**

1. Introduction to Climatology
2. Composition and Structure of Atmosphere
3. Atmospheric temperature
 - i) The horizontal distribution of temperature
 - ii) The vertical distribution of temperature
4. Atmospheric pressure
5. Atmospheric Circulation (Permanent, seasonal and local)
6. Atmospheric moisture and precipitation, process and its formations
7. Classification of Climate
8. Climatic Change

Geomorphology **32 Hours**

1. Introduction to Geomorphology
2. Geological Structure
3. Geological Time Scale
4. Geomorphic Processes (Case study based)
 - i) Fluvial Process and its Landforms
 - ii) Glaciers and their landforms
 - iii) Aeolian Process its and landforms
 - iv) Waves and Geomorphology of Coasts
5. Landforms of Domal, Folded and Faulted structures
6. Volcanism and Volcanic Landforms
7. Karst Topography
8. Drainage patterns and their significance

Reference Books:

1. H. J. DeBlij. *Physical Geography of the Global Environment*. New York, NY (2016)
2. Hugget, Richard J. *Fundamentals of Geomorphology*. Routledge New York, NY (2011)
3. Strahler, A. (2011) *Introduction to Physical Geography*, John Wiley & Sons. New Jersey.
4. Strahler, A.N., Strahler, A.H. (2004), *Physical Environment*, John Wiley& Sons, New York
5. Dasgupta, S. (Ed.) (2009), *Understanding the Global Environment*, Pearson Longman, New Delhi.
6. Burbank, D.W. & Anderson, R.S. (2011), *Tectonic Geomorphology: A Frontier in Earth Science*, Blackwell Science, London.
7. Charlton, R. (2008), *Fundamentals of Geomorphology*, Routledge Taylor & Francis Group, London.
8. Clarke, J. I. (1958), *The Study of Soils*. Oxford University Press: Oxford.
9. Dury, G.H. (1960), *The Face of the Earth*. Penguin Books. London
10. Hagget, R.J. (2011), *Fundamentals of Geomorphology*, Routledge, London.

INSTRUCTIONAL OBJECTIVES

Climatology

1 Introduction to Climatology

- 1.1 Define the term Climatology
- 1.2 Describe the relation between Weather and Climate

2 Composition and Structure of Atmosphere

- 2.1 Describe the constituents of the atmosphere and their importance
- 2.2 Relate the role of Carbon Di Oxide in the atmosphere
- 2.3 Examine the role of Oxygen in the environment
- 2.4 Explain the four layers of the atmosphere together with their major properties

3. Atmospheric temperature

- 3.1 Explain the horizontal and vertical distribution of temperature
- 3.2 Discuss the global distribution of temperatures and their variation in time and space
- 3.3 Describe the vertical distribution of temperature over the surface of earth
- 3.4 Relate the horizontal distribution of the earth's temperature

4 Atmospheric pressure

- 4.1 Explain atmospheric pressure and its altitudinal variation
- 4.2 Relate atmospheric pressure to wind flow at the surface and aloft

5 Atmospheric Circulation (Permanent, seasonal and local)

- 5.1 Apply these relationships to the operation of local wind systems
- 5.2 Develop a simple model of the global atmospheric circulation
- 5.3 Discuss the pressure systems and wind belts that constitute that model circulation, and the complications that arise when the model is compared to the actual atmospheric circulation
- 5.4 Discuss the seasonal atmospheric circulation system

6 Atmospheric moisture and precipitation, process and its formations

- 6.1 Discuss the hydrological cycle, atmospheric moisture and precipitation
- 6.2 Discuss four basic mechanisms for producing precipitation

7 Classification of Climate

- 7.1 Apply the modified Koppen classification system to the earth
- 7.2 Expand the discussion of tropical (A) and arid (B) climates using climographs developed for actual weather stations
- 7.3 Interpret representative climographs depicting actual conditions in these C climate areas
- 7.4 Expand the discussion of typical D, E, and H climates and to interpret representative climographs for these zones

8 Climatic Change

- 8.1 Relate our understanding of climatic change to the human environment
- 8.2 Focus on the climate change impacts on humans and anthropogenic impacts on our climatic environment
- 8.3 Discuss the problem of ozone depletion and its consequences
- 8.4 Relate the greenhouse effect and its purposed linkage to climate change

Geomorphology

1 Introduction to Geomorphology

- 1.1 Define the term Geomorphology
- 1.2 Relate geomorphology
- 1.3 To Familiarize the students with Geomorphic processes

- 2 Geological Structure**
 - 2.1 Define the term Geological structure
 - 2.2 Understand the relationship between the geological structure and Processes
- 3 Geological Time Scale**
 - 3.1 Introduce the Geological Time Scale and Evolution of the Earth
- 4 Geomorphic Processes (Case study based)**
 - 4.1 Understand the Endogenic and Exogenic Forces and their effects
 - 4.2 Develop the understanding of the primary and secondary landforms
 - 4.3 Familiarize the processes of Denudation
 - 4.4 Introduce the landforms of arid region
 - 4.5 Explain the glacial landforms
 - 4.6 Describe the fluvial landforms
 - 4.7 Familiarize the landforms made by underground water
 - 4.8 Introduce the geomorphic processes related to coastal areas
- 5. Landforms on Domal, Folded and Faulted structures**
 - 5.1 Introduce the landforms made by Domal structure
 - 5.2 Familiarize the landforms made by folded structure
 - 5.3 Describes the landform made by faulted structure
- 6 Volcanic and Volcanic Landforms**
 - 6.1 Develop the understanding of the volcanic processes and features
- 7. Karst Topography**
 - 7.1 Define Karst topography
 - 7.2 Relate the understanding of Karst Landforms with Humid regions
- 8 Drainage patterns and their significance**
 - 8.1 Introduce different type of drainage patterns
 - 8.2 Relate the significance of drainage patterns with geological structures

MGM-132: Communication Skills

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

Learning Outcomes: The student will be able to express their understanding of communication skills in the form of speaking, listening, reading and writing and use it to supplement their TVET skills.

COURSE CONTENTS

1	Listening Skills	
	1.1 Listening comprehension	8 Hours
	1.2 Principals for teaching listening comprehension	
	1.3 How to listening skill be developed	
2	Speaking Skills	
	2.1 Starting and Ending conversations	
	2.2 Introducing oneself and others	12 Hours
	2.3 Greeting, praises and compliments	
	2.4 Interviewing skills	
3	Reading Skills	10 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	12 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	22 Hours
5	Presentation Skills	
	5.1 Uses of Power Point templates	
	5.2 How to prepare presentation in Power Point	
	5.3 Hard & Soft Skills	
	5.4 Dress Code	
	5.5 Group Presentations	

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**
 - 4.1 Understand and demonstrate different types of writing and describing a process
 - 4.2 Explain and demonstrate about writing simple sentences and writing complex sentences
 - 4.3 Developing and demonstration about coherence and cohesion
 - 4.4 Explain about beginning of topic and its middle and end and demonstrate its application
 - 4.5 Explain about linking different paragraphs and demonstrate its use
 - 4.6 Understand how to write business letters and demonstrate its application
- 5. Presentation Skills**
 - 5.1 Uses of Power Point templates
 - 5.2 How to prepare presentation in Power Point
 - 5.3 Hard & Soft Skills
 - 5.4 Dress Code
 - 5.5 Group Presentations

Gen-201: Islamiat

اسلامیات

تدریس مقاصد:

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

() قرآن مجید () منتخب آیات قرآنی

خصوصی مقاصد:

() قرآنی آیات کا ترجمہ

() قرآنی آیات کی تشریح

() قرآنی آیات کی روشنی میں ایک مومن کے اوصاف بیان کر سکے

() قرآنی آیات میں بیان کردہ مومن کے اوصاف اپنے اندر پیدا کر سکے

احادیث نبوی:

عمومی مقاصد:

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

خصوصی مقاصد:

() احادیث کا ترجمہ بیان کر سکے

() احادیث کی تشریح کر سکے

() احادیث کی روشنی میں اسلام کی اخلاقی اقدار کی وضاحت کر سکے

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

سیرت طیبہ:

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

خصوصی مقاصد:

() حضور ﷺ کی ابتدائی زندگی اختصار کے ساتھ بیان کر سکے

() حضور ﷺ کی ہجرت کا واقعہ بیان کر سکے

() حضور ﷺ کی مدنی زندگی اختصار سے بیان کر سکے

() حضور ﷺ کی بطور معلم خصوصیات بیان کر سکے

() حضور ﷺ کی بطور سربراہ بیان کر سکے

حضور ﷺ بحیثیت

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

اسلامی معاشرہ:

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

خصوصی مقاصد:

() اسلامی معاشرہ کا معنی و مفہوم کر سکے

() اسلامی معاشرہ کی امتیازی خصوصیات بیان کر سکے

() اسلامی معاشرہ میں عدل و احسان کی اہمیت بیان کر سکے

() تبلیغ کے لغوی معنی بیان کر سکے

() تبلیغ کی اہمیت اور ضرورت بیان کر سکے

() جہاد کے لفظی و اصطلاحی معنی بیان کر سکے

() جہاد کی اہمیت بیان کر سکے

() جہاد اور قتل میں فرق بیان کر سکے

() جہاد کی مختلف اقسام بیان کر سکے

() لفظ مسجد کی تعریف بیان کر سکے

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

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

اسلامی ریاست:

عمومی مقاصد:

() اسلامی ریاست کی خصوصیات بیان کر سکے

خصوصی مقاصد:

() ریاست کی تعریف بیان کر سکے

() اسلامی ریاست میں طرز حکومت سے آگاہی حاصل کر سکے

() اسلامی ریاست کی خصوصیات بیان کر سکے

تدریس مقاصد:

تحریک پاکستان:

عمومی مقاصد:

() قیام پاکستان کے اسباب و تحریک کو بیان کر سکے

خصوصی مقاصد:

() قومیت کے مفہوم کو بیان کر سکے

() دو قومی نظریہ کی تعریف و توضیح کر سکے

() دو قومی نظریہ کی اہمیت بیان کر سکے

() ہندوستانی مسلمانوں کی محرومیوں کو بیان کر سکے

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

() آزادی ہند اور قیام پاکستان علامہ اقبال اور قائد اعظم کی مسایم کریں

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

() مسلم لیگ کے قیام پاکستان کے لیے جدوجہد بیان کر سکے

(غیر مسلم طلباء کے لیے)

ٹی پی سی
1 0 1
کل وقت 20 گھنٹے

نصاب اخلاقیات

سال دوم

موضوعات:

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

○ حقوق و فرائض

○ قوت برداشت

○ قوت ارادی

○ لگن و جذبہ

○ وسیع النظری

○ بے غرضی

○ انسانی دوستی

○ حفاظتی شعور

○ پاس آزادی

○ کامل آگاہی

○ تغیرات کو قبول کرنا

○ خود شناسی

○ انسانی حقوق کا اعلامیہ / حقوق انسانی پالیسی 2018

○ انسانی حقوق کا معاشرتی اور معاشی ترقی میں کردار

○ حقوق آگاہی / معلومات تک رسائی۔ ملازم پیشہ خواتین کا تحفظ

نصاب اخلاقیات

سال دوم

تدریس مقاصد:

طالب علم اخلاقیات کی اہمیت و ضرورت سے آگاہ ہو سکے اور بیان کر سکے
خصوصی مقاصد: طالب علم اس قابل ہو کہ

- () موضوعات کا مطلب بیان کر سکے
- () عملی زندگی سے مثالوں کی نشاندہی کر سکے
- () اپنی شخصیت اور معاشرے پر موضوعات کے مطابق اثرات پیدا کرنے کے طریقے بیان کر سکے
- () اعلیٰ اخلاقی اقدار میں سے قوت برداشت - قوت ارادی - لگن و جذبہ - وسیع النظری - بے غرض - انسانی دوستی شعور - پاس آزادی - کامل آگاہی اور خود شناسی کی اہمیت
- () اخلاقیات سے متصف ہو کر قومی خدمت بہتر طور پر انجام دے سکے
- () انسانی حقوق کا اعلامیہ / حقوق انسانی کی پالیسی 2018 کے بارے میں جان سکے
- () انسانی حقوق کا معاشرتی اور معاشی ترقی میں اہمیت اور کردار بیان کر سکے
- () حقوق آگاہی و معلومات تک رسائی کے قانون کو جان سکے
- () ملازم پیشہ خواتین کا تحفظ کو اخلاقیات کا حصہ تصور کرے

TTQ 211
TARJAMA TUL QURAN / CIVICS

T	P	C
1	0	1
Total Contact Hours:		
Theory:		32
Practical:		0

SYLLABI AND COURSES OF READING

اخلاقیات لازمی (ETHICS)
(غیر مسلموں کیلئے متبادل اسلامیات لازمی)

MATH-212 APPLIED MATHEMATICS-II**Total Contact Hours:**

T	P	C
2	0	2

Theory: 64 Hours.

Learning Outcomes: The course mainly covers the topics related to Calculus and Analytical Geometry to further enhance the students' capabilities to solve technical problems.

COURSE CONTENTS: FURTHER

- | | | |
|-----------|---|----------------|
| 1 | FUNCTIONS & LIMITS | 4 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 Problems | |
| 2 | DIFFERENTIATION. | 4 Hours |
| | 2.1 Increments | |
| | 2.2 Different Coefficient or Derivative | |
| | 2.3 Differentiation ab-initio or by first principle | |
| | 2.4 Geometrical Interpretation of Differential Coefficient | |
| | 2.5 Differential Coefficient of $Xa, (ax + b)a$ | |
| | 2.6 Three important rules | |
| | 2.7 Problems | |
| 3. | DIFFERENTIATION OF ALGEBRIC FUNCTION | 4 Hours |
| | 3.1 Explicit function | |
| | 3.2 Implicit function | |
| | 3.3 Parametric forms | |
| | 3.4 Problems | |
| 4 | DIFFERENTIATION OF TRIGNOMETRIC FUNCTION | 4 Hours |
| | 4.1 Differential coefficient of $\sin x, \cos x, \text{tang } x$ from first principle | |
| | 4.2 Differential coefficient of $\text{Cosec } x, \text{Sec } x, \text{Cot } x$ | |
| | 4.3 Differentiation of inverse trigonometric function | |
| | 4.4 Problems | |
| 5. | DIFFERENTIATION OF LOGARITHIMIC & EXPONENTIAL FUNCTION | 4Hours |
| | 5.1 Differentiation of $\ln x$ | |
| | 5.2 Differentiation of $\log ax$ | |
| | 5.3 Differentiation of ax | |
| | 5.4 Differentiation of ex | |
| | 5.5 Problems | |

6	RATE OF CHANGE OF VARIABLE	4 Hours
	6.1 Increasing and decreasing function	
	6.2 Maxima and Minima values	
	6.3 Criteria for maximum and minimum values	
	6.4 Method of finding maxima and minima	
	6.5 Problems	
7	INTEGRATION	8 Hours
	7.1 Concept	
	7.2 Fundamental Formulas	
	7.3 Important Rules	
	7.4 Problems	
8	METHOD FOR INTEGRATION	6 Hours
	8.1 Integration by substitution	
	8.2 Integration by parts	
	8.3 Problems	
9	DEFINITE INTEGRALS	6 Hours
	9.1 Properties	
	9.2 Application to Area	
	9.3 Problems	
10	PLANE ANALYTIC GEOMETRY & STRAIGHT LINE	6 Hours
	10.1 Coordinate System	
	10.2 Distance Formula	
	10.3 The Ratio Formulas	
	10.4 Inclination and slope of a line	
	10.5 The Slope Formula	
	10.6 Problems	
11	EQUATION OF STRAIGHT LINE.	6 Hours
	11.1 Some Important Forms	
	11.2 General form	
	11.3 Angle formula	
	11.4 Parallelism and perpendicularity	
	11.5 Problems	
12	THE EQUATION OF THE CIRCLE	8 Hours
	12.1 Standard form of equation	
	12.2 Central form of equation	
	12.3 General form of equation	
	12.4 Radius & coordinate of the Centre	
	12.5 Problems	

Reference Books:

- 1** Text Book developed by P-TEVTA and published by NBF
- 2** Thomas Finny –Calculus and Analytic Geometry
- 3** GhulamYasinMinhas –Technical mathematics Vol II, IlmiKitabKhana ,Lahore.

- 4 Prof .Riaz Ali Khan –Poly Technique Mathematics Series, Volume I & II, MajeedSons, Faisalabad.
- 5 Prof. SanaullahBhatti –Calculus and Analytic Geometry , Punjab Text Book Board, Lahore.

INSTRUCTIONAL OBJECTIVES**1. USE THE CONCEPT OF FUNCTION AND THEIR LIMITS IN SOLVING SIMPLE PROBLEMS**

- 1.1 Define a function
- 1.2 List all types of function
- 1.3 Explain the concept of limit and limit of a function
- 1.4 Explain fundamental theorem on limits
- 1.5 Derive some important limits
- 1.6 Solve simple problems on limits

2 UNDERSTAND THE CONCEPT OF DIFFERENTIAL COEFFICIENT

- 2.1 Derive mathematics expression for a differential coefficient
- 2.2 Explain geometrical interpretation of differential coefficient
- 2.3 Differentiate a content, constant associated with a variable and the Sum of finite number of function
- 2.4 Solved related problems

3 USE RULES OF DIFFERENTIAL TO SOLVE PROBLEMS OF ALGEBRIC FUNCTIONS

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

4 USE RULES OF DIFFERENTIATION TO SOLVE PROBLEMS OF ALGEBRIC FUNCTIONS.

- 4.1 Differentiate from first principle $\sin x$, $\cos x$, $\tan x$.
- 4.2 Derive formula for derivation of $\sec x$, $\operatorname{cosec} x$, $\cot x$
- 4.3 Find differential coefficient of inverse trigonometric functions

5 USE RULES OF DIFFERENTIATION TO LOGARITHMIC AND EXPONENTIAL FUNCTIONS.

- 5.1 Derive formulas for differential coefficient of logarithmic and exponential functions
- 5.2 Solve problems using these formulas

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

- 6.1 Write expression for velocity, acceleration, and slope of a line
- 6.2 Define an increasing and decreasing function, maxima and minima values, of inflection

- 6.3 Explain criteria for maxima and minima values of a function
- 6.4 Solve problems involving rate of change of variables
- 7 APPLY CONCEPT OF INTEGRATION IN SOLVING TECHNOLOGICAL PROBLEMS**
 - 7.1 Explain the concept of integration
 - 7.2 Write basic theorem of integration
 - 7.3 List some important rules of integration
 - 7.4 Derive fundamental formulas of integration
 - 7.5 Solve problems based on these formulas /rules
- 8 UNDERSTAND DIFFERENT METHODS OF INTEGRATION**
 - 8.1 List standard formulas
 - 8.2 Integrate a function by substitution method
 - 8.3 Find integrals by the method of integration by parts
 - 8.4 Solve problems using these methods
- 9 UNDERSTAND THE METHOD OF SOLVING DEFINITE INTEGRALS**
 - 9.1 Define definite integral
 - 9.2 List properties of definite integrals using definite integrals
 - 9.3 Find areas under curves
 - 9.4 Solve problems of definite integrals
- 10. UNDERSTAND THE CONCEPT OF PLANE ANALYTIC GEOMETRY**
 - 10.1 Explain the rectangular coordinate system
 - 10.2 Locate points in different quadrants
 - 10.3 Derive distance formula
 - 10.4 Prove section formula
 - 10.5 Derive slope formula
 - 10.6 Solve problems using the above formulas
- 11. USE EQUATIONS OF STRAIGHT LINE IN SOLVING PROBLEMS**
 - 11.1 Define a straight line
 - 11.2 State general form of equation of a straight line
 - 11.3 Derive slope intercept and intercept forms of equations
 - 11.4 Derive expression for angle between two straight lines
 - 11.5 Derives conditions of perpendicularity and parallelism lines
 - 11.6 Solve problems involving these equations/formulas
- 12. SOLVE TECHNOLOGICAL PROBLEMS USING EQUATION OF CIRCLE**
 - 12.1 Define a circle
 - 12.2 Describe standards, central and general forms of the equation of a circle
 - 12.3 Convert general forms to the central forms of equation of a circle
 - 12.4 Deduce formulas for the radius and the coordinates of the center of a circle from the general form
 - 12.5 Derive equation of the circle passing through three given points
 - 12.6 Solve problems involving these equations

GIS-212 Fundamentals of Mining

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

Learning Outcomes: The main purpose of this course is to impart basic knowledge to the students regarding mining, different methods of extraction of ores and processes. Definitions relating to Mining along with sketch, Four stages in the life of mine, Classification of mining method, Mine supports, Drilling & boring, Explosive and blasting, Mine ventilation, Material handling (Loading & Transportation), Mine Water & Disposal, Value and importance of mining in Pakistan.

COURSE CONTENTS

1	Definitions Relating to Mining Along With Sketch	04 Hours
	1.1. Definitions Mining Processes and Stages: Mining, Prospecting, Exploration, Development and Exploitation, Mineral Processing	
	1.2. Geological Features and Related Terms: Vein, Shoot, Bedded, Deposits, Masses, Outcrop, Float, Gossan, Dip, Strike, Apex, Hanging Wall1, Foot Wall, Ore, Gangue, Country Rock, Waste, Mineral, Metallic Non-Metallic, Lode	
	1.3. Mining Infrastructure and Excavation Methods: Shaft, Drift, Crosscut, Level, Sump, Winze, Raise, Stope, Tunnel, Adit, Collar, Drives, Draw Point	08 Hours
2	Stages in Mining	
	2.1 Prospecting	
	2.2 Exploration	
	2.3 Development	
	2.4 Exploitation & Reclamation (Short notes differentiating each)	04 Hours
3	Classification of Mining Methods	
	3.1. Surface Mining Methods	
	3.1.1 Open Pit Mining	
	3.1.2 Open Cast Mining	
	3.1.3 Quarrying	
	3.1.4 Auger Mining	
	3.1.5 Hydraulic king Mining	
	3.1.6. Dredging Mining	
	3.1.7. Borehole extraction	
	3.1.8. Leaching	
	3.2. Underground Mining Methods	
	Self-Supported Mining Method	
	3.2.1 Roam & Pillar Mining	
	3.2.2 Stope & Pillar Mining	
	3.2.3 Shrinkage Stopping	
	3.2.4 Sub level Stopping	
	3.3. Supported Mining Methods	

- 3.3.1 Cut & Fill Stopping
 - 3.3.2 Stull Stopping
 - 3.3.3 Square set Stopping
 - 3.4. Caving Mining Methods**
 - 3.4.1 Long wall Mining
 - 3.4.2 Sub-level Caving
 - 3.4.3 Block Caving
- 08 Hours**
- 4. Support System in Mining**
 - 4.1 Types of Supports**
 - 4.1.1. Timber Supports (Types, Advantages and Dis-advantages)
 - 4.1.2 Steel Supports (Types, Advantages and Dis-advantages)
 - 4.2 Arches
 - 4.3 Steel Props
 - 4.4 Roof Bolting (Types, Advantages and Dis-advantages)
- 08 Hours**
- 5. Drilling & Boring**
 - 5.1 Difference between drilling & boring
 - 5.2 Main components of drilling system
 - 5.2.1 Drilling Machine
 - 5.2.2 Drilling Rods
 - 5.2.3 Bits
 - 5.3 Types of Drilling Machines
 - 5.3.1 Rotary
 - 5.3.2 Percussive
 - 5.3.3 Churn Drilling
 - 5.4 Types of hammer drills
 - 5.4.1 Drifter
 - 5.4.2 Sinker & Stopper
 - 5.5 Types of Boring Machines
 - 5.6 Percussive Boring & Rotary Boring
- 08 Hours**
- 6. Explosives & Blasting**
 - 6.1 Definitions.**
 - 6.2 Types of Explosive**
 - 6.2.1 Low Explosive
 - i) Black Powder & Gun Powder
 - 6.2.2 High Explosive
 - i) Ammonium Nitrate Base Explosive
 - ii) Nitro Glycerin
 - 6.3. Base Explosives**
 - 6.3.1 Water base explosives Slurry Explosives
 - 6.3.2 Emulsions
 - 6.3.3 Permissible Explosives Cooling Agents
 - 6.3.4 Sheathed Explosive and Non Sheathed Explosive
 - 6.4. Blasting**
 - 6.4.1 Firing Method
 - 6.4.2 Non-Electric Firing
 - 6.4.3 Cap & fuse
 - 6.4.4 Detonating Cord & Nonel
 - 6.4.5 Electric Firing

- 6.4.6 Types of Detonators
 - 6.4.7 Surface & underground pattern with sketch
 - 6.4.8 Controlled blasting techniques
- 04 Hours**
- 7. Mine Ventilation**
- 7.1. Composition of Atmospheric Air**
 - 7.1.1. Oxygen
 - 7.1.2. Nitrogen
 - 7.1.3 Carbon Di-oxide & Argon (Brief note on each)
 - 7.2. Name of Mine Gases and their Properties**
 - 7.2.1 Methane (Fire Damp)
 - 7.2.2 Carbon Dioxide (Black Damp)
 - 7.2.3 Carbon Monoxide (White Damp)
 - 7.2.4 Hydrogen Sulphide (Stink Damp)
 - 7.2.5 Nitrous fumes
 - 7.3. Mine Ventilation**
 - 7.3.1. Definition
 - 7.3.2 Natural Ventilation
 - 7.3.3 Mechanical Ventilation
- 08 Hours**
- 8. Material Handling**
- 8.1. Surface Loading & Excavation Machines**
 - 8.1.1. Power Shovel (Hydraulic, Electric & Backhoes)
 - 8.1.2. Draglines
 - 8.1.3. Bulldozer
 - 8.1.4. Scraper
 - 8.1.5. Bucket Wheel Excavator
 - 8.1.6. Front End Loader
 - 8.1.7. Trucks/ Dumpers/ Tractors trolleys
 - 8.2. Underground Transportation**
 - 8.2.1 Trackless Haulage
 - 8.2.2 Wheel Barrows
 - 8.2.3 Shuttle Cars
 - 8.2.4 Conveyors
 - 8.2.5 Track Haulage
 - 8.2.6 Locomotive Haulage

Types:

 - 1. Diesel
 - 2. Battery
 - 3. Overhead
 - 4. Trolley Wire Locomotives
 - 8.3. Rope Haulage System**

Types:

 - 8.3.1 Direct or Main Rope Haulage
 - 8.3.2 Main & Tail Rope Haulage
 - 8.3.3 Endless Rope Haulage
 - 8.3.4 Gravity Haulage
- 08 Hours**
- 9. Mine Water And Disposal**

- 9.1 Origin and Types of Mine Water**
 - 9.1.1 Ground Water
 - 9.1.2 Surface Water
 - 9.2 Types of Pumps**
 - 9.2.1 Reciprocating Pumps
 - 9.2.2 Centrifugal Pumps
 - 9.2.3 Submersible pumps
 - 9.2.4 Sludge pumps
 - 9.2.5 Mono pumps
 - 9.3. Siphon**
 - 9.3.1 Introduction
 - 9.3.2 Mechanism
- 10. Value and Importance of Mining in Pakistan** **04 Hours**
- 10.1 Mineral Potential of the Country
 - 10.2 Nature of Mining Industry
 - 10.3 Present Status of Mining Industry and Major Constraints **04 Hours**
 - 10.4 Future Prospects
- 11. Case Study**
(Coal, Salt, Lime Stone, gypsum, Fire Clay, Sand Stone, Gemstones, Copper, Gold, Chromite Mining etc)

Reference Books:

1. "Elements of Mining" Prepared by Mining Development Cell Lahore (2010), 2nd Edition
2. "Mine Ventilation" Prepared by Mining Development Cell Lahore (2010), 2nd Edition
3. "Introductory Mining Engineering" by Howard L. Hartman (1987), 2nd Edition

INSTRUCTIONAL OBJECTIVES

- 1** Define the basic terminologies relating to mining along with sketch
- 2** Describe the different Stages In Mining
- 3** Explain the Classification Of Mining Method
- 4** Explain Mine Supports
- 5** Define and differentiate Drilling & Boring
- 6** Define and differentiate Explosives & Blasting
- 7** Describe the Mine Ventilation
- 8** Develop the understanding of Material Handling (Loading & Transportation).
- 9** Develop the understanding of Mine Water And Disposal
- 10** Understand the Value and Importance of Mining in Pakistan
- 11** Illustrate the various mining practices in Pakistan (Coal, Salt, Lime Stone, Gypsum, Fire Clay, Sand Stone, Gemstones, Copper, Gold and Chromite Mining etc.)

GIS-223 Geodesy & Global Positioning System

Total Contact Hours	64	T	P	C
Theory	64	2	3	3
Practical	96			

Learning Outcomes: Develop understanding in theory as well as practical methods involved in GPS and Geodesy. Sharpen skills and concepts in GPS and geodetic parameters behind GIS projects..

COURSE CONTENTS

- | | |
|---|-----------------|
| 1. Geodesy | 32 Hours |
| 1.1 Introduction. Definitions, scope, evolution, current trends and future prospects of geodesy | |
| 1.2 Earth's shape & size, ellipsoid, its gravitational field and geoid | |
| 1.3 Units of measurement | |
| 1.4 Elementary geometry of the ellipsoid and spheroid | |
| 1.5 Types of geodesy, geometric, gravimetric, satellite and space geodesy | |
| 1.6 Traditional survey positional techniques | |
| 1.7 Triangulation, traverse and trilateration | |
| 1.8 Various types of heights, ellipsoidal heights, orthometric heights, geoidal separation. | |
| 1.9 Deflection of the vertical, radius of curvature, radius of curvature along prime vertical and meridional plane. | |
| 1.10 Geodetic to Geocentric Coordinate Conversions | |
| 2. GPS (Global Positioning System) | 32 Hours |
| 2.1 Introduction | |
| 2.2 Components of GPS | |
| 2.3 Working Mechanism of GPS | |
| 2.4 Planning a GPS survey, data collection and data formats | |
| 2.5 Differential GPS | |
| 2.6 Field Survey in Mining context | |

Reference Books:

1. Aronoff, S. (2004), Geographic Information Systems, A Management Perspective WDL Publications, Ottawa.
2. Burrough, P. (2002), Principles of Geographic Information Systems for Land Resources Management., Oxford University Press, Oxford,
3. Bolstad, P. (2007), GIS Fundamentals: A First Text on Geographic Information Systems. Third Edition. Eider Press, 620pp
4. Clarke, K. (2004), Getting started with Geographic Information System, Prentice Hall , New York,
5. Demers, M. N. (2008). Fundamentals of Geographical Information Systems. Fourth Edition. John Wiley & Sons, New York.
6. Foresman, T. (1997), History of Geographic Information System, Prentice Hall, New York.
7. Heywood, I., Cornelius, S., and Carver, S. (2011). An Introduction to Geographical Information System. Fourth Edition. Prentice hall, New Delhi.

8. Krygier, J., & Wood, D. (2011), Making Maps: A Visual Guide to Map Design for GIS. Second Edition. The Guilford Press, New York.
9. Ahmed, (2006) Introduction to GPS: the Global Positioning system, Artech house. Boston.
10. Gopi, S., & Sati, K. R. (2007) Advanced Surveying: Total station, GIS and Remote Sensing, Delhi, Dorling Kindersley.
11. Kaplan (2006) Understanding GPS: Principles and applications. London, Artech House Boston.
12. Kennedy, M. (2010) The Global positioning system Arc GIS, tyler and Frances group, New York.
13. Kumar, P. (2007) Dictionary of Global Positioning System, Delhi, Biotech, Books.

Instructional Objectives

1. Geodesy

- 1.1 Introduce geodesy
- 1.2 Introduce datum and coordinate systems
- 1.3 Define change of Projection
- 1.4 Learn ellipsoid and spheroid
- 1.5 Conduct traditional survey positional techniques
- 1.6 Demonstrate various types of heights, ellipsoidal heights, Orthometric heights, geoidal separation.
- 1.7 Learn deflection of the vertical. radius of curvature, radius of curvature along prime vertical and meridional plane.
- 1.8 Learn Geodetic to Geocentric Coordinate Conversions
- 1.9 Evaluate the discrepancies between different horizontal and vertical datums as it pertains to the practice of land surveying.
- 1.10 Understand Geodesy concepts and techniques in an interdisciplinary setting
- 1.11 Convert point coordinates between different geodetic reference system

2. Global Positioning System

- 2.1 Practice to learn coordinate systems
- 2.2 Understand GPS concepts and techniques in an interdisciplinary setting
- 2.3 Learn the working mechanism of GPS in the field
- 2.4 Learn to manipulate GPS data (Collection and format)
- 2.5 Conduct GPS based Field Surreys
- 2.6 Apply best practices for GPS surveys.
- 2.7 Explain theoretical concepts of GPS and Differential GPS survey methods and data processing
- 2.8 Learn how to use GPS for spatial decision making
- 2.9 Apply the various tools and techniques for data preparation and analysis with sophisticated skills.

List of Practicals**96 Hours****1. Geodesy**

- 1.12 Introduce geodesy
- 1.13 Introduce datum and coordinate systems
- 1.14 Introduce change of Projection
- 1.15 Learn ellipsoid and spheroid
- 1.16 Conduct traditional survey positional techniques
- 1.17 Demonstrate various types of heights, ellipsoidal heights, Orthometric heights, geoidal separation.
- 1.18 Learn deflection of the vertical, radius of curvature, radius of curvature along prime vertical and meridional plane
- 1.19 Learn Geodetic to Geocentric Coordinate Conversions

2. Global Positioning System

- 2.10 Introduce coordinate systems
- 2.11 Exercises of GPS in Lab
- 2.12 Working Mechanism of GPS in the field
- 2.13 Manipulate GPS data (Collection and format)
- 2.14 Conduct GPS based Field Survey

GIS-234 Surveying – I

Total Contact Hours	256	T	P	C
Theory	64	2	6	4
Practical	192			

Learning Outcomes: Develop understanding and practical skill in surveying by field and laboratory work.

COURSE CONTENTS

1. Fundamental Concept	10 Hours
1.1 Definitions: Surveying and levelling	
1.2 Uses of Surveying	
1.3 Classification of Surveying: Primary Classification, Secondary classification	
1.4 General Principle of Surveying	
1.5 Methods of linear measurement	
1.6 Conversion for important units	
2. Distance Measurement	06 Hours
2.1 Methods of Chaining on sloppy and level ground	
2.2 To erect and drop perpendicular from survey line	
2.3 Scale (Drawing scale)	
2.4 Procedure of Plotting	
3. Levelling	12 Hours
3.1 Definitions	
3.2 Levelling: objective and use of levelling	
3.3 Different Types of levels	
3.4 Types of levelling staff	
3.5 Types of levelling operation	
3.6 Adjustment of level	
3.7 Methods of calculation of reduced level	
3.8 Sources of error in levelling	
3.9 Plotting of profile & cross-section	
3.10 Problems on reduction of levels	
4. Angles & Meridian	10 Hours
4.1 Definition	
4.2 Types of meridian	
4.3 Magnetic declination	
4.4 Angles: Interior and exterior angles	
4.5 True north in the field	
5. Latitude & Departure	6 Hours
5.1 Calculation of coordinates from known, bearing and distance	
5.2 Calculation of bearing and distance from known coordinates	
5.3 Problem on conversion of reduce bearing to whole circle bearing and numerical	
6. Compass Surveying	12 Hours
6.1 Introduction and purpose	
6.2 Traversing	
6.3 Types of compass	

- 6.4 Temporary adjustment of compass
- 6.5 Plotting of compass traverse
- 6.6 Numerical problem

7. Area and Volume

08 Hours

- 7.1 Area of regular figures, square, triangle, trapezoid, trapezium, circle, sector of circle, ellipse, curve surface of a cylinder and cone
- 7.2 volume of regular solids, rectangular, cylinder, a prism and cone or pyramid, use of plan meter, pantograph
- 7.3 Measurement of area of irregular figures
- 7.4 Numerical calculation area and volume of figure mentioned above

Reference Books:

1. Surveying and Leveling. By N N Basak (1994), 2nd Edition
2. Elementary Surveying. Eighth edition. By Michael Elfick, John Fryer etal
3. Advanced Surveying. By Satheesh Gopi, R. Sathikumar, N.Madhu
4. Plane Surveying. By Alak De
5. Roy, S.K. (2010) Fundamentals of Surveying. PHI learning Pvt Ltd, New Delhi.

INSTRUCTIONAL OBJECTIVES

- 1. Fundamental Concept**
 - 1.1 Understanding of Definitions
 - 1.2 Learning uses of Surveying
 - 1.3 To learn Classification of Surveying
 - 1.4 Introduction of General Principles of Surveying
 - 1.5 Learning Methods of linear measurement
 - 1.6 Learning of Conversion of important units
- 2. Distance Measurement**
 - 2.1 Learning different Methods of Chaining
 - 2.2 Learning to erect and drop perpendicular from survey line
 - 2.3 Understanding of Scales
 - 2.4 Procedure of Plotting
- 3. Leveling**
 - 3.1 Learning about objective and use of levelling
 - 3.2 Understanding of Definitions
 - 3.3 Learning about types of levels
 - 3.4 Understanding types of leveling staff
 - 3.5 Understanding types of leveling operation
 - 3.6 Learning of adjustment of level
 - 3.7 Understanding calculation methods of reduced level
 - 3.8 Study of sources of error in leveling
 - 3.9 Learning how to plot of profile & cross-section
 - 3.10** Problems on reduction of levels
- 4. Angles & Meridian**
 - 4.1 Definition
 - 4.2 Types of meridian
 - 4.3 Magnetic declination
 - 4.4 Angles: Interior and exterior angles
 - 4.5 To find true north in the field
- 5. Latitude & Departure**
 - 5.1 Student should be able to calculate coordinates from known, bearing and distance
 - 5.2 Learning of calculation of bearing and distance from known coordinates
 - 5.3 Problem on conversion of reduce bearing to whole circle bearing and numerical
- 6. Compass Surveying**
 - 6.1 Introduction and purpose of compass surveying
 - 6.2 Learning Traversing technique
 - 6.3 Understanding types of compass
 - 6.4 Learning temporary adjustment of compass
 - 6.5 Learning how to plot compass traverse
 - 6.6** Numerical problem
- 7. Area and Volumes**
 - 7.1 Calculation of Area of regular figures, square, triangle, trapezoid, trapezium, circle, sector of circle, ellipse, curve surface of a cylinder and

coal,

- 7.2 Learning how to calculate volume of regular solids, rectangular, cylinder, a prism and cone or pyramid, use of plan meter, pantograph,
- 7.3 To be able to Measure area of irregular figures,
- 7.4 Numerical calculation area and volume of figure mentioned above.

List of Practicals**192 Hours**

1. Introduction to survey instruments –use of survey instruments – Field measurements and their record on surveyor’s book. – Exercise on ranging of lines and avoiding obstacles
2. Introduction to compass- Temporary adjustment of compass – Measurement of angles around central station-Measurement of angles in open and closed interconnected survey lines
Observation of magnetic bearing- observation on local attraction and magnetic declination-conversion of quad rental bearings into whole circle bearing.
3. Calculation on latitudes and departures with reference to measurements in the field –preparation of survey sheets
4. Introduction to levels- Types of levels – Exercise and methods of leveling like differential leveling cross-section leveling and profile leveling , Reciprocal leveling – Preparation of Survey sheets
5. Calculation of area by co-ordinate – Exercise on calculation of volume of deposit with given data notes of field survey

Note: Each Practical comprises of several activities which may take Three to Five Weeks

GIS-243 **Introduction to Construction Techniques**

Total Contact Hours		T	P	C
Theory	64	2	3	3
Practical	96			

Learning Outcomes: To provide foundational knowledge and practical skills in civil construction, focusing on essential concepts and techniques applied in the construction industry. Introduction, site preparation, foundation construction, masonry work, waterproofing, flooring, false works, and fire protection and hands-on learning and practical application of construction methods and materials.

COURSE CONTENTS

1. Introduction to Civil Construction	06 Hours
1.1 Introduction to the subject	
1.2 Understanding building components and specifications	
1.3 Introduction to basic construction terminology	
1.4 Various steps in construction of a residential building	
2. Site Preparation and Layout	06 Hours
2.1 Introduction to Site layout for construction projects	
2.2 Introduction to construction drawings	
2.3 Construction procedure of a single and multi-storey building	
2.4 Basic water supply and electrical supply considerations	
3. Foundation Construction	06 Hours
3.1 Simple foundation design and layout	
3.2 Brickwork foundation construction	
3.3 Foundations for staircases	
3.4 Introduction to shallow and deep foundations	
3.5 Foundations of framed buildings	
4. Masonry Work	05 Hours
4.1 Introduction to block masonry techniques	
4.2 laying of concrete blocks and compound walls	
4.3 Tools for stone and marble work	
4.4 State the stripping of formwork	
5. Water and Termite Proofing of the Structures	03 Hours
5.1 Basic water and termite proofing methods	
5.2 Materials used for waterproofing and termite prevention, water proofing of basement	
6. Flooring and False Work	05 Hours
6.1 Ground and suspended floor construction	
6.2 Laying of toppings	
6.3 Floors and types of floors and use of abrasives in floors	
6.4 Introduction to basic types of false works and their purpose	
6.5 Characteristics of a good form work quality, safety and economy	
7. Basic Tools and Equipment	04 Hours
7.1 Introduction to common construction tools and equipment	
7.2 Safety precautions and proper usage	
8. Stairs, Lifts, and Escalators	04 Hours
8.1 Different types of stairs and staircases	
8.2 Introduction to lifts, elevators, and escalators	
8.3 Simple planning and design of a stair-relation between going and rise,	

	width of stair, landing and location of stair	
9.	Basement Construction and Multi-storey Construction	06 Hours
9.1	Purpose and construction methods of basements	
9.2	Waterproofing techniques for basements	
9.3	Introduction to box basements	
9.4	Types and overview of multi-storey framed structure construction	
9.4	Basic components and materials used for multi-storey framed buildings	
10.	Fire Protection	04 Hours
10.1	Understanding fire causes and prevention	
10.2	Basic fire protection measures in buildings	
10.3	Fire-resisting construction-classification of building for fire resistance	
10.4	fire protection of concrete, wooden and steel structures	
11.	Maintenance and Repair	06 Hours
11.1	Importance of maintenance in structural integrity	
11.2	Common repair techniques for building components	
11.3	Repair to damage surface finishing such as plaster, pointing, white wash, distemper and painting	
11.4	Exposure of reinforcement spalling causes and repairs	
11.5	Protection against leakage through roofs-causes and repairs	
11.6	Repair to concrete structures.	
11.7	Maintenance of drainage system and electrical system	
12.	Municipal Requirements	03 Hours
12.1	Classification of buildings	
12.2	Understanding building regulations and codes	
12.3	Compliance with municipal requirements in construction projects	
13.	Miscellaneous Topics	06 Hours
12.1	Introduction to basic techniques fire protection of Buildings	
12.2	Basic methods of heating and cooling of buildings	
12.3	introduction to the Acoustic design of buildings	
12.4	introduction to earthquake resistant Design of structures	
12.5	Introduction to building codes	

Reference Books:

1. Construction Planning techniques, technology and applications 10th Edition, McGraw Hill New York 2023
2. Construction Technology: Eric Fleming, [2004], Blackwell Publishing
3. Fundamentals of Building Construction: Edward Allen, [1985], Wiley & Sons
4. Rehabilitation and Reuse of Old Buildings: D. High field, [1987], E & F. N Spon
5. Building Materials and Construction: Theodore Marotta, [2005], Pearson Apprentice-Hall.2.

INSTRUCTIONAL OBJECTIVES

- 1. Introduction to Civil Construction**
 - 1.1 Understand the fundamentals of civil construction
 - 1.2 Identify and describe different building components and their specifications
 - 1.3 Define basic construction terminology used in the industry
 - 1.4 Outline the various steps involved in constructing a residential building
- 2. Site Preparation and Layout**
 - 2.1 Explain the concept of site layout for construction projects
 - 2.2 Interpret construction drawings and their importance
 - 2.3 Describe the construction procedure for single and multi-storey buildings
 - 2.4 Discuss basic considerations for water supply and electrical supply in construction
- 3. Foundation Construction**
 - 3.1 Demonstrate simple foundation design principles and layout
 - 3.2 Explain the process of brickwork foundation construction
 - 3.3 Identify the foundations required for staircases
 - 3.4 Differentiate between shallow and deep foundations
 - 3.5 Describe the foundations of framed buildings
- 4. Masonry Work**
 - 4.1 Introduce block masonry techniques
 - 4.2 Demonstrate the laying of concrete blocks and compound walls
 - 4.3 Identify tools used for stone and marble work
 - 4.4 Explain the process of stripping formwork
- 5. Water and Termite Proofing of Structures**
 - 5.1 Discuss basic methods of water and termite proofing
 - 5.2 Identify materials used for waterproofing and termite prevention
 - 5.3 Explain the waterproofing process for basements
- 6. Flooring and False Work**
 - 6.1 Describe ground and suspended floor construction methods
 - 6.2 Explain the process of laying toppings
 - 6.3 Identify different types of floors and their applications
 - 6.4 Introduce basic types of false works and their purpose
- 7. Basic Tools and Equipment**
 - 7.1 Identify common construction tools and equipment
 - 7.2 Discuss safety precautions and proper usage
- 8. Stairs, Lifts, and Escalators**
 - 8.1 Describe different types of stairs and staircases
 - 8.2 Introduce lifts, elevators, and escalators
 - 8.3 Explain the planning and design of stairs
- 9. Basement Construction and Multi-storey Construction**
 - 9.1 Discuss the purpose and construction methods of basements
 - 9.2 Explain waterproofing techniques for basements
 - 9.3 Introduce box basements
 - 9.4 Provide an overview of multi-storey framed structure construction

10. Fire Protection

- 10.1 Understand fire causes and prevention
- 10.2 Discuss basic fire protection measures in buildings
- 10.3 Describe fire-resisting construction techniques
- 10.4 Explain fire protection of concrete, wooden, and steel structures

11. Maintenance and Repair

- 11.1 Highlight the importance of maintenance in structural integrity
- 11.2 Explain common repair techniques for building components
- 11.3 Discuss repair methods for damaged surface finishing
- 11.4 Describe maintenance and repair of drainage and electrical systems

12. Municipal Requirements

- 12.1 Classify different types of buildings
- 12.2 Understand building regulations and codes
- 12.3 Ensure compliance with municipal requirements in construction projects

13. Miscellaneous Topics

- 13.1 Introduce basic techniques for fire protection of buildings
- 13.2 Discuss methods of heating and cooling buildings
- 13.3 Provide an overview of acoustic design of buildings
- 13.4 Introduce earthquake-resistant design of structures
- 13.5 Explain the importance of building codes

List of Practicals

96 Hours

These practical activities provide students with hands-on experience and reinforce the theoretical concepts taught in the course, preparing them for careers in civil construction

1. **Construction Layout**
Students observe job layout plan for a building project showing, material, plant and accommodations on site
2. **Foundation Construction Demonstration**
Students observe a demonstration of laying foundation bricks or concrete blocks. They learn about leveling, alignment, and basic foundation construction techniques. The students should visit for demonstration of pile boring site and draw lay out plan (showing machinery location and other details)
3. **Masonry Work Practice**
Students practice laying concrete blocks and building compound walls
They learn how to mix mortar and apply it correctly for masonry work
4. **Flooring Installation Workshop**
Students participate in installing ground and suspended floors
They learn about different types of flooring materials and finishing techniques
5. **Basement construction**
Students sketch basement of a building and show the water proofing treatments and visit an actual building with basement construction
6. **Tool Handling Session**
Students have a hands-on session with common construction tools
They learn about tool safety and proper usage under supervision
7. **Staircase Construction Simulation**
Students simulate staircase construction using provided materials
They learn about staircase planning, design, and basic construction methods
8. **Fire Safety Drill**
Students participate in a fire safety drill and learn how to use fire extinguishers
They discuss fire-resistant construction materials and safety measures
9. **Maintenance and Repair Workshop**
Students practice basic maintenance tasks like repairing cracks and leaks
They learn about electrical and plumbing maintenance in buildings
10. **Building Regulations Compliance Exercise**
Students review local building regulations and codes. They design small-scale structures compliant with regulations and present their designs
11. **Visit of Multi-Storey Building construction**
Students should visit to under construction building project and presentation of visit report discussing different aspects of construction
12. **Visit to a precast concrete factory**
Students should visit to a precast concrete factory and preparation of its layout and report

GIS-254 **Cartographic Techniques**

Total Contact Hours	256	T	P	C
Theory	64	2	6	4
Practical	192			

Learning Outcomes: Knowledge with the fundamental principles and concept of cartography, acquainted with the cartographic techniques in real world.

COURSE CONTENTS**Map Projection**

1. Introduction	02 Hours
1.1 General principles Classification and choice of Projection	
1.2 Merits and Demerits	
2. Types of Projections.	02 Hours
2.1 Construction of network with tables by simple graphic methods of projections	
3 Cylindrical Projections	10 Hours
3.1 Introduction	
3.2 Simple – Cylindrical Projection	
3.3 Equal Area projection	
3.4 Mercator’s Projection	
4 Conical Projection	8 Hours
4.1 Conical with one standard Parallel’s	
4.2 Conical with two standard parallel’s	
4.3 Bonne’s Projection	
5 Zenithal Projection	10 Hours
5.1 Gnomonic Projection	
5.2 Stereographic Projection	
5.3 Orthographic Projection	

Statistical Techniques **2 Hours**

1 Introduction	
1.1 General principles	
2 Frequency Distribution	6 Hours
2.1 Theory with examples	
3 Averages	12 Hours
3.1 Mean	
3.2 Median	
3.3 Mode	
3.4 Mean deviation	
4 Distributional Maps	12 Hours
4.1 Introduction about maps	
4.2 Types of maps	
4.3 Preparation of distributional maps with the help of symbols	
4.4 Line Bars, Shade, Dots and Circles	

Reference Books:

- 1 Guljan, M. M. (1974). Map projection. Oxford University Press.
- 2 Grampton, J. W. (2010), Mapping: A critical Introduction to Cartography & GIS.

3. Robinson, A. H. (2002), Elements of Cartography, New York, John Willey Sons: New York.
4. Kraak, M.J. & Ormelling, F. J. (1996), Cartography: Visualization of Spatial Data Longman Harlow.
5. Singh, R.L. (1985), An Introduction to Practical Geography. Rose Publishers, New Delhi.

INSTRUCTIONAL OBJECTIVES

1. **Map Projection**
 - 1.1. **Introduction**
 - 1.1.1 Introduce different types of map projections
 - 1.1.2 Capable of Identifying the uses and merits/demerits
 - 1.1.3 Understand the concepts of map projections
 - 1.2. **Types of Projections**
 - 1.2.1 Define the types of map projections
 - 1.2.2 Use the concepts in solving technological problems
 - 1.3. **Cylindrical Projections**
 - 1.3.1 Able to draw types of cylindrical Projections
 - 1.3.2 Use to solve the practical/technological problems.
 - 1.3.3 Explain the merits and demerits of cylindrical projection
 - 1.4. **Conical Projections**
 - 1.4.1 Able to draw types of conical Projections
 - 1.4.2 Use to solve the practical/technological problems
 - 1.4.3 Explain the merits and demerits of conical projection
 - 1.5. **Zenithal Projections**
 - 1.5.1 Able to draw types of Zenithal Projections
 - 1.5.2 Use to solve the practical/technological problems
 - 1.5.3 Explain the merits and demerits of Zenithal projection
2. **Statistical Techniques**
 - 2.1. **Introduction**
 - 2.1.1 Introduce the concept of statistical techniques
 - 2.1.2 Explain the uses of the statistical techniques
 - 2.1.3 Explain the significance of statistical techniques in representation of data
 - 2.1.4 Tabulate the statistical data
 - 2.1.5 Formulate the statistical data
 - 2.2. **Frequency Distribution**
 - 2.2.1 Explain the frequency distribution
 - 2.2.2 Use the techniques in frequency distribution of data
 - 2.2.3 Formulate and tabulate the statistical data
 - 3.3. **Averages**
 - 3.3.1 Explain the averages in given data
 - 3.3.2 Describes the uses of Mean Median and Mode in data
 - 3.3.3 Calculate the various techniques of measurements
 - 4.4. **Distributional Maps**
 - 4.4.1 Explain the maps and its types
 - 4.4.2 Understand the methods of showing distribution of variables on map.
 - 4.4.3 Describe use of maps in mining industry.
 - 4.4.4 Enable to calculate the measures of location
 - 4.4.5 Prepare distributional maps with the help of symbols line, bars, shade, dots and circles methods.

Map Projection**1.1. Introduction**

- 1.1.1 Learn different types of map
- 1.1.2 Capable of Identifying the small scale and large scale maps
- 1.1.3 Learn to draw the traditional method in map projections

1.2 Types of Projections

- 1.2.1 Manual work sheet of different types of map projections
- 1.2.2 Develop the understanding in solving technological problems

1.3 Cylindrical Projections

- 1.3.1 Draw types of cylindrical Projections (Simple Cylindrical, Mercator, Equal area)
- 1.3.2 Practice to solve the practical/technological problems
- 1.3.3 Learn the digital formation of the cylindrical projection

1.4 Conical Projections

- 1.4.1 Draw types of conical Projections (with one Standard, with two standards, Bonn's)
- 1.4.2 Practice to solve the practical/technical problems
- 1.4.3 Learn the digital formation of the conical projection

1.5 Zenithal Projections

- 1.5.1 Draw types of Zenithal Projections (Orthographic, Gnomonic, Stereographic)
- 1.5.2 Practice to solve the practical/technical problems
- 1.5.3 Learn the digital formation of the Zenithal projection

2. Statistical Techniques**2.1 Introduction**

- 2.1.1 Introduce statistical techniques. (Lab work)
- 2.1.2 Develop the understanding of statistical techniques (Lab work)
- 2.1.3 Learn to draw the statistical techniques in representation of data
- 2.1.4 Tabulate the statistical data (Lab work)
- 2.1.5 Formulate the statistical data (Lab work)

2.2 Frequency Distribution

- 2.2.1 Calculate the frequency distribution
- 2.2.2 Learn to use the techniques in frequency distribution of data
- 2.2.3 Formulate and tabulate the statistical data

3.3 Averages

- 3.3.1 Develop the understanding the averages in given data
- 3.3.2 Practice the uses of Mean Median and Mode in data
- 3.3.3 Calculate the various techniques of measurements

4.4 Distributional Maps

- 4.4.1 Learn to draw by tracing the World and regional maps
- 4.4.2 Develop the understanding of methods in showing distribution of variables on map
- 4.4.3 Learn to draw the digital maps of mining areas
- 4.4.4 Enable to calculate the navigational maps of different locations
- 4.4.5 Prepare distributional maps with the help of symbols line, bars, shade, dots and circles methods

GIS-263 **Spatial Analysis and GIS Programming**

Total Contact Hours	192	T	P	C
Theory	64	2	3	3
Practical	96			

Learning Outcomes: Develop spatial analysis skills, reveals how basic understanding to spatial analysis concepts are implemented within Geographic Information Systems and GIS programming.

COURSE CONTENTS

1. Geographic Information Analysis and Spatial Data	06 Hours
1.1 Introduction	
1.2 Spatial Data Type	
1.3 Potential of Spatial data	
1.4 Geographic analysis and cartographic Modeling	
2. Point Pattern Analysis	06 Hours
2.1 Introduction	
2.2 Describe Point Pattern	
2.3 Assessing Point Pattern statistically	
2.4 Practical Point Pattern analysis	
3. Lines and networks	06 Hours
3.1 Introduction	
3.2 Representing and Storing linear enteritis	
3.3 Network analysis	
4. Area objects and spatial autocorrelation	06 Hours
4.1 Introduction	
4.2 Types of area objects	
4.3 Geometric properties of area	
4.4 Boundary analysis	
4.5 Buffering and neighborhood function	
4.6 Proximity analysis	
4.7 Neighborhood function/analysis	
5. Describing and analyzing fields	09 Hours
5.1 Introduction	
5.2 Modeling and storing field data	
5.3 Spatial interpolation	
5.4 Methods/algorithms	
5.5 Application in Mining	
5.6 Derived measure on surfaces	
6. Map Overlay	09 Hours
Introduction	
6.1 Vector Overlay Operation	
6.2 Raster Overlay Operations	
6.3 Problems in Simple Boolean polygon Overlay	
7. GIS Programming	22 Hours
7.1 Introduction to Python,	
7.2 Python Basics	
7.3 Python Control Statements	
7.4 Python Programming for GIS	

Reference Books:

1. ITC (2000) "Principles of Geographic Information Systems" ITC Educational Textbook Series, Enschede, The Netherlands. ISBN: 90- 6461-226-4
2. Aronoff, S. (2004) "Geographic Information Systems: A Management Perspective" WDL Publications, Ottawa, Fifth Edition. ISBN – 0912804008.
3. David O' S and David, J. U (2003) "Geographic Information Analysis", John Wiley & Sons, Inc., Canada, P-434
4. Chang, K, T. (2002), Introduction to Geographic Information Systems, McGraw Hill
5. Stillwell, J & Clarke, G. (2004), Applied GIS and Spatial Analysis, John Wiley & Sons, UK, P-406
6. Peter M. A and Nicholas J. T, (1999), Advances in Remote Sensing and GIS Analysis, John Wiley & Sons, UK, P-273
7. Robert, L., Derek, T. (1992) "Fundamentals of Spatial Information Systems". Academic Press.
8. Paul, L., Michael, G., David, M. & David, and R. "Geographic Information Systems: 11.
9. Principles, Techniques, Applications and Management". John Wiley & sons, 1999.
10. Aronoff, S. (1995) Geographic Information Systems: A Management Perspective, Wdl Publications, Ottawa, Canada, fourth edition.

INSTRUCTIONAL OBJECTIVES

- 1. Geographic Information Analysis and Spatial Data**
 - 1.1 Introduce Geographic Information Analysis and Spatial Data
 - 1.2 Learn Spatial Data Type
 - 1.3 Know the Potential of Spatial data
 - 1.4 Conduct Geographic analysis and cartographic Modeling
- 2. Point Pattern Analysis**
 - 2.1 Introduce point pattern analysis
 - 2.2 Describe Point Pattern
 - 2.3 Assess Point Pattern statistically
 - 2.4 Practice Point Pattern analysis
- 3. Lines and networks**
 - 3.1 Introduce line and networks
 - 3.2 Represent and Storing linear entries
 - 3.3 Perform network analysis
- 4. Area objects and spatial autocorrelation**
 - 4.1 Introduce area objects and spatial autocorrelation
 - 4.2 Learn types of area objects
 - 4.3 Draw geometric properties of area
 - 4.4 Perform boundary analysis
 - 4.5 Learn buffering and neighborhood function
 - 4.6 Learn proximity analysis
 - 4.7 Perform neighborhood function/analysis
- 5. Describing and analyzing fields**
 - 5.1 Describing and analyzing fields
 - 5.2 Learn Modeling and storing field data
 - 5.3 Learn Spatial interpolation
 - 5.4 Learn Methods/algorithms
 - 5.5 Learn application
 - 5.6 Derived measure on surfaces
- 6. Map Overlay**
 - 6.1 Introduce map overly
 - 6.2 Learn Vector Overlay Operation
 - 6.3 Perform Raster Overlay Operations
 - 6.4 Learn how to solve problems in Simple Boolean polygon Overlay
- 7. GIS Programming**
 - 7.1 Introduce Programming Languages
 - 7.2 Introduce Python and history of Python
 - 7.3 Learn Python Basics (Environment, Variables, Data Types)
 - 7.4 Introduce Python Libraries
 - 7.5 Explain Python Programming for GIS

List of Practical**96 Hours**

- 1. Geographic Information Analysis and Spatial Data**
 - 1.1 Practice Geographic Information Analysis and Spatial Data
 - 1.2 Conduct Geographic analysis and cartographic Modeling
- 2. Point Pattern Analysis**
 - 2.1 Perform point pattern analysis
 - 2.2 Practice Point Pattern analysis
- 3. Lines and networks**
 - 3.1 Perform Storing linear entries
 - 3.2 Perform network analysis
- 4. Area objects and spatial autocorrelation**
 - 4.1 Practice area objects and spatial autocorrelation
 - 4.2 Draw geometric properties of area
 - 4.3 Perform boundary analysis
 - 4.4 Practice buffering and neighborhood function
 - 4.5 Practice proximity analysis
 - 4.6 Perform neighborhood function/analysis
- 5. Describing and analyzing fields**
 - 5.1 Practice modeling and storing field data
 - 5.2 Perform Spatial interpolation
 - 5.3 Perform Methods/algorithms
- 6. Map Overlay**
 - 6.1 Perform map overly
 - 6.2 Practice Vector Overlay Operation
 - 6.3 Perform Raster Overlay Operations
- 7. GIS Programming**
 - 7.1 Hello World Program in Python
 - 7.2 Create a simple calculator that can perform basic arithmetic operations like addition, subtraction, multiplication, and division.
 - 7.3 Write a script to create a new shape file and add features (points, lines, or polygons) to it
 - 7.4 Develop a script that conducts spatial queries, such as finding all points within a specific polygon

GIS-273 **Fundamentals of Digital Image Processing**

Total Contact Hours	192	T	P	C
Theory	64	2	3	3
Practical	96			

Learning Outcomes: Provides practical application of Digital Image Processing of remotely sensed data for analysis of earth resources. Focusing on the various aspects of Digital Image Processing to extract useful information via working on a real-life project.

COURSE CONTENTS

1. Introduction	10 Hours
1.1 What is an image	
1.2 Pixel size	
1.3 Image size	
1.4 Spatial Resolution	
1.5 Spectral Channels	
1.6 Raster image formats	
2. Introduction to Digital Processing	10 Hours
2.1 What is digital image processing	
2.2 Fundamentals in digital image processing	
2.3 Components of Image processing system	
2.4 Examples Associated with the concept of Image processing system	
3. Digital Image Fundamentals	15 Hours
3.1 Preprocessing	
3.1.1 Radiometric Processing	
3.1.2 Advance atmospheric correction tools	
3.1.3 De striping and related issues	
3.1.4 Subsets	
3.1.5 Geometric correction by Resampling	
3.2 Image statistics	
3.2.1 Mean of DN	
3.2.2 Median of DN	
3.2.3 S. Deviation of DN	
3.2.4 Histogram	
3.3 Image Contrast enhancement	
3.3.1 Linear Stretching	
3.3.2 Piecewise	
3.3.3 Exponential	
3.4 Filtering	
3.4.1 Noise Reduction	
3.4.2 Edge enhancement	
3.5 Exercise	
4. Image Geo Referencing	9 Hours
4.1 Affine transformation	
4.2 Word File	
4.3 Coordinate Systems	
4.4 Exercise	
5. Image Interpretation	20 Hours
5.1 Image Classification	

- 5.2 Supervised Classification
- 5.3 Unsupervised classification
- 5.4 Exercise
- 5.5 Interpretation Elements
 - 5.5.1 Tone
 - 5.5.2 Texture
 - 5.5.3 Association
 - 5.5.4 Location
 - 5.5.5 Shape
 - 5.5.6 Size
 - 5.5.7 Shadow

Reference Books:

1. Schowengerdt, R A (1997) Remote Sensing, Models and Methods for Image Processing (Academic Press) ISBN 0-12-628981-6 Gonzalez, R. C., Woods, R. E. (2018).
2. Digital image processing. Pearson Education. ISBN: 978-0-13-335672-4
3. ERDAS Field Guide™ Volume One January 2008
4. Principles of Remote Sensing by ITC Netherlands
5. Campbell, J. B., and Wynne, R H. Introduction to remote sensing
6. Gonzalez, R. C. Digital Image Processing. Second Edition
7. Mather, P.M. Computer processing of remotely sensed images.
8. ITC, Principles of Geographic Information Systems, 2000, ITC Educational Textbook Series, Enschede, The Netherlands (Chapter 6)
9. Robert A. S. (1997) Remote Sensing: Models and Methods for Image Processing Second Edition, Academic Press, Burlington, MA
10. Aronoff, S. (1995) Geographic Information Systems: A Management Perspective, Wdl Publications, Ottawa, Canada, fourth edition

INSTRUCTIONAL OBJECTIVES

1. Introduction

- 1.1 Define an image
- 1.2 State information about a pixel
- 1.3 Specify an Image size
- 1.4 State Resolution
- 1.5 Define Spectral Channels
- 1.6 Describes Raster image formats

2. Introduction to digital processing

- 10.1 Define digital image processing
- 10.2 Explain the Fundamentals in digital image processing
- 10.3 State Components of Image processing system
- 10.4 Give examples Associated with the concept of Image processing system

11. Digital Image Fundamentals

- 11.1 Distinguish among the elements of visual Perception
- 11.2 Define Light and the electromagnetic Spectrum
- 11.3 Describes Image sensing and acquisition in followings
 - 11.3.1 Image acquisition using single sensor
 - 11.3.2 Image acquisition using sensor strips
 - 11.3.3 Image acquisition using sensor array

12. Image Processing

- 12.1 Explain the Preprocessing in following areas
 - 12.1.1 Radiometric Processing
 - 12.1.2 Advance atmospheric correction tools
 - 12.1.3 De striping and related issues
 - 12.1.4 Subsets
 - 12.1.5 Geometric correction by Resampling
- 12.2 Define Image statistics of the followings
 - 12.2.1 Mean of DN
 - 12.2.2 Median of DN
 - 12.2.3 S. Deviation of DN
 - 12.2.4 Histogram
- 12.3 State Image Contrast enhancement in the followings
 - 12.3.1 Linear Stretching
 - 12.3.2 Piecewise
 - 12.3.3 Exponential
- 12.4 Knowing Filtering of the followings
 - 12.4.1 Noise Reduction
 - 12.4.2 Edge enhancement
- 12.5 Capable of doing Exercises

13. Capable in Image geo referencing in the following capacities

- 13.1 Affine transformation
- 13.2 Word File
- 13.3 Coordinate Systems
- 13.4 Exercise

14. Capable in Image Interpretation

- 14.1 Demonstrate the Image Classification
- 14.2 Define Supervised Classification

14.3 Define Unsupervised classification

14.4 Capable in Exercises

14.5 Demonstrate in the following Interpretation Elements

14.5.1 Tone

14.5.2 Texture

14.5.3 Association

14.5.4 Location

14.5.5 Shape

14.5.6 Size

14.5.7 Shadow

List of Practicals

96 Hours

1. Learn the techniques of digital image processing
2. Demonstrate a knowledge of a broad range of fundamental image processing
3. Determination of Image analysis techniques
4. Find the Image analysis concepts
5. Study how digital images are represented in computer
6. Learn digital image manipulation in computer
7. Study image storage in computer
8. Demonstrate display of image in computer
9. Learn hands-on experience of image processing
10. Demonstrate image enhancement
11. Design practical solutions to a range of common image processing problems
12. Create practical solutions to a range of common image processing problems
13. Critically assess the results of their solutions
14. Learn shortcomings in results of their solutions

GIS-282**Report Writing**

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

Learning Outcomes: Recognize how to plan and complete reports for maximum impact. Understand and identify the different measures of readability. Know the basics, how to tailor a report for a specific audience.

COURSE CONTENTS

1. Report Writing	06 Hours
1.1 Introduction to Report	
1.2 Writing Definition	
1.3 Purpose of reports	
1.4 Importance of clear and effective communication	
1.5 Different types of reports (e.g., analytical reports, research reports, business reports)	
1.6 Overview of the course objectives and structure	
2. Purpose and Scope	06 Hours
2.1 Understanding Audience and Purpose Identifying the target audience for reports	
2.2 Determining the purpose and scope of reports	
2.3 Tailoring the content and style of reports to meet audience needs	
2.4 Exercises and case studies to practice audience analysis	
3. Writing Process	06 Hours
3.1 Planning and Organization	
3.2 Steps in the report writing process	
3.3 Structuring reports: introduction	
3.4 Body	
3.5 Creating effective outlines and organizing information logically	
3.6 Strategies for synthesizing and summarizing complex information	
3.7 Conclusion	
4. Writing Technique	06 Hours
4.1 Clarity and Conciseness	
4.2 Writing clear and concise sentences	
4.3 Avoiding jargon	
4.4 Technical language and unnecessary words	
4.5 Using active voice and strong verbs	
4.6 Editing and revising for clarity and readability	
5. Writing Structure	04 Hours
5.1 Data Presentation and Visualization	
5.2 Selecting appropriate data visualization techniques (e.g., tables, charts, graphs)	
5.3 Design principles for effective visual aids	
5.4 Interpreting and analyzing data in reports	
5.5 Tools for creating visualizations (e.g., Microsoft Excel, PowerPoint, Tableau)	
6. Writing Format	04 Hours

- 6.1 Writing Style and Tone
- 6.2 Developing a professional writing style
- 6.3 Choosing appropriate tone and language for different types of reports
- 6.4 Maintaining consistency in style and formatting
- 6.5 Exercises to practice tone and style variations
- 7. Writing Components 04 Hours**
 - 7.1 Report Sections and Components
 - 7.2 Common sections of reports (e.g., executive summary, introduction, methodology, findings, conclusions, recommendations)
 - 7.3 Guidelines for writing each section effectively
 - 7.4 Examples and templates for different report formats
- 8. Literature Survey and Referencing 06 Hours**
 - 8.1 Citation and Referencing
 - 8.2 Importance of citing sources in reports
 - 8.3 Different citation styles (e.g., APA, MLA, Chicago)
 - 8.4 Guidelines for citing sources within the text and creating reference lists
 - 8.5 Plagiarism awareness and avoidance
- 9. Review and Proofreading 06 Hours**
 - 9.1 Reviewing and Proofreading
 - 9.2 Strategies for reviewing and proofreading reports
 - 9.3 Common errors to watch out for (e.g., grammar, punctuation, spelling)
 - 9.4 Peer review and feedback techniques
 - 9.5 Using editing tools and software for proofreading
- 10. Finalizing and Presentation 08 Hours**
 - 10.1 Finalizing and Delivering Reports
 - 10.2 Formatting and layout considerations
 - 10.3 Adding title pages, tables of contents, and appendices
 - 10.4 Tips for presenting reports effectively (e.g., oral presentations, PowerPoint slides)
 - 10.5 Distributing reports and following up with stakeholders
- 11. Report Evaluation 04 Hours**
 - 11.1 Practical Applications and Case Studies
 - 11.2 Real-world examples of effective report writing
 - 11.3 Analyzing and critiquing sample reports
 - 11.4 Group projects or case studies to apply report writing principles
- 12. Review and Analysis 04 Hours**
 - 12.1 Assessment and Feedback
 - 12.2 Assessing report writing skills through assignments, quizzes, and exams
 - 12.3 Providing constructive feedback on student reports
 - 12.4 Self-assessment and reflection activities
 - 12.5 Strategies for continuous improvement in report writing skills
 - 12.6 Throughout the course interactive activities, assignments, discussions, and feedback sessions should be incorporated to enhance student engagement and learning.
 - 12.7 Additionally, guest speakers or industry professionals could be invited to share insights and best practices in report writing.

Reference Books:

1. Professional Report Writing by Simon Mort 1st Edition 1992
2. Teaching Creative Writing for Primary Schools Standards by Reia Ali
3. A handbook of Report Writing by Arka Bhattacharya
4. How to write Technical Reports by Heike Hering (2nd Edition)
5. Technical report Writing by Souther, James W.

INSTRUCTIONAL OBJECTIVES

- 1. Report Writing**
 - 1.1 Introduce students about Report
 - 1.2 Understanding of Definition
 - 1.3 Students should be able to understand purpose of report
 - 1.4 Importance of clear and effective communication
 - 1.5 To teach students about different types of reports
 - 1.6 Overview of the course objectives and structure
- 2. Purpose and Scope**
 - 2.1 Students should learn about purpose and target audience of reports
 - 2.2 Understanding the purpose and scope of reports
 - 2.3 Learning how to Tailor the content and style in context of audience needs
 - 2.4 Exercises and case studies to practice audience analysis
- 3. Writing Process**
 - 3.1 Learning about how to plan and organize report
 - 3.2 Students should learn steps involved in report writing process
 - 3.3 Understanding structure of report
 - 3.4 How to build body of report
 - 3.5 Learning how to creating effective outlines and organizing information
 - 3.6 Strategies for synthesizing and summarizing complex information
 - 3.7 How to conclude report
- 4. Writing Technique**
 - 4.1 Understanding the terms Clarity and Conciseness in report writing
 - 4.2 Learning how to write clear and concise sentences
 - 4.3 Learning how to avoiding jargon
 - 4.4 Understanding of technical language and unnecessary words
 - 4.5 Using active voice and strong verbs
 - 4.6 Editing and revising for clarity and readability
- 5. Writing Structure**
 - 5.1 Learning how to Present and Visualize data
 - 5.2 Learning how to select appropriate data visualization technique
 - 5.3 Understanding of design principles for effective visual aids
 - 5.4 Interpreting and analyzing data in reports
 - 5.5 Understanding of tools for creating visualizations
- 6. Writing Format**
 - 6.1 Student should learn about writing Style and Tone of report
 - 6.2 Learning how to Develop a professional writing style
 - 6.3 Learning how to Choose appropriate tone and language of reports
 - 6.4 Maintaining consistency in style and formatting
 - 6.5 Exercises to practice tone and style variations
- 7. Writing Format**
 - 7.1 Introduce students about Sections and Components of a report
 - 7.2 Learning about common sections of reports
 - 7.3 Guidelines for writing each section effectively
 - 7.4 Examples and templates for different report formats
- 8. Literature Survey and Referencing**

- 8.1 Student should be able to add and read Citation and Referencing
- 8.2 Understanding the importance of citing sources in reports
- 8.3 Learning how to add and read different citation styles
- 8.4 Guidelines for citing sources within the text and creating reference lists
- 8.5 Students should learn about Plagiarism and how to avoid it

9. Review and Proofreading

- 9.1 Understanding reviewing and proofreading of report
- 9.2 Learning different Strategies for reviewing and proofreading
- 9.3 Common errors to watch out for
- 9.4 Understanding Peer review and feedback techniques
- 9.5 Using editing tools and software for proofreading

10. Finalizing and Presentation

- 10.1 How to Finalize and Deliver Reports
- 10.2 Learning Formatting and layout considerations
- 10.3 How to add title pages, tables of contents, and appendices
- 10.4 Tips for presenting reports effectively
- 10.5 Distributing reports and following up with stakeholders

11. Report Evaluation

- 11.1 Practical Applications and Case Studies
- 11.2 Real-world examples of effective report writing
- 11.3 Learning how to analyze and critique sample reports
- 11.4 Group projects or case studies to apply report writing principles

12. Review and Analysis

- 12.1 Assessment and Feedback process understanding
- 12.2 Assessing report writing skills through assignments, quizzes, and exams
- 12.3 Providing constructive feedback on student reports
- 12.4 Self-assessment and reflection activities
- 12.5 Strategies for continuous improvement in report writing skills
- 12.6 Throughout the course interactive activities, assignments, discussions, and feedback sessions should be incorporated to enhance student engagement : learning.
- 12.7 Additionally, guest speakers or industry professionals could be invited to s insights and best practices in report writing.

اسلامیات مطالعہ پاکستان

GEN 301

ٹی پی سی
1 0 1
کل وقت 20 گھنٹے

نصاب سال سوئم

حصہ اول اسلامیات

حصہ دوئم مطالعہ پاکستان

موضوعات:

1- قرآن مجید:

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

2- دس منتخب احادیث کا ترجمہ (تشریح)

() بنی الا سلام علی خمس شہادت انا الاله الا لمراقم الصلوٰتہ و ایتنا الزکوٰۃ و حج البيت و صوم

رمضان

() الدین النصیحتہ

() المنشاء موتمن

() للمومن علی المومن سنت خصال یعود ماذا مرض و تزہدہ اذا مات و یحببہ اذا دعا

() لیسلم علیہ اذا لقیہ و لیثمتہ اذا عطس و فصیحلہ اذا غاب او شہد

() لا تخن من خانک

() لا یدخل الجنۃ قاتع

() ان اللہ حرم علیکم عقوق المہات و اضاعته المال

() لیسر او لا تعسر او لا تنفر

() ذاق طعم الایمان من مرضی باللہ و با الا سلام دینا بمحمد نبیا

() افضل الذکر لا الہ الا اللہ

3- حقوق و فرائض:

حصول تعلیم بطور فرض، والدین اور اولاد کے حقوق و فرائض، ہمسایہ کے حقوق، بچوں کے حقوق، عورتوں کے حقوق، بزرگ

شہریوں کے حقوق، مجنث افراد کے حقوق۔

4- اسلام کی اخلاقی اقدار:

صبر و استقلال، غفور و درگزر، ایفائے عہد، اخوت، ایثار و قربانی۔

سال سوئم

حصہ اول اسلامیات

تدریس مقاصد

قرآن حکیم:

عمومی مقاصد: منتخب سورتوں اور آیات کی روشنی میں اسلام کے بنیادی مقاصد اور عبادات جان سکے
خصوصی مقاصد: طالب علم اس قابل ہو جائے گا کہ۔

سورۃ الفاتحہ، آیت لکڑی، سورۃ بقرہ کی آخری آیات ازمن الرسول سے اور سورۃ اخلاق کا ترجمہ و تشریح کر سکے
طالب علم درج ذیل کا مفہوم بیان کر سکے

- () رب العالمین صرف اللہ تعالیٰ ہے
- () اللہ رحم کرنے والا ہے
- () قیامت کے دن بادشاہی اللہ کی ہوگی
- () عبادات اور استعانت کا حقدار صرف اللہ ہے
- () طالب علم درج ذیل کا مفہوم بیان کر سکے
- () اللہ پاک ہر عیب سے پاک ہے
- () اللہ کے اسمائے حسنہ حق اور قیوم ہیں
- () تمام انبیاء پر ایمان لانا ضروری ہے
- () رسول، ملائکہ، کتب، سماویہ، پر ایمان لانا فرض ہے
- () اطاعت حقیقی صرف اللہ کے لیے ہے
- () اسلامی احکامات پر عمل کرنا انسانی بساط میں ہے
- () کفر کو اللہ کی مدد کے بغیر شکست نہیں دی جاسکتی
- () اللہ ایک ہے
- () اللہ کسی کا محتاج نہیں نہ اسکا کوئی شریک ہے

منتخب احادیث:

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

خصوصی مقاصد:

- () احادیث کا ترجمہ بیان کر سکے
- () احادیث کی تشریح کر سکے
- () معاشرتی اور انفرادی زندگی میں احادیث سے رہنمائی حاصل کر سکے

حقوق و فرائض:

عمومی مقاصد:

- () اسلامی معاشرے کا ایک اچھا فرد بن سکے

خصوصی مقاصد:

- () والدین کے حقوق و فرائض بیان کر سکے
- () ہمسایوں کے حقوق بیان کر سکے
- () بچوں کے حقوق بیان کر سکے
- () عورتوں کے حقوق کی پاسداری کر سکے
- () بزرگ شہریوں کے حقوق کا خیال رکھ سکے
- () منہض حضرات کے حقوق جان سکے اور ان کے حقوق کی پاسداری کر کے انہیں معاشرے کا ایک مفید فرد بنایا جاسکے
- () اسلام میں حقوق و فرائض کی آگاہی کی صورت میں اپنے اندر خدمتِ خلق کا جذبہ پیدا کر سکے

اسلامی اقدار:

عمومی مقاصد:

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

خصوصی مقاصد:

- () اخلاق کے معنی و مفہوم کو بیان کر سکے
- () اسلام میں حسن و اخلاق کی اہمیت بیان کر سکے
- () قرآن و سنت کی روشنی میں صبر و استقلال کی اہمیت بیان کر سکے
- () ایقائے عہد کی اہمیت بیان کر سکے
- () اخوت کے معنی و مفہوم بیان کر سکے
- () اخوتِ اسلامی کی اہمیت بیان کر سکے

() اسلام کی اعلیٰ اقدار کو اپنا کر مثالی معاشرہ پیدا کر سکے

نصاب (سال سوئم)

GEN 301

ٹی پی سی
1 0 1
کل وقت 12 گھنٹے

مطالعہ پاکستان

حصہ دوئم

موضوعات:

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

مطالعہ پاکستان (حصہ دوم)

قیام پاکستان

تدریس مقاصد:

عمومی مقاصد:

() قیام پاکستان کے بعد درپیش مسائل سے آگاہی حاصل کرے اور بیان کرے

خصوصی مقاصد:

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

() ریڈ کلف اور اس کے ایوارڈ کے بارے میں بیان کر سکے

() بنگال اور کلکتہ کی تقسیم کی وجوہات بیان کر سکے

() پنجاب کی تقسیم کی تفصیل بیان کر سکے

() مہاجرین کی آمد سے جو مسائل پیدا ہوئے انہیں بیان کر سکے

() ریاستوں کے الحاق کے بارے میں تفصیل بیان کر سکے

() ریاست جموں کشمیر کے بارے میں بیان کر سکے

() نہری پانی کے تنازعہ کو بیان کر سکے

() قرارداد مقاصد کی تفصیلات بیان کر سکے

() 22 علماء کے متفقہ اسلامی نکات بیان کر سکے

() 1973 کے آئین میں انسانی حقوق کی دفعات (28-8)۔ اقلیتوں کے حقوق اور دیگر محروم طبقات کے حقوق کے بارے میں

جان سکے

() قیام پاکستان کے بعد نفاذ اسلام کی کوششوں کو بیان کر سکے

() پاکستان کے محل وقوع اور اس کی جغرافیائی اہمیت بیان کر سکے اور GSP+ کے تعارف اور عملی طریقہ کار بیان کر سکے

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

ٹی پی سی
1 0 1
کل وقت 20 گھنٹے

غیر مسلم طلباء کے لیے

GEN301

نصاب اخلاقیات

سال سوئم

موضوعات:

- () احساس ذمہ داری
- () مثبت ذہن
- () عدل و انصاف
- () قومی خدمت کا جذبہ
- () ذکر و نظر کی پاکیزگی
- () احترام آدمیت
- () شائستگی
- () عفو و درگزر
- () بردباری
- () خود انحصاری
- () اثر و نفوذ
- () جامعیت
- () اپنی ذات کی معرفت (بذریعہ ہم عمر طلباء، اساتذہ، اہم شخصیات)
- () بچوں کے حقوق
- () عورتوں کے حقوق
- () بزرگ شہریوں کے حقوق
- () محنت حضرات کے حقوق

غیر مسلم طلباء کے لیے
نصاب اخلاقیات (سال سوئم)

تدریس مقاصد:

عمومی مقاصد:

- () ملکی ترقی کے لیے اعلیٰ اوصاف کے ساتھ بہتر طور پر ملک و ملت کی خدمت کر سکے
- خصوصی مقاصد: طالب علم اس قابل ہو سکے کہ
- () موضوعات کا مطلب بیان کر سکے
- () عملی زندگی سے مثالوں کی نشاندہی کر سکے
- () موضوعات کی اہمیت بیان کر سکے
- () اپنی شخصیت اور معاشرے پر موضوعات کے مطابق اثرات پیدا کرنے کے طریقے بیان کر سکے
- () مثبت ذہن کے ساتھ کام کر سکے
- () عدل و انصاف سے ادارہ میں، دفتر میں بہتر ماحول پیدا کر سکے
- () ماحول کو اخلاقی طور پر پاکیزہ بنائے
- () کارکنوں کی بہتر طور پر دل جوئی کر سکے
- () کارکردگی میں اضافہ کر سکے
- () باہمی احترام کی برکات سے استفادہ کر سکے
- () بچوں کے حقوق بیان کر سکے
- () عورتوں کے حقوق کی پاسداری کر سکے
- () بزرگ شہریوں کے حقوق کا خیال رکھ سکے
- () محنت حضرات کے حقوق جان سکے اور ان کے حقوق کی پاسداری کر کے انہیں معاشرے کا ایک مفید فرد بنایا جا سکے

GIS-314

Surveying – II

Total Contact Hours	256	T	P	C
Theory	64	2	6	4
Practical	192			

Learning Outcomes: Develop understanding and practical skill in advance surveying by field and laboratory work.

COURSE CONTENTS

1. Theodolite Traversing	08 Hours
1.1 Introduction	
1.2 Types of Theodolite	
1.3 Methods of horizontal and vertical angles	
1.4 Methods of Traversing	
1.5 Traversing with theodolite	
1.6 Azimuth and double fore sight methods	
2. Total Station	14 Hours
2.1 Introduction	
2.2 Types of total station	
2.3 Parts of total station	
2.4 Precautions in handling the total station	
2.5 Preparation of total station for observations	
2.6 Display unit	
2.7 Methods of total station	
2.8 Functions of total station	
2.9 Setting out grade	
2.10 Distance measurement	
2.11 Prism constant correction	
2.12 Selection of fine / coarse mode	
2.13 Stake out distance measurement	
2.14 Off set distance measurements	
2.15 Coordinate measurement	
2.16 Setting height of instrument and target	
2.17 Measuring coordinates of instrument station	
2.18 Measuring of missing line	
2.19 Measuring of height of an object	
2.20 Execution of layout by total station	
2.21 Procedure of horizontal distance and area by total station, data entry	
3. GPS (Global Positioning System)	12 Hours
3.1 Introduction	
3.2 Principles of GPS	
3.3 Parts of GPS	
3.4 Observation of GPS	
3.5 Functions of GPS	
3.6 Survey by GPS	
3.7 Method of errors, measurements	
3.8 RTK method input of digital data in GIS	
3.9 Type of GPS	

- | | | |
|-----------|--|-----------------|
| 4. | Topographic Survey | 10 Hours |
| | 4.1 Definition | |
| | 4.2 Contour lines and their characteristics | |
| | 4.3 Contour interval | |
| | 4.4 Methods of contouring | |
| | 4.5 Hachures, hill shading, form lines, bench marks and trigonometric stations | |
| | 4.6 Radial line | |
| | 4.7 Direct and indirect | |
| | 4.8 Interpretation of topographic profiles | |
| 5. | Curves | 10 Hours |
| | 5.1 Elements of simple circular curve | |
| | 5.2 Geometry of a simple circle curve | |
| | 5.3 Laying off horizontal and vertical curve | |
| | 5.4 Numerical curve | |
| | 5.5 Super elevation | |
| | 5.6 Transition curve | |
| 6. | Municipal & Subdivision Surveys | 10 Hours |
| | 6.1 Control monuments and surveys | |
| | 6.2 Steps in a city survey | |
| | 6.3 Triangulation for city survey | |
| | 6.4 Traverse for control of city survey | |
| | 6.5 Leveling for city surveys | |
| | 6.6 Base surveys | |
| | 6.7 Topographic survey of city | |
| | 6.8 Revenue surveys | |
| | 6.9 Underground surveys | |

Reference Books:

1. Ahmed, (2006) Introduction to GPS: the Global Positioning system, Artech house. Boston.
2. Gopi, S., & Sati, K. R. (2007) Advanced Surveying: Total station, GIS and Remote Sensing, Delhi, Dorling Kindersley.
3. Kaplan (2006) Understanding GPS: Principles and applications. London, Artech House Boston.
4. Kennedy, M. (2010) The Global positioning system Arc GIS, tyler and Frances group, new York.
5. Kumar, P.(2007) Dictionary of Global Positioning System, Delhi, Biotech, Books.

INSTRUCTIONAL OBJECTIVES

- 1. Theodolite Traversing**
 - 1.1 Introduction
 - 1.2 Types of Theodolite
 - 1.3 Methods of Horizontal and vertical angles
 - 1.4 Methods of Traversing
 - 1.5 Traversing with theodolite continuous
 - 1.6 Azimuth and double fore sight methods
- 2. Total Station**
 - 2.1 Introduction
 - 2.2 Types of Total Station
 - 2.3 Parts of Total Station
 - 2.4 Precautions in handling the Total Station
 - 2.5 Preparation of Total Station for observations
 - 2.6 Display unit
 - 2.7 Methods of Total Station
 - 2.8 Functions of Total Station
 - 2.9 Setting out grade
 - 2.10 Distance measurement
 - 2.11 Prism constant correction
 - 2.12 Selection of fine / coarse mode
 - 2.13 Stake out distance measurement
 - 2.14 Off set distance measurements
 - 2.15 Coordinate measurement
 - 2.16 Setting height of instrument and target
 - 2.17 Measuring coordinates of instrument station
 - 2.18 Measuring of missing line
 - 2.19 Measuring of height of an object
 - 2.20 Execution of layout by total station
 - 2.21 Procedure of horizontal distance and area by total station, data entry
- 3. GPS (Global Positioning System)**
 - 3.1 Introduction
 - 3.2 Principles of GPS
 - 3.3 Parts of GPS
 - 3.4 Observation of GPS
 - 3.5 Functions of GPS
 - 3.6 Survey by GPS
 - 3.7 Methods of errors, measurements
 - 3.8 RTK method input of digital data in GIS
 - 3.9 Type of GPS**
- 4. Topographic Survey**
 - 4.1 Definition
 - 4.2 Contour lines and their characteristics
 - 4.3 Contour interval
 - 4.4 Method of contouring
 - 4.5 Radial line\
 - 4.6 Direct and indirect

4.7 Interpretation of topographic profiles

5. **Curves**

- 5.1 Elements of simple circular curve
- 5.2 Geometry of a simple circle curve
- 5.3 Laying off horizontal and vertical curve
- 5.4 Numerical curve
- 5.5 Super elevation
- 5.6 Transition curve

6. **Municipal & Subdivision Surveys**

- 6.1 Control monuments and surveys
- 6.2 Steps in a city survey
- 6.3 Triangulation for city survey
- 6.4 Traverse for control of city survey
- 6.5 Leveling for city surveys
- 6.6 base surveys
- 6.7 Topographic survey of city
- 6.8 Revenue surveys
- 6.9 Underground surveys

List of Practicals**192 Hours**

- 1-** To familiarize with theodolite – types of theodolite – function of different parts of theodolite.
 - 1.1 Temporary adjustment of theodolite
 - 1.2 Measurement of horizontal and vertical angles –transiting the theodolite
 - 1.3 Traversing with theodolite – permanent adjustment of theodolite
 - 1.4 Azimuth and deflection angle traverse – Traverse by angles to the right and interior angle traverse – Adjustment of tape transit survey
- 2-** Types of total station – function of different parts of total station – preparation of total station for observation – use of display unit – Methods of total station – function of total station- Execution of layout of by total station – data storage - data transfer to computer software
- 3-** Preparation of G.P.S for observation – initializing the G.P.S – field procedure communication with base and rover - measuring the UTM and Local coordinate.
data transfer to computer software. Stake out the survey point.
- 4-** Mapping – Selection of contour interval – contouring with spot levels – square methods of contouring – interpolation of contours
- 5-** Laying off horizontal curve – circular curves – laying of vertical curves – Exercise on transition and compound curve
- 6-** Survey for street - system property lines – water supply and sanitary system – electrification and telephone system

Note: Each Practical comprises of several activities which may take Three to Five Weeks

GIS-324 GIS & RS APPLICATION IN EARTH SCIENCES

Total Hours	256	T	P	C
Theory	64	2	6	4
Practical	192			

Learning Outcomes: To discuss the recent tools and techniques in Earth Sciences with reference GIS and RS and demonstrate GIS and RS application in multitude of sub disciplines of physical environment.

COURSE CONTENTS

1. Introduction	08 hours
1.1 Definition and Scope	
1.2 Sub disciplines of Earth Sciences	
1.3 GIS mapping and Remote Sensing of the environment	
2. Earth Materials and Mineralogy	14 hours
2.1 The crust and its composition	
2.2 Rocks and Minerals	
2.3 Rock cycle	
2.4 Mineral properties	
2.5 Ore deposits and economic minerals	
2.6 Remote Sensing for mineral exploration	
2.7 Economic geology; exploration and exploitation of natural resources, petroleum Basins of Pakistan	
3. The Lithosphere and Plate Tectonics	14 Hours
3.1 The structure of the Earth	
3.2 The relief features of the continents and oceanic basins	
3.3 Plate Tectonics	
3.4 GIS mapping of earthquake prone areas/risk zones	
4. Global Vegetation and Soils	14 Hours
4.1 Natural vegetation	
4.2 Plants and environment	
4.3 Terrestrial Ecosystems	
4.4 The nature of Soil	
4.5 Soil development	
4.6 Normalized Difference Vegetation Index (NDVI)	
5. GIS and RS for Physical environment	14 Hours
5.1 GIS mapping	
5.2 Radar-an active Remote Sensing System	

5.3 Passive Remote Sensing System

5.4 Scanning System

5.5 Orbiting Earth Satellites

5.6 Remote Sensing for land cover monitoring (snow and glacier, natural vegetation, rangeland, etc)

Reference Books:

1. De Blij, H.J., Muller, P.O., & Williams, R. S. (2004). Physical Geography: The Global environment (Vol.2). Oxford University Press
2. Perkin, D. (1995) Mineralogy. Premier Printer, New York. Second Edition
3. Strahler, A. H., & Strahler, A. N. (2005). Physical Geography: Science and Systems of the Human Environment . New York, NY: Wiley.
4. Aronoff, S. (2004), Geographic Information Systems, A Management Perspective WDL Publications, Ottawa.
5. Foody, G.M. & Curran, P.J. (1994). Environmental Remote Sensing from Regional to Global scales. John, Wiley & Sons. Inc. 250 p.
6. Gibson, P. J (2000). Introductory Remote Sensing: Principles and Concepts Rutledge.
7. Lillesand, T. M. & Kiefer, R. W. (2010). Remote Sensing and Image Interpretation, 6th edition. John Wiley and Sons Inc.
8. Lulla, K. & Dessinov, L.V. (2000). Dynamic Earth Environmental: Remote Sensing Observations from shuttle Mir Mission John, Wiley & Sons. Inc
9. Rancez, A.N. (1999). Remote Sensing for the Earth Sciences. John Wiley & Sons. Inc

Instructional Objectives

1. Introduction

- 1.1 Explain definition and Scope
- 1.2 Describe sub disciplines of Earth Sciences
- 1.3 Develop the understanding of GIS mapping and Remote Sensing of the Environment

2. Earth Materials and Mineralogy

- 2.1 Define the crust and its composition
- 2.2 Differentiate rocks and minerals
- 2.3 Elaborate the rock cycle
- 2.4 Develop the understanding of mineral properties
- 2.5 Differentiate Ore deposits and economic minerals
- 2.6 Develop the understanding of Remote Sensing for mineral exploration
- 2.7 Elaborate economic Geology; Exploration and Exploitation of Natural Resources, Petroleum Basins of Pakistan

3. The Lithosphere and Plate Tectonics

- 3.1 Explain the structure of the Earth
- 3.2 Develop the understanding of the relief features of the continents and oceanic basins
- 3.3 Describe Plate Tectonics
- 3.4 Develop the understanding of GIS mapping of earthquake prone areas/zones
- 3.5 Perform the application of Remote Sensing in different fields of Earth Sciences

4. Global Vegetation and Soils

- 4.1 Define natural vegetation
- 4.2 Elaborate plants and environment
- 4.3 Develop the understanding of terrestrial ecosystems
- 4.4 Explain the nature of soil
- 4.5 Describe soil development
- 4.6 Develop the understanding of Normalized Difference Vegetation Index (NDVI)

5. GIS and RS for Physical environment

- 5.1 Develop the understanding of GIS mapping
- 5.2 Elaborate Radar-an active Remote Sensing system
- 5.3 Elaborate Passive Remote Sensing system
- 5.4 Describe Scanning System
- 5.5 Develop the understanding of Orbiting Earth Satellites
- 5.6 Develop the understanding of Remote Sensing for land cover monitoring (snow and glacier, natural vegetation, rangeland, etc)

List of Practical**192 Hours****1. Introduction**

- 1.1 Introduce Coordinate Systems
- 1.2 Learn to Plot a geographic grid of graph paper (manual)
- 1.3 Learn Land use / Land cover survey based field work
- 1.4 Practice the application of GIS mapping and Remote Sensing of the Environment
- 1.5 Learn practical component involves in use of recent tools and techniques

2. Earth Materials and Mineralogy

- 2.1 Remote Sensing Application in Physical Environment
- 2.2 Digital Elevation Models of relief features of the Earth environment
- 2.3 Use of recent technologies in mineral/element identifications
- 2.5 Use of recent technologies in Ore deposits and economic minerals
- 2.6 Application of Remote Sensing for mineral exploration
- 2.7 Use of recent technologies in economic Geology; Exploration and Exploitation of Natural Resources, Petroleum Basins of Pakistan

3. The Lithosphere and Plate Tectonics

- 3.1 Practice the shape and size of the Earth
- 3.2 Learn to draw the relief features of the continents and oceanic basins by using recent tools and techniques
- 3.3 Plot Tectonics map of the World
- 3.4 Develop the understanding of GIS mapping of earthquake prone areas/risk zones
- 3.5 Practice Remote Sensing below the ground surface

4. Global Vegetation and Soils

- 4.1 Practice to investigate a GIS application in global distribution of Plants/Vegetal cover
- 4.2 Practice a GIS application in regional and local Plants distribution
- 4.3 Digital mapping of terrestrial ecosystems
- 4.4 Practice the spatial distribution of soil properties and classes using Digital Soil Mapping
- 4.5 Practice soil mapping in agriculture
- 4.6 Investigate by learning Normalized Difference Vegetation Index (NDVI)

5. GIS and RS for Physical environment

- 5.1 Develop a digital map of given environment in GIS perspective
- 5.2 Learn to explore Radar-An Active Remote Sensing system
- 5.3 Learn to explore Passive Remote Sensing systems
- 5.4 Practice multispectral scanners
- 5.5 Develop the understanding of Orbiting Earth Satellites in global and regional weather systems
- 5.6 Draw the application Remote Sensing for land cover monitoring (snow and glacier, natural vegetation, rangeland, etc)

GIS-333 Spatial Database Management**Total Contact Hours****T P C****Theory 64****2 3 3****Practical 96**

Learning Outcomes: Explain fundamental concepts of spatial databases, including data models and indexing. Design and implement simple spatial databases to store and manage geospatial data efficiently. Apply SQL queries to retrieve, analyze, and manipulate basic spatial data. Demonstrate proficiency in spatial indexing techniques for enhanced database performance. Develop skills in data integration, ensuring seamless interoperability of spatial databases. Assess and apply basic spatial database management techniques to real-world scenario.

COURSE CONTENTS

- | | | |
|-----------|--|----------------|
| 1. | Introduction to Spatial Database | 6 Hours |
| | 1.1 Overview of Spatial Database: Definition, characteristics, and types | |
| | 1.2 Importance of Spatial Data in Real-world Applications | |
| | 1.3 Comparison between spatial and non-spatial (traditional) database | |
| 2. | Basics of GIS (Geographic Information System) | 8 Hours |
| | 2.1 Fundamental concepts of GIS | |
| | 2.2 Spatial data types and structures | |
| | 2.3 Spatial Data Modeling | |
| | 2.4 Vector data model: points, lines, and polygons | |
| 3. | Spatial Database Acquisition and Design | 6 Hours |
| | 3.1 GPS data collection | |
| | 3.2 Field surveys and data acquisition methods | |
| | 3.3 Principles of spatial database design | |
| | 3.4 Entity-relationship modeling for spatial data | |
| | 3.5 Normalization in spatial database | |
| 4. | Spatial Query Languages | 6 Hours |
| | 4.1 Introduction to SQL for spatial databases | |
| | 4.2 Spatial query operations | |
| | 4.3 Basic spatial queries (e.g., buffering, overlay, proximity analysis) | |
| | 4.4 Examples of spatial queries | |
| 5. | Spatial Indexing | 5 Hours |
| | 5.1 Importance of Indexing in Spatial Database | |
| | 5.2 Types of spatial indexing techniques | |
| | 5.3 Implementation and optimization | |
| 6. | Integration of Remote Sensing Data | 5 Hours |
| | 6.1 Incorporating remote sensing data into spatial database | |
| | 6.2 Challenges and Best Practices | |
| | 6.3 Case Studies | |
| 7. | Web-based Spatial Database | 5 Hours |
| | 7.1 Introduction to Web GIS | |
| | 7.2 Designing and Implementing Web-based spatial database | |
| | 7.3 Geo-spatial Web services | |

- | | | |
|------------|--|-----------------|
| 8. | Spatial Data Quality and Uncertainty | 5 Hours |
| | 8.1 Assessing and managing data quality in spatial database | |
| | 8.2 Dealing with uncertainty in spatial data | |
| | 8.3 Quality assurance and control | |
| 9. | Case Studies in Spatial Database Management | 8 Hours |
| | 9.1 Real-world applications and success stories | |
| | 9.2 Challenges faced and Lessons Learnt | |
| | 9.3 Introduction to emerging trends and modern topics | |
| 10. | Final Project and Review | 10 Hours |
| | 10.1 Hands-on Project: Designing and implementing a spatial database | |
| | 10.2 Review of Key Concepts and Takeaways | |
| | 10.3 Future Directions in Spatial Database Management | |

Reference Books:

- 1- Spatial Database: A Tour by Shashi Shekhar and Sanjay Chawla, Publishing Year: 2003 ,1st Edition
- 2- Fundamentals of Spatial Information Systems by Michael Worboys and Matt Duckham, Publishing Year: 2004, Edition: 1st Edition
- 3- Principles of Geographic Information Systems by Peter A. Burrough and Rachael A. McDonnell, Publishing Year: 2015, 2nd Edition
- 4- Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke, Publishing Year: 2002, 3rd Edition
- 5- Spatial Database Systems: Design, Implementation and Project Management by Albert K. W. Yeung and T.Y. Lam, Year: 2019,1st Edition

INSTRUCTIONAL OBJECTIVES

- 1. Introduction to Spatial Database**
 - 1.1 Define spatial database and describe their characteristics and types
 - 1.2 Explain the importance of spatial data in real-world applications
 - 1.3 Compare spatial database with traditional non-spatial databases
- 2. Basics of GIS (Geographic Information System)**
 - 2.1 Understand fundamental concepts of GIS
 - 2.2 Describe spatial data types and structures
 - 2.3 Explain spatial data modeling and the vector data model
- 3. Spatial Database Acquisition and Design**
 - 3.1 Discuss GPS data collection methods
 - 3.2 Explain field surveys and data capture techniques
 - 3.3 Describe principles and techniques for spatial database design
- 4. Spatial Query Languages**
 - 4.1 Introduce SQL for spatial databases
 - 4.2 Perform basic spatial query operations
 - 4.3 Provide examples of spatial queries
- 5. Spatial Indexing**
 - 5.1 Discuss the importance of indexing in spatial databases
 - 5.2 Describe types of spatial indexing techniques
 - 5.3 Explain implementation and optimization of spatial indexing
- 6. Integration of Remote Sensing Data**
 - 6.1 Incorporate remote sensing data into spatial database
 - 6.2 Identify challenges and best practices
 - 6.3 Present case studies demonstrating the integration of remote sensing data
- 7. Web-based Spatial Database**
 - 7.1 Introduce Web GIS concepts
 - 7.2 Design and implement web-based spatial database
 - 7.3 Discuss geo-spatial web services
- 8. Spatial Data Quality and Uncertainty**
 - 8.1 Assess and manage data quality in spatial database
 - 8.2 Address uncertainty in spatial data
 - 8.3 Implement quality assurance and control measures
- 9. Case Studies in Spatial Database Management**
 - 9.1 Present real-world applications and success stories
 - 9.2 Discuss challenges faced and lessons learnt
 - 9.3 Introduce emerging trends and modern topics in spatial database management
- 10. Final Project and Review**
 - 10.1 Design and implement a spatial database for a hands-on project
 - 10.2 Review key concepts and takeaways from the course
 - 10.3 Discuss future directions in spatial database management

List of Practicals**96 Hours**

The Instructor should design the exercises to give an understanding related to following concepts

1. Introduction to Spatial Database: Familiarize students with the basic concepts and principles of spatial database
2. Database Design: Teach students how to design spatial databases effectively, including entity-relationship modeling and schema design
3. Spatial Querying: Introduce students to spatial querying techniques using SQL for data retrieval and analysis
4. GIS Fundamentals: Provide an overview of Geographic Information Systems (GIS) and their role in spatial database management
5. Spatial Data Types: Explore different types of spatial data and how they are represented in spatial databases
6. Indexing Techniques: Teach students various spatial indexing techniques to enhance database performance
7. Data Entry and Management: Practical sessions on entering and managing spatial data in databases
8. Spatial Analysis: Introduce students to basic spatial analysis techniques using spatial databases
9. Application Development: Hands-on exercises on developing applications that utilize spatial databases
10. Project Work: Assign a project where students apply their knowledge and skills to solve real-world spatial database management problems

GIS-344 Drone Mapping and Aerial Photography & Photogrammetry

Total Contact Hours		T	P	C
Theory	64	2	6	4
Practical	192			

Learning Outcomes: Develop understanding and practical skill in advance surveying by field and laboratory work.

COURSE CONTENTS

- | | |
|---|-----------------|
| 1. Introduction to Drones and Aerial Photography | 14 Hours |
| 1.1 Introduction to Drones | |
| 1.1.1 History and evolution of drones | |
| 1.1.2 Types of drones and their applications | |
| 1.1.3 Drone components and technology | |
| 1.2 Aerial Photography Basics | |
| 1.2.1 Introduction to aerial photography | |
| 1.2.2 Camera types and specifications | |
| 2. Drone Operations and Mapping Techniques | 25 Hours |
| 2.1 Flight Planning | |
| 2.1.1 Principles of flight planning | |
| 2.1.2 Software tools for flight planning | |
| 2.1.3 Mission execution and monitoring | |
| 2.1.4 Ground control points and camera calibration | |
| 2.2 Data Acquisition & processing by Drone | |
| 2.2.1 Collecting and managing aerial imagery | |
| 2.2.2 Identifying features from aerial imagery | |
| 2.2.3 Image processing techniques | |
| 2.2.4 Quality control and accuracy assessment | |
| 2.3 Image Interpretation and Photogrammetry | |
| 2.3.1 Image interpretation Techniques | |
| 2.3.2 Image analysis | |
| 3. Advanced Techniques and Applications | 25Hours |
| 3.1 3D Mapping and Modeling | |
| 3.1.1 Point clouds and mesh generation | |
| 3.1.2 Creating 3D models from aerial imagery | |
| 3.1.3 Applications of 3D mapping | |
| 3.1.4 Thermal imaging & multi-spectral image analysis | |
| 3.1.5 Hand held LiDAR | |

Reference Books:

1. The Drone Pilot's Handbook" by Adam Juniper
2. The Handbook of Drone Photography: A Complete Guide to the New Art of Do-It-Yourself Aerial Photography" by Chase Guttman
3. Introduction to Modern Photogrammetry" by Edward M. Mikhail and James S. Bethel
4. Manual of Photogrammetry" by American Society for Photogrammetry and Remote Sensing (ASPRS)
Close-Range Photogrammetry and 3D Imaging" by Thomas Luhmann, Stuart Robson, Stephen Kyle, and Ian Harley

INSTRUCTIONAL OBJECTIVES

- 1. Introduction to Drones**
 - 1.1 Describe the historical development and evolution of drones
 - 1.2 Identify different types of drones and their respective applications
 - 1.3 Explain the key components and underlying technology of drones
- 2. Aerial Photography Basics**
 - 2.1 Define aerial photography and its significance in various fields
 - 2.2 Differentiate between different types of cameras used in aerial photography and understand their specifications
- 3. Drone Flight Planning**
 - 3.1 Understand the principles and importance of flight planning for drones
 - 3.2 Utilize software tools effectively for flight planning purposes
 - 3.3 Demonstrate competence in executing and monitoring drone missions
- 4. Image Interpretation and Photogrammetry**
 - 4.1 Explain the concepts of ground control points and camera calibration in image interpretation
 - 4.2 Apply photogrammetric techniques for accurate data collection and processing
- 5. Data Acquisition & Processing by Drone**
 - 5.1 Demonstrate proficiency in collecting and managing aerial imagery
 - 5.2 Identify features accurately from aerial imagery and employ appropriate image processing techniques
 - 5.3 Conduct quality control measures and assess accuracy in data acquired by drones
- 6. 3D Mapping and Modeling**
 - 6.1 Generate point clouds and meshes from aerial imagery
 - 6.2 Create 3D models effectively using drone-captured data
 - 6.3 Understand and apply various applications of 3D mapping
- 7. Advanced Techniques and Applications**
 - 7.1 Describe the principles and applications of thermal imaging and multispectral image analysis
 - 7.2 Understand the concept and applications of handheld LiDAR technology

List of Practicals**192Hours**

- 1. Drone Familiarization**
 - 1.1 Identify and label different parts of a drone
 - 1.2 Demonstrate how to properly handle and care for a drone
 - 1.3 Practice basic maneuvers such as takeoff, landing, hovering, and controlling altitude
- 2. Camera Basics**
 - 2.1 Compare different types of cameras used in aerial photography
 - 2.2 Adjust camera settings such as aperture, shutter speed, and ISO sensitivity
 - 2.3 Capture test images with various settings to observe the impact on image quality
- 3. Flight Planning**
 - 3.1 Use flight planning software to create a sample flight plan for a specific area
 - 3.2 Discuss factors such as weather conditions, airspace regulations, and safety precautions
 - 3.3 Simulate a drone flight using the planned route and monitor its progress
- 4. Image Interpretation**
 - 4.1 Analyze aerial imagery to identify key features such as buildings, roads, and vegetation
 - 4.2 Practice marking ground control points and understanding their significance in image calibration
 - 4.3 Compare different image processing techniques to enhance image clarity and detail
- 5. Data Acquisition & Processing**
 - 5.1 Conduct a drone flight to collect aerial imagery of a mining area
 - 5.2 Process the collected images using photogrammetry software to generate a surface

GIS-354 GIS & RS based Projects / FIELD Survey Camps

Total Contact Hours		T	P	C
Theory	0	0	12	4
Practical	384			

**COURSE CONTENTS
PROJECTS**

**384
Hours**

(A group of students may select any one of these categories)

1. GIS Based Reports:

- 1.1 Mapping local biodiversity: Students can use GIS software to map the distribution of different Mines and plants or animal species in local and regional perspective
- 1.2 Land use Land Cover Maps: Assessment of reclamation efforts and environmental mitigation measures. Students can analyze urban patterns, land use, and population density to propose improvements or changes for mine / city planning and management
- 1.3 Environmental Impact Assessment (EIA): Students can assess the environmental impact of a proposed Mining/construction projects or development by analyzing factors such as terrain, water resources, and vegetal cover
- 1.4 Temporal Analysis: Students can create temporal maps of their local area by overlaying historical data onto current GIS maps to show changes over time

2. Remote Sensing (RS) Based Reports:

- 2.1 Deforestation analysis: Students can use remotely sensed data to track deforestation rates in a specific area and analyze the causes and effects of deforestation especially by mining
- 2.2 Flood Mapping: Students can use remotely sensed data to assess pre and post impact
- 2.3 Change Detection in Land use / land cover

3. GIS Programming based Reports:

- 3.1 Custom map application: Students can develop a web or mobile application that allows users to create custom maps by selecting layers, adding markers, and drawing shapes
- 3.2 Geocoding tool: Students can develop a tool that converts addresses into coordinates systems (latitude and longitude) using Google Maps
- 3.3 Students can develop a script to performs a specific spatial analysis task, such as buffer analysis, overlay analysis, or interpolation

The field report is seen as a major component of the program in which the student/group will demonstrate an ability to independently integrate knowledge, skills and competencies acquired from all earlier courses, together with an opportunity to consolidate and develop additional skills in the use and application of GIS and RS in physical and human environments keeping in view of the research methodologies.

NOTE: It's an internal report. Evaluated by the external examiner as nominated by PBTE through viva voce of already completed reports by the students. Computer based reports varies accordingly .

MINIMUM QUALIFICATION OF INSTRUCTORS /LECTURER
For Technical Subjects

- 16 years of Education in GIS & RS from a HEC recognized University for GIS subjects.
- 16 years of Education in Civil/Mining/Geological engineering

MINIMUM QUALIFICATION OF JUNIOR INSTRUCTORS/Technical
Laboratory Staff

- DAE in relevant field (Mining Technology, GIS & RS in Land & Mines Surveying) with minimum five years of experience in relevant industries

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

- i) MA degree in English/ Islamiat / Pst. with 2 years of teaching experience
- ii) M.Sc. degree in IT / Computer Sciences or BE in Computer Engineering/ Sciences with 2-years of teaching experience
- iii) M.Sc. degree in Mathematics with 2-years of teaching experience
- iv) M.Sc. degree in Physics / Chemistry with 2-years of teaching experience
- v) MBA/ MBE-con./ BBA (Hons.) degree with 2-years of teaching experience

EMPLOYABILITY OF THE PASS-OUTS

Sectors / Areas:-

1. Geological Survey of Pakistan.
2. Pakistan Mineral Development Corporation.
3. Punjab Mineral Development Company.
4. Directorate of Mines and Minerals.
5. Inspectorate of Mines.
6. Mining Based Companies in-land and foreign especially Gulf countries.
7. Urban Units Punjab
8. Irrigation Department
9. Agricultural Department
10. Civil construction
11. Entrepreneurship/ freelancing etc.
12. University and Colleges
13. NESPAK

Job Occupation

Designation	University and Colleges	Public and Private Organization
Lab assistant	✓	
Lab supervisor	✓	
Lab attendant	✓	
Field supervisor/survey	✓	✓
Research assistant	✓	✓
Data analyst		✓
Data interpreter		✓
Middle line manager		✓
Lecturer assistant	✓	
Curator		✓

DETAIL OF COMMITTEE

Sr.No	Name & Designation	Qualification	Experience
1	Dr. Ali Iqtadar Mirza, Professor / Head Geography Department, GCU, Lahore.	Ph.D. Environment & Urban Planning Perspective in GIS	20-Years
2	Dr. Muhammad Farooq Ahmed, Assistant Professor, Department of Geological Engineering, UET Lahore.	Ph.D. Geological Engineering specialization in GIS	20-Years
3	Mr. Waqas Kareem, Director GIS, Irrigation Department, Punjab, Lahore.	MS Remote Sensing and GIS	15 Years
4	Mr. Rizwan Saqib, Manager GIS O/o the Directorate, General Mines & Mineral Department, Punjab, Lahore.	M.Sc. GIS, M.Phil. Earth Sciences	10 Years +
5	Engr. Syed Mustafa Raza, Director, Mining Development Cell, Lahore.	B.Sc. Mining Engineering	18 Years
6	Engr. Muhammad Saleem Langah Director,PSM Punjab School of Mines Katas.	B.Sc. Mining Engineering	10 Years
7	Engr. Muhammad Shahbaz, Deputy Director Punjab School of Mines Katas.	B.Sc. Mining Engineering	05 Years
8	Engr. Muhammad Ajaz Anjum, Assistant Director Electrical, Punjab School of Mines, Katas.	B.Sc Electrical Engineering	08 Years