D.A.E. Electronics Curriculum Revised / Reviewed NCRC, NAVTTC Adapted by TEVTA

(2014-15)

DAE ELECTRONICS TECHNOLOGY
SCHEME OF STUDIES
(Reviewed By NCRC, NAVTTC)

			T	P	C
FIRST YEAR					
Gen	111	Islamiat & Pakistan Studies	1	0	1
Eng	112	English	2	0	2
Math	123	Applied Mathematics-I	3	0	3
Phy.	122	Applied Physics	1	3	2
Ch.	132	Applied Chemistry	1	3	2
A.Comp	112	Computer Fundamentals	1	3	2
El.TR	114	Electrical Circuits	3	3	4
El.TR	123(Rev.)	Electronics Devices	2	3	3
El.TR	132	Engineering Drawing & Computer Aided Design	0	6	2
El.TR	141(Rev.)	Electrical Wiring	0	3	1
		T o t a l	**14**	**24**	**22**
SECOND YEAR					
Gen	211	Islamiat & Pak Studies	1	0	1
Math	233	Applied Mathematics-II	3	0	3
Coms	211	Communication Skills	1	0	1
El.TR	212(Rev.)	Propagation of Electromagnetic Waves	2	0	2
El.TR	225	Analog Electronics	3	6	5
El.TR	233(Rev.)	Electrical Instruments & Measurements	2	3	3
El.TR	243(Rev.)	Electrical Machines	2	3	3
El.TR	253	Communication Systems	2	3	3
El.TR	264	Digital Electronics	3	3	4
El.TR	271	PCB Fabrication	0	3	1
		T o t a l	**19**	**21**	**26**
THIRD YEAR					
Gen	311	Islamiat & Pak Studies	1	0	1
Mgm	311	Industrial Management & Human Relations	1	0	1
OSHE	311	Occupational Safety, Health and Environment	1	0	1
El.TR	314	Computer Architecture	3	3	4
El.TR	323	Equipment Maintenance & Servicing	1	6	3
El.TR	332	Project	0	6	2
El.TR	343	Industrial Electronics	2	3	3
El.TR	353	Power Electronics	2	3	3
El.TR	363	Microcontroller Programming and Applications	2	3	3
	T o t a l		**13**	**24**	**21**

اسلامیات/مطالعہ پاکستان

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

کتاب و سنت

(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 تنالو البر حتی تنفقوا مما تحبون
1.2 واعتصموا بحبل اللّٰہ جمیعا" ولا تفرقو
1.3 ولا یجرمنکم شنان قوم علی ان لا تعدلوا
1.4 ان اللّٰہ یامرکم ان تودوا الامانات الی اھلھا
1.5 ان اللّٰہ یامر بالعدل والاحسان
1.6 ان الصلوتہ تنھی عن الفحشاء والمنکر
1.7 لقد کان لکم فی رسول اللّٰہ سوۃ حسنتہ
1.8 ان اکرمکم عند اللّٰہ اتقاکم
1.9 وما آتاکم الرسول فخرزووما نھی عنھوانتھوا
1.10 ولوفو بالعھد
1.11 وماشروھن بالمعروف
1.12 یمحق اللّٰہ الربوویربی الصمدقات
1.13 واصبر علی ما اصابک
1.14 وقولو قولا سدیدا
1.15 ان الدین عند اللّٰہ السلام

(ب) سنت

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

1- انما الاعمال بالنیات

2- انما بعثت لاتمم مکارم الاخلاق

3- لا یومن احدکم حتی یحب لاخیہ ما یحب لنفسہ

4- المسلم من سلم المسلمون من لسانہ ویدہ

5- قل امنت باللہ ثم استقم

6- خیرکم خیرکم لاہلہ

7- سباب المسلم فسوق وقتالہ کفر

8- المومن اخو المومن

9- کل المسلم علی المسلم حرام بمعہ وما لہ وعرضہ

10- ایتہ المنافق ثلاث اذا حدیث کذب واذا اوتمن خان واذا وعد اخلف

دین اسلام

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

1- توحید

2- رسالت

3- آخرت

4- ملائکہ

5- آسمانی کتب

2.2 عبادات

1- نماز 2- روزہ 3- حج 4- زکوٰۃ

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

حصہ اول

حصہ اسلامیات

تدریسی مقاصد

۱۔ قرآن مجید

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

خصوصی 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 کی دس 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 اسوۂ حسنہ کی پیروی کا جذبہ پیدا ہو سکے

-4

دین اسلام

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

خصوصی مقاصد

لفظ دین اسلام کے لغوی اور اصطلاحی معنی بیان کر سکے

اسلام کے بنیادی مقاصد کی اہمیت بیان کر سکے

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

عبادت کے لغظی و اصطلاحی معنی بیان کر سکے

عقیدے اور عبادت کا فرق بیان کر سکے

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

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

(غیر مسلم طلباء کے لئے)

ک	ع	ی
1	0	1

GEN 101

نصاب اخلاقیات سال اول

حصہ دوم مطالعہ پاکستان

کل وقت-20 گھنٹے

موضوعات

اخلاقیات کی تعریف اور اہمیت

اخلاقیات کا معیار (قانون، عقل، الہی 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 (سال اول)

تدریسی مقاصد

عمومی مقاصد: اعلیٰ اخلاق کی وجہ سے ملکی ترقی میں مثبت قدر متعارف کر سکے

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

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

نصاب (سال اول) Gen III

حصہ دوئم　　مطالعہ پاکستان　　کل وقت 12 گھنٹے

موضوعات

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

☆ نظریہ پاکستان

قیام پاکستان کی اساس (دین اسلام) قیام پاکستان کی غرض و غایت نظریہ پاکستان کی وضاحت - نظریہ پاکستان اور مسلم اقبال اور قائداعظم کے ارشادات کی روشنی میں

☆ نظریہ پاکستان کا تاریخی پس منظر

محمد بن قاسم کی آمد - مجدد الف ثانی اور شاہ ولی اللہ کی تبلیغی خدمات سید احمد شہید کی تحریک مجاہدین

☆ تعلیمی تحریکیں

علی گڑھ - ندوۃ العلماء (لکھنؤ) - مدرسۃ الاسلام - (کراچی) اسلامیہ کالج (پشاور) انجمن حمایت اسلام (لاہور)

مطالعہ پاکستان (حصہ دوئم)

تدریسی مقاصد

حریت فکر:

عمومی مقصد

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

خصوصی مقاصد

- ☆ حریت فکر کا معنی و مفہوم بیان کر سکے
- ☆ آزادی فکر کی اہمیت بیان کر سکے
- ☆ خصوصاً اسلام میں آزادی اظہار رائے کی اہمیت بیان کر سکے
- ☆ ذہنی غلامی کے قومی سطح پر نقصانات کے بیان کر سکے
- ☆ جسمانی غلامی قومی سطح پر نقصانات بیان کر سکے

نظریہ پاکستان

عمومی مقصد:

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

خصوصی مقاصد:

- ☆ نظریہ کی تعریف بیان کر سکے اور اس کی وضاحت کر سکے
- ☆ نظریہ پاکستان کی تعریف کر سکے اور اس کا مفہوم بیان کر سکے
- ☆ علامہ اقبال اور قائداعظم کے فرمودات کی روشنی میں نظریہ پاکستان بیان کر سکے

نظریہ پاکستان کا تاریخی پہلو

عمومی مقصد

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

خصوصی مقاصد:

- ☆ محمد بن قاسم کے بارے میں بیان کر سکے

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

علمی تحریکیں

عمومی مقصد

- برصغیر کی علمی تحریکوں سے آگاہی حاصل ہو سکے

خصوصی مقاصد:

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

****

Eng-112 ENGLISH

Total contact hours

		T	P	C
Theory	64			
Practical	0	2	0	2

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

COURSE CONTENTS

ENGLISH PAPER "A"

1 PROSE/TEXT 16 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 between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

ENGLISH PAPER "B"

3 GRAMMAR 26 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 10 hours

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

RECOMMENDED BOOKS

- 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. APPLY 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-123 APPLIED MATHEMATICS-I

T	P	C
3	0	3

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

AIMS: After completing the course the students will be able to

1. Solve problems of Algebra, Trigonometry, vectors, Mensuration, 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 Hours**

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. BINOMIAL THEOREM **6 Hours**

2.1 Factorials
2.2 Binomial Expression
2.3 Binomial Co-efficient
2.4 Statement
2.5 The General Term
2.6 The Binomial Series
2.7 Problems.

3. PARTIAL FRACTIONS **6 Hours**

3.1 Introduction
3.2 Linear Distinct Factors Case I
3.3 Linear Repeated Factors Case II
3.4 Quadratic Distinct Factors Case III
3.5 Quadratic Repeated Factors Case IV
3.6 Problems

4. FUNDAMENTALS OF TRIGONOMETRY **6 Hours**

4.1 Angles
4.2 Quadrants
4.3 Measurements of Angles
4.4 Relation between Sexagesimal & circular system
4.5 Relation between Length of a Circular Arc & the Radian Measure of its central Angle
4.6 Problems

5. TRIGONOMETRIC FUNCTIONS AND RATIOS **6 Hours**

5.1 Trigonometric functions of any angle

5.2 Signs of trigonometric Functions
5.3 Trigonometric Ratios of particular Angles
5.4 Fundamental Identities
5.5 Problems

6. GENERAL IDENTITIES **6 Hours**

6.1 The Fundamental Law
6.2 Deductions
6.3 Sum & Difference Formulae
6.4 Double Angle Identities
6.5 Half Angle Identities
6.6 Conversion of sum or difference to products
6.7 Problems

7. SOLUTION OF TRIANGLES **6 Hours**

7.1 The law of Sines
7.2 The law of Cosines
7.3 Measurement of Heights & Distances
7.4 Problems

8. VECTORS AND PHASORS **12 Hours**

8.1 Scalars and Vectors
8.2 The unit Vectors i, j, k
8.3 Direction Cosines
8.4 Dot Product
8.5 Cross Product
8.6 Analytic Expressions for dot and cross products
8.7 Phasors
8.8 Significance of j Operator
8.9 Different Forms
8.10 Algebraic Operations
8.11 Problems

9. COMPLEX NUMBERS **9 Hours**

9.1 Introduction and Properties
9.2 Basic Operations
9.3 Conjugate
9.4 Modulus
9.5 Different Forms
9.6 Problems

10. BOOLEAN ALGEBRA AND GATE NETWORKS **15 Hours**

10.1 Concept and basic laws
10.2 Sums of product and products of sums
10.3 Binary, decimals and octals, presentation of decimal numbers in BCD
10.4 Intercoversion of numbers
10.5 OR Gates and AND Gates
10.6 Logical Expressions and their simplifications
10.7 Demorgan's Theorams

10.8 NAND Gates and NOR Gates
10.9 Problems

11. PLANE ANALYTIC GEOMETRY AND STRAIGHT LINE 6 Hours

11.1 Coordinate system
11.2 Distance formula
11.3 Ration Formulas
11.4 Inclination and slope of line
11.5 Slope Formula
11.6 Problems

12. EQUATIONS OF THE STRAIGHT LINE 6 Hours

12.1 Some Important Forms
12.2 General form
12.3 Angle Formula
12.4 Parallelism and Perpendicularity
12.5 Problems

13. EQUATIONS OF THE CIRCLE 6 Hr.

13.1 Standard and Central forms of equations
13.2 General Form of Equation
13.3 Radius and Coordinates of Center
13.4 Problems

RECOMMENDED BOOKS

- Applied Mathematics Math-123, by Nasir -ud-Din Mahmood, Sana-ullah Khan, Tahir Hameed, Syed Tanvir Haider, Javed Iqbal, Vol - I, National Book Foundation

Math-123 APPLIED MATHEMATICS-I

INSTRUCTIONAL OBJECTIVES

1. USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATION

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 the sum and product of the roots.
1.7 Form a quadratic equation from the given roots.
1.8 Solve problems involving quadratic equations.

2. APPLY BINOMIAL THEOREM FOR THE EXPANSION OF BINOMIAL AND EXTRACTION OF ROOTS.

2.1 State binomial theorem for positive integral index.
2.2 Explain binomial coefficients:
(n,0), (n,1).....(n,r)....., (n,n)
2.3 Derive expression for the general term.
2.4 Calculate the specified terms.
2.5 Expand a binomial of a given index.
2.6 Extract the specified roots.
2.7 Compute the approximate value to a given decimal place.
2.8 Solve problems involving binomials.

3. APPLY DIFFERENT METHODS FOR RESOLVING A SINGLE FRACTION INTO PARTIAL FRACTIONS USING DIFFERENT METHODS

3.1 Define a partial fraction, a proper and an improper fraction.
3.2 Explain all the four types of partial fractions.
3.3 Set up equivalent partial fractions for each type.
3.4 Explain the methods for finding constants involved.
3.5 Resolve a single fraction into partial fractions.
3.6 Solve problems involving all the four types.

4. UNDERSTAND THE SYSTEMS OF MEASUREMENT OF ANGLES.

4.1 Define angles and the related terms.
4.2 Illustrate the generation of an angle.
4.3 Explain sexagesimal and circular systems for the measurement of angles.
4.4 Derive the relationship between radian and degree.
4.5 Convert radians to degrees and vice versa.
4.6 Derive a formula for the circular measure of a central angle.
4.7 Use this formula for solving problems.

5. UNDERSTAND BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRIC FUNCTIONS.

5.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sides of a

right triangle.

5.2 Derive fundamental identities.
5.3 Find trigonometric ratios of particular angles.
5.4 Draw the graph of trigonometric functions.
5.5 Solve problems involving trigonometric functions.

6. USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICAL PROBLEMS.

6.1 List fundamental identities.
6.2 Prove the fundamental law.
6.3 Deduce important results.
6.4 Derive sum and difference formulas.
6.5 Establish half angle, double and triple angle formulas.
6.6 Convert sum or difference into product and vice versa.
6.7 Solve problems.

7. USE CONCEPT, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES.

7.1 Define angle of elevation and angle of depression.
7.2 Prove the law of sines and the law of cosines.
7.3 Explain elements of a triangle.
7.4 Solve triangles and the problems involving heights and distances.

8. UNDERSTAND PRINCIPLES OF VECTORS AND PHASORS

8.1 Define unit vectors i, j, k.
8.2 Express a vector in the component form.
8.3 Explain magnitude, unit vector, direction cosines of a vector.
8.4 Explain dot product and cross product of two vector.
8.5 Deduce important results from dot and cross product.
8.6 Define phasor and operator j.
8.7 Explain different forms of phasors.
8.8 Perform basic Algebraic operation on phasors.
8.9 Solve problems on phasors.

9. USE PRINCIPLES OF COMPLEX NUMBERS IN SOLVING TECHNOLOGICAL PROBLEMS.

9.1 Define a complex number and its conjugate.
9.2 State properties of complex numbers.
9.3 Give different forms of complex numbers.
9.4 Perform basic algebraic operations on complex numbers.
9.5 Solve problem involving complex numbers.

10. SOLVE TECHNICAL PROBLEMS USING PRINCIPLES OF BOOLEAN ALGEBRA

10.1 Explain fundamental concepts of Boolean algebra
10.2 Explain binary numbers, octal numbers, decimal numbers and their interconversion.
10.3 Explain digital addition and multiplication and its applications to OR gates and AND Gates
10.4 Illustrate complimentation and inversion
10.5 Evaluate logical expression
10.6 List basic Laws of Boolean Algebra

10.7 Explain De-Morgan's theorem
10.8 Explain basic duality of Boolean algebra
10.9 Derive Boolean expression
10.10 Explain combination of GATES
10.11 Illustrate sum of products and product of sum
10.12 Derive product of sum expression
10.13 Explain NAND Gates and NOR Gates
10.14 Use the map methods for simplifying expressions
10.15 Explain sub-cubes and covering

11. UNDERSTAND THE CONCEPT OF PLANE ANALYTIC GEOMETRY

11.1 Explain the rectangular coordinate system.
11.2 Locate points in different quadrants.
11.3 Derive distance formula.
11.4 Describe the ratio formula
11.5 Derive slope formula
11.6 Solve problems using the above formulae.

12. USE EQUATIONS OF STRAIGHT LINE IN SOLVING PROBLEMS.

12.1 Define equation of a straight line.
12.2 Derive slope intercept and intercept forms of equations of a straight line.
12.3 Write general form of equations of a straight line.
12.4 Derive an expression for angle between two straight lines.
12.5 Derive conditions of perpendicularity and parallelism of two straight lines.
12.6 Solve problems using these equations/formulae.

13. SOLVE TECHNOLOGICAL PROBLEMS USING EQUATIONS OF CIRCLE

13.1 Define a circle.
13.2 Describe standard, central and general forms of the equation of a circle.
13.3 Convert general form to the central form of equation of a circle.
13.4 Deduce formula for radius and coordinates of the center of a circle.
13.5 Derive equation of the circle passing through three points.
13.6 Solve problems involving these equations.

Phy-122 APPLIED PHYSICS

Total Contact Hours

		T	P	C
Theory	32			
Practical	96	1	3	2

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

COURSE CONTENTS

1 MEASUREMENTS. 2 Hours.

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

2 SCALARS AND VECTORS. 4 Hours.

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

3 MOTION 4 Hours.

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

4 TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA. 6 Hours.

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

5 WAVE MOTION. 5 Hours

- 5.1 Review Hooke's law of elasticity
- 5.2 Motion under an elastic restoring force
- 5.3 Characteristics of simple harmonic motion
- 5.4 S.H.M. and circular motion
- 5.5 Simple pendulum
- 5.6 Wave form of S.H.M.
- 5.7 Resonance
- 5.8 Transverse vibration of a stretched string

6 SOUND. 5 Hrs

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

7 LIGHT. 5 Hours

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

8 OPTICAL FIBER. 2 Hours

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

9 LASERS. 3 Hours

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

RECOMMENDED BOOKS

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

Phy-122 APPLIED PHYSICS

INSTRUCTIONAL OBJECTIVES

1 USE CONCEPTS OF MEASUREMENT TO PRACTICAL SITUATIONS AND TECHNOLOGICAL PROBLEMS.

1.1 Write dimensional formulae for physical quantities
1.2 Derive units using dimensional equations
1.3 Convert a measurement from one system to another
1.4 Use concepts of measurement and Significant figures in problem solving.

2 USE CONCEPTS OF SCALARS AND VECTORS IN SOLVING PROBLEMS INVOLVING THESE CONCEPTS.

2.1 Explain laws of parallelogram, triangle and polygon of forces
2.2 Describe method of resolution of a vector into components
2.3 Describe method of addition of vectors by rectangular components
2.4 Differentiate between dot product and cross product of vectors
2.5 Use the concepts in solving problems involving addition resolution and multiplication of vectors.

3 USE THE LAW OF CONSERVATION OF MOMENTUM AND CONCEPTS OF ANGULAR MOTION TO PRACTICAL SITUATIONS.

3.1 Use law of conservation of momentum to practical/technological problems.
3.2 Explain relation between linear and angular motion
3.3 Use concepts and equations of angular motion to solve relevant technological problems.

4 USE CONCEPTS OF TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA TO PRACTICAL SITUATION/PROBLEMS.

4.1 Explain Torque
4.2 Distinguish between Centre of gravity and centre of mass
4.3 Explain rotational Equilibrium and its conditions
4.4 Explain Rotational Inertia giving examples
4.5 Use the above concepts in solving technological problems.

5 USE CONCEPTS OF WAVE MOTION IN SOLVING RELEVANT PROBLEMS.

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

6 UNDERSTAND CONCEPTS OF SOUND.

6.1 Describe longitudinal wave and its propagation
6.2 Explain the concepts: Intensity, loudness, pitch and quality of sound
6.3 Explain units of Intensity of level and frequency response of ear
6.4 Explain phenomena of silence zones, beats
6.5 Explain Acoustics of buildings

6.6 Explain Doppler effect giving mathematical expressions.

7 USE THE CONCEPTS OF GEOMETRICAL OPTICS TO MIRRORS and LENSES.

7.1 Explain laws of reflection and refraction

7.2 Use mirror formula to solve problems

7.3 Use the concepts of image formation by mirrors and lenses to describe working of optical instruments, e.g. microscopes, telescopes, camera and sextant.

8 UNDERSTAND WAVE THEORY OF LIGHT

8.1 Explain wave theory of light

8.2 Explain phenomena of interference, diffraction, polarization of light waves

8.3 Describe uses of polarization given in the course contents.

9 UNDERSTAND THE STRUCTURE, WORKING AND USES OF OPTICAL FIBER.

9.1 Explain the structure of the Optical Fiber

9.2 Explain its principle of working

9.3 Describe use of optical fiber in industry and medicine.

Phy-122 APPLIED PHYSICS

LIST OF PRACTICALS.

1 Draw graphs representing the functions:
   a) y=mx for m=0, 0.5, 1, 2
   b) $y=x^2$
   c) y=1/x
2 Find the volume of a given solid cylinder using vernier callipers.
3 Find the area of cross-section of the given wire using micrometer screw gauge.
4 Prove that force is directly proportional to (a) mass, (b) acceleration, using fletchers' trolley.
5 Verify law of parallelogram of forces using Grave-sands apparatus.
6 Verify law of triangle of forces and Lami's theorem
7 Determine the weight of a given body using
   a) Law of parallelogram of forces
   b) Law of triangle of forces
   c) Lami's theorem
8 Verify law of polygon of forces using Grave-sands apparatus.
9 Locate the position and magnitude of resultant of like parallel forces.
10 Determine the resultant of two unlike parallel forces.
11 Find the weight of a given body using principle of moments.
12 Locate the centre of gravity of regular and irregular shaped bodies.
13 Find Young's Modules of Elasticity of a metallic wire.
14 Verify Hooke's Law using helical spring.
15 Study of frequency of stretched string with length.
16 Study of variation of frequency of stretched string with tension.
17 Study resonance of air column in resonance tube and find velocity of sound.
18 Find the frequency of the given tuning fork using resonance tube.
19 Find velocity of sound in rod by Kundt's tube.
20 Verify rectilinear propagation of light and study shadow formation.
21 Study effect of rotation of plane mirror on reflection.
22 Compare the refractive indices of given glass slabs.
23 Find focal length of concave mirror by locating centre of curvature.
24 Find focal length of concave mirror by object and image method
25 Find focal length of concave mirror with converging lens.
26 Find refractive index of glass by apparent depth.
27 Find refractive index of glass by spectrometer.
28 Find focal length of converging lens by plane mirror.
29 Find focal length of converging lens by displacement method.
30 Find focal length of diverging lense using converging lens.
31 Find focal length of diverging lens using concave mirror.
32 Find angular magnification of an astronomical telescope.
33 Find angular magnification of a simple microscope (magnifying glass)
34 Find angular magnification of a compound microscope.
35 Study working and structure of camera.
36 Study working and structure of sextant.
37 Compare the different scales of temperature and verify the conversion formula.
38 Determine the specific heat of lead shots.
39 Find the coefficient of linear expansion of a metallic rod.
40 Find the heat of fusion of ice.
41 Find the heat of vaporization.
42 Determine relative humidity using hygrometer.

Ch-132 APPLIED CHEMISTRY

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

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

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

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

1. INTRODUCTION **2 Hours**

1.1 The scope and significance of the subject.
1.2 Orientation with reference to Technology.
1.3 Terms used & units of measurements in the study of chemistry.

2. FUNDAMENTAL CONCEPTS OF CHEMISTRY **2 Hours**

2.1 Symbols, Valency, Radicals, formulas.
2.2 Chemical Reactions & their types.
2.3 Balancing of equations by ionic method.

3. ATOMIC STRUCTURE **2 Hours**

3.1 Sub-atomic particles.
3.2 Bohrs Atomic Model.
3.3 The periodic classification of elements and periodic law
3.4 General characteristics of a period and group.

4. CHEMICAL BOND **2 Hours**

4.1 Nature of chemical Bond.
4.2 Electrovalent bond with examples.
4.3 Covalent Bond(Polar and Non-polar, sigma & Pi Bonds with examples.
4.4 Co-ordinate Bond with examples.

5. SOLIDS AND LIQUIDS **3 Hours**

5.1 The liquid and Solids state.
5.2 The liquids and their general properties (Density, viscosity, surface tension capillary action etc).
5.3 Solids and their general properties.
5.4 Crystal structure of solids
5.5 Crystals of Si and Ge.

6. WATER **3 Hours**

6.1 Chemical nature and properties.
6.2 Impurities.
6.3 Hardness of water (types, causes & removal)
6.4 Scales of measuring hardness (Degress Clark, French, PPM, Mgm per litre).
6.5 Boiler feed water, scales and treatment.
6.6 Sea-water desalination, sewage treatment.

7. ACIDS, BASES AND SALTS **2 Hours**

7.1 Definitions with examples.
7.2 Properties, their strength, basicity & Acidity.
7.3 Salts and their classification with examples.
7.4 pH-value and scale.

8. OXIDATION & REDUCTION **2 Hours**

8.1 The process with examples.
8.2 Oxidizing and Reducing agents.
8.3 Oxides and their classifications.

9. NUCLEAR CHEMISTRY **2 Hours**

9.1 Introduction.
9.2 Radioactivity (Alpha, beta and gamma rays).
9.3 Half life process.
9.4 Nuclear reaction & transformation of elements.
9.5 Isotopes and their uses.

10. ALLOYS **2 Hours**

10.1 Introduction with need.
10.2 Preparation and properties.
10.3 Some important alloys and their composition.

11. CORROSION **2 Hours**

11.1 Introduction with causes.
11.2 Types of corrosion.
11.3 Rusting of Iron
11.4 Protective measures against corrosion.

12. ELECTRO CHEMISTRY **2 Hours**

12.1 Ionization and Arrhenius theory of Ionization.
12.2 Electrolytes and Electrolysis.
12.3 Faraday's Laws and numericals related to them.
12.4 Application of Electrolysis (Electron, lathing etc).
12.5 Electro Chemical cells.

13. ELECTRICAL INSULATING MATERIALS. **2 Hours**

13.1 Introduction.
13.2 Solid insulators with chemical nature.
13.3 Liquid insulators with chemical nature.
13.4 Gaseous insulators with chemical nature.

13.5 Uses and their classification.

14. SEMI CONDUCTORS. 2 Hours

14.1 Introduction
14.2 Atomic structure of silicon and germanium.
14.3 Bonding & Conductivity.
14.4 Energy bands in a semiconductor.

15. ETCHING PROCESS. 2 Hours

15.1 The process and its aims.
15.2 Etching reagents.
15.3 Applications of processors.

RECOMMENDED BOOKS

1. Intermediate Text-Books of chemistry I & II
2. ILMI Applied Science by SH. Ata Mohammed
3. Materials science by J.C.Anderson & Leaver.
4. Polytechnic Chemistry by G.N.Ready (ELBS & Nelson, Hong Kong).
5. Chemistry for engineers by Eric Gyngell.

Ch-132 APPLIED CHEMISTRY

INSTRUCTIONAL OBJECTIVES

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

1.1 Define chemistry and its terms.
1.2 Define the units of measurements in the study of chemistry.
1.3 Explain the importance of chemistry in various fields of specialization.
1.4 Explain the role of chemistry in this technology.

2. UNDERSTAND LANGUAGE OF CHEMISTRY AND CHEMICAL REACTIONS.

2.1 Define symbol, valency, radical, formula with examples of each.
2.2 Write chemical formula of common compounds.
2.3 Define chemical reaction and equations.
2.4 Describe types of chemical reactions with examples.
2.5 Explain the method of balancing the equation by ionic method.

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

3.1 Define atom.
3.2 Describe the fundamental sub atomic particles
3.3 Distinguish between atomic no. mass no. and between isotope and isobars.
3.4 Explain the arrangements of electrons in different shells and sub energy levels and understand bohr's atomic model.
3.5 Explain the grouping and placing of elements in the periodic table especially Si & germanium.
3.6 State the periodic law of elements.
3.7 Explain the trend of properties of elements based on their position in the periodic table.
3.8 Explain general characteristics of a period and a group.

4. UNDERSTAND THE NATURE OF CHEMICAL BONDS.

4.1 Define chemical Bond.
4.2 State the nature of chemical bond.
4.3 Differentiate between electrovalent and covalent bonding.
4.4 Explain the formation of polar and non polar, sigma and pi-bond with examples.
4.5 Describe the nature of coordinate bond with examples.

5. UNDERSTAND THE STATES OF MATTER AND DISTINGUISHES SOLIDS FROM GASES.

5.1 Describe the liquid and solid states of matter.
5.2 State the general properties of liquid.
5.3 State the general properties of solid.
5.4 Explain the formation of crystals and their types.
5.5 Describe the crystal structure of Si and Ge.

6. UNDERSTAND THE CHEMICAL NATURE OF WATER.

6.1 Describe the chemical nature of water with its formula.
6.2 Describe the general impurities present in water.
6.3 Explain the causes and methods to remove hardness of water.

6.4 Express hardness in different units like mg/litre. p.p.m, degrees Clark and degrees French.
6.5 Describe the formation and nature of scales in boiler feed water.
6.6 Explain the method for the treatment of scales.
6.7 Explain the sewage treatment and desalination of sea water.

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

7.1 Define acids, bases and salts with examples.
7.2 State general properties of acids and bases.
7.3 Differentiate between acidity and basicity.
7.4 Define salts, give their classification with examples.
7.5 Explain pH value of solution and pH scale.

8. UNDERSTAND THE PROCESS OF OXIDATION AND REDUCTION.

8.1 Define oxidation.
8.2 Illustrate the oxidation process with examples.
8.3 Define reduction.
8.4 Explain reduction process with examples.
8.5 Define oxidizing and reducing agents and give at least six examples of each.
8.6 Define oxides.
8.7 Classify the oxides and give examples.

9. UNDERSTAND THE FUNDAMENTALS OF NUCLEAR CHEMISTRY.

9.1 Define nuclear chemistry and radio activity.
9.2 Differentiate between alpha, beta and gamma particles.
9.3 Explain half life process.
9.4 Explain at least six nuclear reactions resulting in the transformation of some elements.
9.5 State the uses of isotopes.

10. UNDERSTAND THE NATURE OF ALLOYS USED IN THE RESPECTIVE TECHNOLOGY.

10.1 Define alloy.
10.2 Explain different methods for the preparation of alloys.
10.3 Explain important properties of alloys.
10.4 Explain the composition, properties and uses of alloys.

11. UNDERSTAND THE PROCESS OF CORROSION.

11.1 Define corrosion.
11.2 Describe different types of corrosion.
11.3 State the causes of corrosion.
11.4 Explain the process of rusting of iron.
11.5 Describe methods to prevent/control corrosion.

12. UNDERSTAND THE APPLICATION OF ELECTROCHEMISTRY IN DIFFERENT FIELDS OF INDUSTRIES.

12.1 Define ionization, electrolyte and electrolysis.
12.2 Describe Arrhenius theory of ionization.
12.3 State Faraday's laws of electrolysis.
12.4 Apply Faraday's laws of different fields of industry.

12.5 Solves numerical problem on Faraday's Laws.
12.6 Explain the construction and working of Daniel cell and lead accumulator.

13. KNOW THE USE OF INSULATING MATERIALS.

13.1 Define insulator, conductor.
13.2 Classify solid, liquid and gaseous insulators with their chemical nature.
13.3 Describe their uses.

14. UNDERSTAND THE NATURE AND CHEMISTRY OF SEMI CONDUCTORS.

14.1 Define semi conductors.
14.2 Draw the atomic structure of silicon and germanium.
14.3 Describe the process of bonding and conductivity in conductors and semi conductors.
14.4 Explain energy bands in semi conductors.

15. USE ETCHING PROCESS IN DIFFERENT FIELDS OF TECHNOLOGY.

15.1 Define etching process and its aims.
15.2 Enlist the chemicals/reagents used in the process.
15.3 Explain the use of the process in the technology.

A.Comp-112 COMPUTER FUNDAMENTALS

T	P	C
1	3	2

Total contact hours:

Theory: 32 Hours.
Practical: 96 Hours.

AIMS After completion of this course the students will be able to

1. Describe micro-,mini-, mainframe- and super-computer.
2. Explain the function of CPU, input and output devices of a computer system
3. Enlist, appropriate specification of a computer for a certain specific purpose.
4. Apply Windows and Disk operating system for a specific operation.
5. Design small program in C language.
6. Use MS Word Application Package as a word processor.

Use MS Excel Application Package as an electronic spread sheet.

COURSE CONTENTS

1. ELECTRONIC DATA PROCESSING (EDP). (07 Hours)

1.1. Data Concept
1.2 Block diagram of a microcomputer (PC) system.
1.3 Input and output devices and CPU
1.4 Specification of CPU, input output devices.
1.5 Processor types.
1.6 Computer concept.
1.7 Secondary storage devices.
1.8 Printers and plotters.
1.9 Using computer for application software.

2. DISK OPERATING SYSTEM (DOS). (02 Hours)

2.1 Internal Commands.
2.2. External Commands.
2.3 Batch files.

3. C LANGUAGE. (10 Hours)

3.1 Introduction to C.
3.2 Variables and Constants.
3.3. Operators.
3.4 INPUT / OUTPUT statement
3.5 Assignment statement.
3.6 Decisions.
3.7 Loops.
3.8 Functions.

4. WINDOWS OPERATING SYSTEM AND APPLICATIONS (05 Hours)

4.1 Introduction of Windows Operating System
4.2 Setting, point & help commands
4.3 Windows explorer

4.4 Microsoft Word

4.4.1 Introduction
4.4.2 File and Edit Command
4.4.3 Other word Processing Commands
4.4.4 Tool Bars & their functions
4.4.5 Getting MS Word help
4.4.6 Creating tables

5. Microsoft Excel (06 Hours)

5.1 Inserting & Deleting Cells, Rows and Columns
5.2 Managing Worksheets
5.3 Formatting and customizing data
5.4 Use of Formulas and Functions (formatting numbers, decimal places, etc)
5.5 Drawing different types of charts
5.6 Use of page setup and printing configurations
5.7 Use of shortcuts

6. Internet (02 Hours)

6.1 Brief history of Internet
6.2 How Internet works
6.3 Internet Addressing schemes
6.4 WWW and Web browsing and use of URL
6.5 Search Engine / Proper use of search engine
6.6 What is E-mail ? create E-mail account and attachment of files with e-mail.

TEXT/REFERENCE BOOKS.

1. George Culp Instructional computing Fundamentals for IBM Microprocessors.
2. The Turbo C Programming by Robert Lafore ISBN *067222738X (0-672-22738-X)*
3. Microsoft Office 2003 – The Complete Reference *by Jennifer Ackerman Kettell, Guy Hart-Davis, Curt Simmons* ISBN: 0072229950 904 pp.

A.Comp-112 COMPUTER Fundamentals

INSTRUCTIONAL OBJECTIVES

1. Understand Electronic Data Processing (EDP).

1.1. Discuss Data Concept
1.2 Draw the Block diagram of a microcomputer (PC) system.
1.3 Define Input and output devices and CPU
1.4 Describe Specification of CPU, input output devices.
1.5 Discuss processor types.
1.6 Discuss Computer concept.
1.7 Define Secondary storage devices.
1.8 Describe Printers and plotters.
1.9 Use computer for application software.

2. Understand Disk Operating System (DOS).

2.1 Describe Internal Commands.
2.2. Describe External Commands.
2.3 Discus Batch files.

3. Understand C Language.

3.1 Introduce C Language
3.2 Differentiate between Variables and Constants.
3.3. Discuss Operators.
3.4 Understand INPUT / OUTPUT statement
3.5 Understand Assignment statement.
3.6 Discuss Decisions.
3.7 Discuss Loops.
3.8 Describe Functions.

4. Understand Windows Operating System and Applications

Introduce the Windows Operating System
Discuss Setting, point & help commands
Understand the role of Windows explorer
Understand the Microsoft Word
Introduce MS Word
Describe File and Edit Command
Describe other word Processing Commands
Understand the Tool Bars & their functions
Able to Get MS Word help
Able to creating tables

5. Understand Microsoft Excel

5.1 Describe Inserting & Deleting Cells, Rows and Columns
5.2 Manage Worksheets
5.3 Use formatting and customizing data
5.4 Use Formulas and Functions (formatting numbers, decimal places, etc)
5.5 Draw different types of charts

5.6 Describe the use of page setup and printing configurations
5.7 Describe the use of shortcuts

6. Understand Internet

6.1 Discuss the brief history of Internet
6.2 Describe how Internet works
6.3 Describe Internet addressing schemes
6.4 Discuss WWW and Web browsing and use of URL
6.5 Discuss Search Engine
6.6 Describe the proper use of search engine
6.7 Define E-mail.
6.8 Discuss the process of creating E-mail account and attachment of files with e-mail.

A.Comp-112 COMPUTER Fundamentals

LIST OF PRACTICALS

1. **DOS**
    1. Identify key board, mouse, CPU, disk drive, Disks, Monitor & Printer.
    2. Practice for booting up of a computer system with DOS system disk and power off system at DOS prompt.
    3. Practice for CLS, VER, VOL, DATE & TIME commands.
    4. Practice for COPY, REN commands.
    5. Practice for DEL, TYPE, PATH, PROMPT, COPY CON, MD, CD, RD Commands.
    6. Practice of the practicals at S.No. 3, 4, 5.
    7. Practice for FORMAT command with /s, /u, /v switches.
    8. Practice for DISKCOPY, DISKCOMP Commands.
    9. Practice for SCANDISK, XCOPY, DELETE, TREE, LABEL Commands.
    10. Practice for PRINT, UNDELETE commands.
    11. Practice for the practicals at S.No. 8, 9, 10, 11
    12. Practice for creating a batch file.

2. **C-Language**
    1. Practice for Loading & Unloading Turbo C software interface and identify its menu bar.
    2. Creating, Editing and saving a source program.
    3. Compiling, linking and Execution a program.
    4. Prepare a C-Language program to perform the arithmetic operations by using all arithmetic operators. Also print the result on the screen.
    5. Prepare a C-Language program to exchange the values of two variables and to print their actual and exchanged values.
    6. Prepare a C-Language program to input a number calculate the cube of the number and print the result on the screen.
    7. Prepare a C-Language program to calculate area of rectangle, when length & width are given.
    8. Prepare a C-Language program to input a number if the number is divisible by 3 then print the message on the screen that " the number is divisible by 3" use " block if statement".
    9. Prepare a C-Language program to calculate the area of a circle, when radius and diameter is given.
    10. Prepare a C-Language program to perform simple arithmetic operation by using switch statement.
    11. Prepare C-Language programs using IF-THEN-ELSE and For Loop statement.
    12. Prepare a C-Language program by using an Array.
    13. Prepare a C-Language program by calling functions.
    14. Prepare a C-Language program by calling functions with reference.

3. MICROSOFT WORD

1. Practice for loading and unloading MS Word.
2. Practice for creating document and saving it.
3. Practice for spell-check facility of the MS Word.
4. Practice for various Word-Processing Manu Options.
5. Practice for printing a document.
6. Practice for margin and TAB setting and document alignment.
7. Practice for some advance features.

4. MICROSOFT EXCEL

1. Practice for loading and unloading MS Excel.
2. Practice for creating sheets, workbooks and save it.
3. Practice for creating Table and Graph in MS Excel.
4. Practice for preparing formulas and arithmetic calculations.

5. **INTERNET**

1. How to connect Internet.
2. The use of Web browsers.
3. The use of Search Engine.
4. The use of E-mail.

El.TR-114 ELECTRICAL CIRCUITS

Total Contact Hours:		T	P	C
Theory:	96 Hours	3	3	4
Practical:	96 Hours			

Prerequisite: Applied Mathematics & Physics

AIMS This course is designed so that the student will be able to learn basic knowledge of electricity and electronics.

Understand the operation and application of electrical and electronic principles, devices and circuits.

1. Identify the different electrical /electronics component, devices and types of circuits.
2. Explain the principles of operations and applications of electrical and electronic components, devices and circuits.
3. Use different electrical/electronic components and devices in different circuits configuration.
4. Describe the ratings, tolerances, coding and troubles in different electrical and electronics components and circuits.
5. Calculate current, voltage, power and power factor using circuit laws and network theorems.
6. Use filters and coupling in electronics circuits.

COURSE CONTENTS.

1. BASIC PRINCIPLES OF ELECTRICITY (5 Hours)

1.1 Electron Theory
- 1.1.1 Structure of atom, K, L and M shell, energy levels and valence electrons.
- 1.1.2 Energy bands with reference to conductors, insulators and semiconductor.

1.2 Electrical Quantities
- 1.2.1 Potential, current and resistance.
- 1.2.2 Units of potential, current and resistance.
- 1.2.3 Conventional and electron current

2. DC FUNDAMENTALS. (16 Hours)

2.1 Ohm's Law
- 2.1.1 Definition of Ohm's law.
- 2.1.2 Problems on Ohm's Law.

2.2. Laws of Resistance
- 2.2.1 Specific Resistance, conductance and conductivity.

2.2.2 Effect of temperature on resistance and temp. Coefficient of resistance.
- 2.2.3 Problems on $R= \rho \times L/A$ and $R_t = R_o (1+ \alpha t)$
- 2.2.4 Resistance in series, parallel and series-parallel
- 2.2.5 Calculations on combination of resistance and cells in series, parallel and series-parallel combinations.
- 2.2.6 Power and Energy their units and calculations.
- 2.2.7 Power dissipation in resistors.

2.3 Kirchhoff's Laws
- 2.3.1 Introduction of Kirchhoff's Laws.
- 2.3.2 Calculation using KVL and KCL by loop and node methods.

2.4 Resistors
- 2.4.1 Resistor construction and types.
- 2.4.2 Application of resistors.
- 2.4.3 Resistors, Power rating.
- 2.4.4 Resistor, troubles.

2.5 Batteries
- 2.5.1 Types of DC sources.
- 2.5.2 Types of cells, Primary and secondary cells (Mercury, silver oxide, Nickel-cadmium, etc.)
- 2.5.3 Lead acid batteries.
- 2.5.4. Solar cell.
- 2.5.5 Internal resistance of a cell.
- 2.5.6 Application of cell as constant voltage and constant current source.

3. NETWORK THEOREMS. (10 Hours)

3.1 Superposition theorem for complex circuits.
3.2 Calculation based on the superposition theorem.
3.3 Thevenin's Theorem circuits simplification.
3.4 Calculation base on the Thevenin's theorem.
3.5 Norton theorem and current source concept.
3.6 Calculation based on the Norton's Theorem.
3.7 Star and Delta transformation.
3.8 Calculation based on Star and Delta transformation.

4. MAGNETISM AND ELECTROMAGNETISM. (12 Hours)

4.1 Magnetism.
- 4.1.1 Introduction to magnetism, magnetic line of force, flux, flux-density, permeability, Reluctance and their units.
- 4.1.2 Properties of magnetic lines of force.
- 4.1.3 Types of magnets.
- 4.1.4 Magnetic properties of materials (ferro-, para- and dia-magnetic) magnetic induction.

4.2 Electromagnetism.
- 4.2.1 Electromagnetism, M.M.F. (AT) field intensity (H =AT/L) ampere turns/meter.
- 4.2.2 B-H curve and magnetic Hystersis.
- 4.2.3 Electromagnetic induction.
- 4.2.4 Magnetic field around a current carrying conductor and solenoids cork screw and left hand rules.
- 4.2.5 Force between two magnetic fields and motor action.
- 4.2.6 Faraday's Law of Electromagnetic induction ($R=Nd\Phi/dt$.)
- 4.2.7 Lenz's Law.

5. ELECTROSTATICS. (12 Hours)

5.1 Principle of electrostatic, positive and negative charges.
5.2 Laws of electrostatic.
5.3 Electrostatic induction and field strength.
5.4 Properties of electric lines of force and comparison with magnetic lines.
5.5. Dielectric, dielectric strength and its importance permittivity and break down voltage.
5.6 Capacitance and capacitors. Capacitance of parallel plate capacitor.
5.7 Types and uses of capacitors.

5.8 Equivalent capacitance for series, parallel and series parallel combination of capacitors.
5.9 Energy stored in capacitors.
5.10 Colour code, tolerance and rating of capacitors.
5.11 Troubles in capacitors.

6. AC FUNDAMENTALS. (16 Hours)

6.1 The simple AC generator.
- 6.1.1 Sine wave, cycle, wavelength, period, frequency and units.
- 6.1.2 AC sine wave form and its characteristics. (Instantaneous, peak, average, rms or effective values and their inter relation).
- 6.1.3 Audio and Radio frequencies, wavelengths and periods frequency spectrum.
- 6.1.4 Types of alternating wave forms(sinusoidal and non-sinusoidal waves). Fundamental wave and harmonics.

6.2 AC Circuits
- 6.2.1 AC through pure resistance, Phaser quantities.
- 6.2.2 Phase angle, in-phase, out of phase waves and phase lag & lead and power factor.
- 6.2.3 Calculation of V,I and W for resistive circuits through inductance.
- 6.2.4 Self inductance, and self induced voltage.
- 6.2.5 Inductive reactance ($X_L=2\pi fL$) Phase relation between V & I.
- 6.2.6 Phaser diagram and power for pure inductor.
- 6.2.7 AC through R-L series circuit.
- 6.2.8 Phaser diagram and power in a R-L series circuit.
- 6.2.9 Time constant ,τ =L/R, and its effect.
- 6.2.10 Impedance, Impedance triangle.
- 6.2.11 AC through R-L parallel circuit.
- 6.2.12 Inductive reactance in series, parallel and series-parallel combination.
- 6.2.13 Q of coil and its effects on selectivity.
- 6.2.14 Skin effect, AF and RF chokes.
- 6.2.15 Troubles in chokes.
- 6.2.16 AC through pure capacitor. Phase relation between V&I and power.
- 6.2.17 Capacitive reactance
- 6.2.18 AC through R-C series circuit.
- 6.2.19 Time constant RC and its effect.
- 6.2.20 Impedance, Impedance triangle.
- 6.2.21 AC through R-C parallel circuit.
- 6.2.22 Capacitive reactance in series, parallel, and series parallel combination.
- 6.2.23 AC through RLC series circuit, phase relation and power calculation.
- 6.2.24 AC through RLC parallel circuit phase relation and power calculation.
- 6.2.25 Simple calculations for RLC circuits.
- 6.2.26 Concepts of real Power (VI CosΦ) and apparent power (VA), power factor. simple calculations.

7. TRANSFORMER (8 Hours)

7.1 Principle of transformer, mutual inductance, coefficient of mutual inductance.
7.2 Turn ratio and e.m.f. equation
7.3 Construction, types of transformers, core materials.
7.4 Application of transformers in electronics.
7.5 Auto-transformers, principle, advantages, disadvantages and applications.
7.6 Poly phase transformers, star and delta connection.

7.7 Phase and line voltage and current their, inter-relation.
7.8 Transformer losses.
7.8.1 Core loss.
7.8.2 Hysteressis loss.

8. RESONANCE. (8 Hours)

8.1 Condition of resonance and resonant circuit.
8.2 Relation between f, L and C at resonance.
8.3 Series resonant circuit. Impedance of series resonant circuit.
8.4 Current, voltage and impedance characteristic of series resonant circuit.
8.5 Parallel resonant circuit and its impedance
8.6 Characteristics of impedance, current and voltage of a parallel resonant circuit
8.7 Series and parallel resonance curve comparison and Bandwidth.
8.8 Q of circuit, Effect of Q on the slope and width of the resonance curves.
8.9 Relation between the slope of the resonance curve on selectivity.
8.10 Effect of the L.C. ratio on selectivity.
8.11 Use of resonance circuit in radio and TV receivers.

9. FILTER & COUPLING CIRCUITS (9 Hours)

9.1 Purpose and action of a filter circuit.
9.2 Principle of filter action.
9.3 Types of filter circuit LPF, HPF, K filter and m drive filter.
9.4 Band Pass filter (BPF) Band Stop filter (BSF)
9.5 Power supply filter.
9.6 Purpose and action of coupling circuit.
9.7 Coefficient of coupling and coupled impedance.
9.8 Type of coupling, RC, Impedance transformer coupling.
9.9 Delay action circuits, R-L and R-C circuits.
9.10 Time constant of R-L & R-C circuits and its importance in rise and fall of circuit current and voltage.

TEXT/REFERENCE BOOKS.

1. Bird J O — *Electrical and Electronic Principles and Technology*, *Second Edition* (Newnes, 2004) ISBN 0750665505
2. Bird J O — *Electrical Circuit Theory and Technology* (Newnes, 2004) ISBN 0750657847
3. Grob, Bernard, *Basic Electronics*, Eight Edition.

El.TR 114 ELECTRICAL CIRCUITS

INSTRUCTIONAL OBJECTIVES

1. BASIC PRINCIPLE OF ELECTRICITY.

1.1 Understand electron theory.

1.1.1 Describe the structure of atom.
1.1.2 Describe the K, L, and M shells.
1.1.3 Describe energy level.
1.1.4 Describe valence electron.
1.1.5 Explain energy bands with reference to conductors, insulators & semiconductors.

1.2 Understand Electrical Quantities

1.2.1 Describe potential, current & resistance
1.2.2 Describe units of potential, current & resistance
1.2.3 Differentiate between conventional current and electron current.

2. DC FUNDAMENTALS.

2.1 Understand Ohm's Law.

2.1.1 Define ohm's law
2.2.2 Solve problems on Ohm's law

2.2 Understand Laws of Resistance

2.2.1 Define specific resistance
2.2.2 Define conductor
2.2.3 Define conductivity
2.2.4 Explain the effect of temperature on resistance
2.2.5 Explain coefficient of resistance
2.2.6 Solve problems on $R = \rho \times L/A$ and $R_t = R_o (1+xt)$.
2.2.7 Describe the resistance in series
2.2.8 Describe the resistance in parallel
2.2.9 Describe the resistance in series-parallel
2.2.10 Calculate the combination of resistances and cells, R_t, I & V.
2.2.11 Define power and energy
2.2.12 Describe units of power and energy
2.2.13 Explain the power dissipation in resistors

2.3 Understand Kirchhoffs' Laws

2.3.1 Define Kirchhoff's laws
2.3.2 Solve problems using Kirchhoff voltage law
2.3.3 Solve problems using kirchhoff current law

2.4 Understand Resistors

2.4.1 Define resistance and resistor
2.4.2 List types of resistors
2.4.3 Enlist use of resistors
2.4.4 Describe resistor colour codes
2.4.5 Describe power rating of resistor

2.5 Understand Batteries
- 2.5.1 Name types of D.C source
- 2.5.2 Describe types of cells (Mercury, Silver oxide, Nickel cadmium)
- 2.5.3 Describe lead acid battery
- 2.5.4 Describe solar cells
- 2.5.5 Explain the internal resistance of cell
- 2.5.6 Use cells in series and parallel of voltage and constant source of current

3. NETWORK THEOREMS.

3.1 Understand Superposition, Thevenin & Norton theorems
- 3.1.1 Explain Superposition theorem
- 3.1.2 Solve problems based on superposition theorem
- 3.1.3 Explain Thevenin's theorem
- 3.1.4 Solve problems based on Thevenin's theorem
- 3.1.5 Explain Norton's theorem
- 3.1.6 Solve problems based on Norton's theorem
- 3.1.7 Explain transformation of star to delta and delta to star networks
- 3.1.8 Solve problems based on star, delta transformation

4. MAGNETISM & ELECTROMAGNETISM

4.1 Understand magnetism
- 4.1.1 Describe lines of force, flux, flux density, permeability, reactance & their units
- 4.1.2 Explain properties of magnetic lines of force
- 4.1.3 Describe types of magnets
- 4.1.4 Explain magnetic properties of materials
- 4.1.5 Define and list ferromagnetic, paramagnetic and diamagnetic materials.
- 4.1.6 Describe magnetic induction.

4.2 To understand electromagnetism
- 4.2.1 Describe electromagnetism
- 4.2.2 Describe magneto-motive force
- 4.2.3 Describe field intensity (H=AT/L)
- 4.2.4 Draw B-H Curve
- 4.2.5 Explain B-H curve
- 4.2.6 Describe magnetic hystersis
- 4.2.7 Explain electromagnetic induction
- 4.2.8 Explain magnetic field around a current carrying conductor
- 4.2.9 Define inductor
- 4.2.10 Write formula for inductance base on physical parameters of an inductor [L= Ur x (N)*2 x A / L]
- 4.2.11 Solve problem using the above formula for inductor
- 4.2.12 Describe solenoids
- 4.2.13 Describe cork screw rule and left hand rule
- 4.2.14 Explain force between two magnetic fields and motor action
- 4.2.15 Define Faraday's law of electromagnetic induction ($e = Nd\Phi/dt$)
- 4.2.16 Define Lenz's Law

5. ELECTROSTATICS.

5.1 Understanding Electrostatics
- 5.1.1 Describe principle of electrostatic charges

5.1.2 Explain the effect of negative & positive charges
5.1.3 Describe the laws of electrostatics
5.1.4 Describe electrostatic induction & field strength
5.1.5 Explain properties of electric lines of force
5.1.6 Compare between electric lines of force and magnetic lines of force
5.1.7 Describe dielectric & dielectric strength/dielectric constant
5.1.8 Describe the importance of dielectric & dielectric strength
5.1.9 Describe capacitor and capacitance
5.1.10 Describe breakdown voltage
5.1.11 Describe the capacitance of parallel plate capacitor
5.1.12 Describe types of capacitors
5.1.13 Describe the use of capacitors
5.1.14 Calculate the total capacitance in series in parallel and series-parallel combination
5.1.15 Explain the energy stored in capacitor
5.1.16 Describe the colour coding, tolerance and voltage rating of capacitors
5.1.17 Describe the troubles in capacitors

6. AC FUNDAMENTALS.

6.1 Understand A.C Waveform

6.1.1 Describe sine wave (cycle, wave length, period, frequency and their units)
6.1.2 Draw AC sine waveform (sinusoidal, square, saw tooth)
6.1.3 Describe Instantaneous value, peak value, average value, r.m.s. value, effective value and their inter-relation
6.1.4 Describe Audio & Radio frequencies and their wavelengths
6.1.5 Draw the electromagnetic wave spectrum
6.1.6 Define harmonic and fundamental wave.

6.2 Understand AC circuits

6.2.1 Describe AC through resistors
6.2.2 Describe phase angle, in phase & out of phase waves
6.2.3 Describe phase lag, lead & power factor
6.2.4 Calculate voltage, current & power(v,i,w) for resistive circuit
6.2.5 Describe AC through inductance using waveforms and phasor diagram
6.2.6 Define self inductance & self induced voltage
6.2.7 Explain inductive reactance ($X_L=2\pi fL$), phase relation between voltage & current
6.2.8 Draw its phaser diagram
6.2.9 Calculate power for pure inductor
6.2.10 Explain AC through R-L series circuit
6.2.11 Draw phaser diagram for R-L series circuit
6.2.12 Calculate power factor for R-L series circuit
6.2.13 Calculate time constant for L/R
6.2.14 Define impedance
6.2.15 Draw impedance triangle
6.2.16 Explain AC through R-L parallel circuit
6.2.17 Calculate inductive reactance for series, parallel and series-parallel inductor
6.2.18 Describe skin effect
6.2.19 Describe audio frequency chokes

6.2.20 Describe radio frequency chokes
6.2.21 Explain ac through pure capacitor
6.2.22 Explain phase relation between voltage, current & power for AC through capacitors
6.2.23 Calculate capacitive reactance ($\frac{1}{2} \pi f C$)
6.2.24 Explain AC through R-C series circuit
6.2.25 Explain time constant for R-C series circuit
6.2.26 Explain AC through R-C parallel circuit
6.2.27 Calculate capacitive reactance for capacitor in series, in parallel and series parallel combination
6.2.28 Explain AC through RLC series circuit
6.2.29 Explain phase relation
6.2.30 Calculate power for RLC series circuit
6.2.31 Explain real power (VI Cos Φ), apparent power (VI)
6.2.32 Calculate power factor

7. TRANSFORMER.

7.1 Understand the transformers
7.1.1 Explain the principle of transformer
7.1.2 Define mutual induction
7.1.3 Define coefficient of mutual induction
7.1.4 Describe turn ratio of transformer
7.1.5 Describe construction of transformer
7.1.6 Enlist the types of transformer
7.1.7 Enlist core material of transformer
7.1.8 Describe auto transformer
7.1.9 Explain star, delta connections of three phase transformer
7.1.10 Explain phase & line voltage for star and delta connection
7.1.11 Explain phase & line current for star and delta connection of three phase system
7.1.12 List the applications of transformer in electronics:
i) step down transformer,
ii) impedance matching
iii) coupling
7.1.13 Explain transformer losses.
7.1.14 Explain hysteresis loss and core loss.

8. UNDERSTAND RESONANCE

8.1 Explain resonance
8.2 Explain the relation between frequency, inductance & capacitance at resonant
8.3 Draw the series resonant circuit
8.4 Explain series resonant circuit
8.5 Draw the characteristics of series resonant circuit
8.6 Calculate current, voltage and impedance of series resonant circuit
8.7 Draw the diagram of parallel resonant circuit
8.8 Explain the parallel resonant circuit
8.9 Draw the characteristics of parallel resonant circuit
8.10 Compare series and parallel resonant circuit
8.11 Describe the band width of a resonant circuit
8.12 Describe Q of a circuit
8.13 Explain the effect of the L.C ratio on selectivity

8.14 Enlist the use of resonant circuit in radio and TV receivers

9. UNDERSTAND FILTERS & COUPLING CIRCUITS

9.1 Explain purpose & action of a filter circuit
9.2 Enlist the types of filter circuits
9.3 Explain low pass filter high pass filter, K-filter & m-derived filters
9.4 Explain band pass filter & band stop filter
9.5 Explain action & purpose of a coupling circuit
9.6 Define coefficient of coupling
9.7 Enlist types of coupling
9.8 Explain RC, impedance, and transformer coupling
9.9 Define time constant of R-L & R-C Circuits
9.10 Explain importance of rise and fall of circuit current and voltage in reactive circuit.

El.TR -114 ELECTRICAL CIRCUITS

LIST OF PRACTICAL.

1. Study of Ammeter, Voltmeter and Multimeter.
2. a) Measurement of current, voltage and resistance.
   b) Verification of Ohm's Law by:
      Keeping the voltage constant.
      Keeping the resistance constant.
3. a) Verify the laws of series and parallel combination of resistances by
      i) Ohmmeter method.
      ii) Voltmeter-Ammeter method.
4. Determine temperature coefficient of resistance.
5. Verify Kirchhoffs' laws.
6. a) Measurement of power by:
      i) Voltmeter/Ammeter method.
      ii) Wattmeter.
   b) Measurement of Energy by:
      i) Wattmeter and clock method.
      ii) Energy meter.
7. a) Practice of resistor colour coding.
   b) Use of potentiometer and Rheostat as voltage divider and current limiter.
8. Combine cells in series and parallel and verify the net voltage.
9. a) Study of lead acid battery, practice and use of hydrometer and electrolyte preparation.
   b) Practice charging of a lead acid battery.
10. a) Determine the internal resistance of a cell.
    b) Study of E.M.F. of cell and measurement of their voltages.
11. Plot magnetic line of forces of bar magnets in different positions.
12. Study of the magnetic effect of a current carrying:
      i) Conductor.
      ii) coil.
13. Study the change in the Magnetic power of an Electromagnet by the introduction of various cores in the coil.
14. Study of the effect on a current carrying conductor when placed in
    a) magnetic field.
15. Verify Faraday's Laws of Electromagnetic induction.
16. Study of various types of capacitors and their colour coding.
17. Verify laws of combination of capacitors.
18. Observe capacitor charging and discharging.
19. Practice plotting sine wave for a given equation e=Em sine Q.
20. Study of sine wave on an oscilloscope and determine its peak, peak to peak, r.m.s. and average values of current and voltage.
21. Determine of wave length, time period and frequency of a given AC signal by oscilloscope.
22. Determine the power factor of a given AC circuit using a power factor meter.
23. Study the principles of self and mutual induction in coils.
24. a) Determine the inductance of a choke coil.
    b) Determine the capacitance of a capacitor by using digital LCR meter.
25. Determine phase relationship between voltage and current in inductive circuit by showing phase difference between VR and VL using an oscilloscope.

26. Study the behavior of inductance and capacitance with AC and DC supplies.
27. a) Determine active and reactive power in an AC circuit.
    b) Calculate power factor for the above circuit.
28. a) Study of the frequency response of R.L.C. series circuit and resonance effect.
    b) Study of the frequency response of R.L.C. parallel circuit and resonance effect.
29. a) Study of various type of transformers used in electronics field.
    b) Study of single-phase transformer and determine its transformation ratio.
30. Practice of core assembly and winding of the core type transformers.
31. a) Study of various type of incandescent and vapour lamps.
    b) Connect a fluorescent tube light.
32. Verify the line and phase values of current and voltage in star and delta connections.

El.TR 123(Rev.): ELECTRONICS DEVICES

T	P	C
2	3	3

Total contact hours:

Theory: 64 Hours
Practical: 96 Hours

Pre-requisite: Physics course at the level of Secondary school Certificate.

AIM. Apply the principles of operation and function of various basic electronic components and devices to practical circuits.

SPECIFIC:

1. Identify various basic electronics components/devices used in the field of electronics.
2. Explain the principle of operation of various types of electronic components/devices.
3. Identify the function of each electronic components/devices.
4. Identify the pin configurations of various electronics components/devices.
5. Identify specification of electronic components/devices.
6. Identify the use of electronic components.

COURSE CONTENTS.

1. VACUMM TUBE. (04 Hours)

- 1.1 Introduction of various types of Electron emission
- 1.2 Diode, Construction, operation and applications.
- 1.3 Triode, Construction, operation and applications.
- 1.4 Function of multigrid in electron tubes. (tetrode and pentode)

2. DIODES AND APPLICATIONS. (10 Hours)

- 2.1 Semi-Conductors.
  - 2.1.1 Semi -Conductors doping
  - 2.1.2 Intrinsic & extrinsic semi-conductor
- 2.2 Biasing the PN junction.
  - 2.2.1 Depletion region, Junction barrier potential
  - 2.2.2 Forward and reverse bias.
- 2.3 Rectifier Diode.
  - 2.3.1 Half wave and full wave (Bridge) rectifier.
  - 2.3.2 Ripple factor, surge current.
  - 2.3.3 Rectifier filter: L, PI and T filters.
- 2.4 Diode Multiplier.
  - 2.4.1 Voltage multiplier circuits (Doubler, Tripler, Quadrupler)
- 2.5 Diode Data Sheet
- 2.6 Diode as a switch.
- 2.7 Diode Clipper
- 2.8 Diode Clamper

3. BIPOLAR JUNCTION TRANSISTORS (12 Hours)

- 3.1 Transistor types and BJT construction
- 3.2 Basic Transistor operation, Forward, Reverse Bias. Transistor current.
- 3.3 Transistor Parameters and Ratings
- 3.4 Transistor as a voltage amplifier.

3.5 Transistor amplifier configuration, comparison and uses.
3.6 Transistor, modes of operation.
3.7 Transistor as a switch.
3.8 Transistor Clipper

4. FIELD EFFECT TRANSISTOR (09 Hours)

4.1 Field Effect Transistor and its Biasing:
- 4.1.1 Junction Field Effect Transistor (JFET).
- 4.1.2 JFET Characteristics and parameter.
- 4.1.3 JFET Biasing.
- 4.1.4 Metal oxide Semiconductor FET (MOSFET) types.
- 4 1.5 MOSFET Biasing.

4.2 Introduction of Chopper Amplifier
- 4.2.1 Transistor Chopper
- 4.2.2 FET Chopper.

5. SPECIAL DIODES. (15 Hours)

5.1 Zener Diodes.
- 5.1.1 Zener Diode as voltage Regulator, percentage of regulation.
- 5.1.2 Zanier limiting.

5.2 Optical Diodes
- 5.2.1 Light Emitting Diode(LED)
- 5.2.2 Liquid crystal Diode(LCD)
- 5.2.3 Photo diode.

5.3 Varactor Diodes.
- 5.3.1 Varactor in Tuning Circuits.

5.4 Other Diodes.
- 5.4.1 Schottky diode, construction, characteristics, uses
- 5.4.2 Tunnel Diode, Negative resistance region.
- 5.4.3 Tunnel Diode Oscillator.
- 5.4.4 PIN Diode.
- 5.4.5 Step Recovery Diode.
- 5.4.6 LASER Diode
- 5.4.7 IMPATT Diode.
- 5.4.8 Gunn Diode.

6. THYRISTOR & SPECIAL DEVICES. (14 Hours)

6.1 The shockley diode.
6.2 Silicon Controlled Rectifier (SCR)
6.3 Simple SCR Applications.
6.4 Silicon Controlled Switch (SCS)
6.5 Diac and Triac
6.6 Unijunction Transistor (UJT)
6.7 Photo diode & Photo transistor
6.8 Light Activated SCR (LASCR)
6.9 Opto-coupler.

TEXT /REFERENCE BOOKS:

1. TL Floyd "Electronics Devices" 8th ed. Prentice Hall, ISBN 0131140809

El.TR 123(Rev.): ELECTRONICS DEVICES

INSTRUCTIONAL OBJECTIVES.

1. VACUMM TUBE.

1.1 Describe various types of electron emission with application.

1.2 Understand construction, operation and applications of basic electron tubes.

1.2.1 Discuss construction of diode tube.
1.2.2 Explain operation of diode tube.
1.2.3 Describe application of diode tube.
1.2.4 Discuss construction of triode tube.
1.2.5 Explain operation of triode tube.
1.2.6 Describe application of triode tube.
1.2.7 Discuss Function of multigrid in electron tubes. (tetrode and pentode)

2. SEMICONDUCTOR DIODES.

2.1 Understand principles, characteristics and application of various types of semiconductor diodes.

2.1.2 Explain semiconductor doping
2.1.3 List donor and acceptor materials for silicon & germanium
2.1.4 Define majority carries and minority charge carriers.
2.1.5 Explain the effect of temperature & light on the resistance of
(a) intrinsic semiconductor and
(b) Extrinsic semiconductor

2.2 PN Junction Theory:

2.2.1 Draw a PN Junction
2.2.2 Define the terms depletion layer capacitance & diffusion capacitance.
2.2.3 Sketch the voltage-current characteristics curve for a PN junction.
2.2.4 Describe R_F, R_R and I_s from the diode characteristics curve.
2.2.5 List the typical values of barrier potentials for silicon and germanium diode.

2. 3 Understand PN Diode Applications

2.3.1 List the uses of PN diode.
2.3.2 Explain half and full wave rectifier using circuit diagram.
2.3.3 Define Ripple factor, surge current.
2.3.4 Explain function of rectifier (L, PI, T) filters
2.3.5 Explain its uses as voltage multiplier (doubler).
2.3.6 Explain the working of a voltage doubler circuit.
2.3.7 List the applications of voltage multiplier circuit.
2.3.8 Explain the operation of a diode as a switch.
2.3.9 Describe the operation of Diode Clipper
2.3.10 Describe the operation of Diode Clamper.

3. BIPOLAR JUNCTION (BJTs).

3.1 Understand bipolar junction, its biasing and basic BJT circuits.

3.1.1 Draw and label physical structure and symbols for NPN and PNP transistors.
3.1.2 Show the four operation mode of BJT and application of each mode (cut off active, active and inverse).

3.1.3 Compute the values of I_E, and Beta (dc) for given value of I_B and I_C.
3.1.4 Explain the working of basic BJT voltage amplifier w.r.t. bias of junctions, flow of charge carriers and transistor currents.
3.1.5 Define cut off and breakdown voltages of transistor.
3.1.6 List four maximum ratings specified by manufacturers parameters of transistors.
3.1.7 Drive the expression for I_C versus I_B for CE. configuration in the active region
3.1.8 Sketch the input and output static characteristics curves for common base (CB) amplifier.
3.1.9 Repeat 3.1.8 for CE amplifier.
3.1.10 Repeat 3.1.8 for CC amplifier.
3.1.11 List the types of transistor structures.
3.1.12 Draw and label the structure of epitaxial transistor.
3.1.14 Enlist the advantages of I.C. over conventional circuit
3.1.15 List the three broad categories of BJTs with package types used for each
3.1.16 Identify the high frequency limitations of BJT.

3.2 Discuss the operation of Transistor as a switch.
3.3 Discuss the operation of Transistor Clipper.

4. FIELD EFFECT TRANSISTOR

4.1 Understand Field Effect Transistors.
4.1.1 Explain the principle of the n-channel JFET using illustrations.
4.4.2 Sketch the construction of n-channel JFET & its symbol.
4.4.3 Sketch & label a family of drain characteristics of a n-channel JFET.
4.4.4 Define the terms I Dss and Vp.
4.4.5 Explain the effect of change in VGS the JFET characteristics.
4.4.6 Expalin above from 4.4.1 thu. 4.4.3 for p-channel JFET.
4.4.7 Define the major data-sheet parameter of a JFET.
4.4.8 Explain the principle of n-channel enhancement MOSFET.
4.4.9 Sketch & label the family of drain characteristics of n-channel enhancement MOSFET
4.4.10 Repeat 4.4.9 for n-channel depletion-enhancement MOSFET.
4.4.11 Sketch symbols for p & n-channel JFET, n-channel enhancement MOSFET, p- and n- channel depletion- enhancement MOSFET.
4.4.12 List three advantages of n-channel over p-channel MOSFET.
4.4.13 Sketch the cross- section of V-MOSFET.
4.4.14 Explain the working of V-MOSFET.
4.4.15 Compare the V-MOSFET with other FETs.
4.4.16 List the applications of MOSFET.
4.4.17 Sketch the cross section of complementary MOSFET (CMOS).
4.4.18 List the applications of CMOS.

4.5 Understand FET Biasing
4.5.1 Explain to FET biasing.
4.5.2 Draw DC load line and locate bias point on the family of drain characteristic curves of JFET.
4.5.3 Draw a self-bias arrangement p-channel & n-channel JFET.
4.5.4 Set the Q-point for a self-biased JFET.
4.5.5 Explain the Q-point stability of a JFET.
4.5.6 Show zero bias of D-MOSFET.

4.6 Understand Basic FET Circuits

4.6.1 List the three of configuration of FET amplifier.
4.6.2 Sketch & label the circuit for CS-JFET amplifier.
4.6.3 Write down expressions for Av and Zi and Zo for CS,CD,CG,JFET amplifier
4.6.4 Draw MOSFET amplifier configuration .
4.6.5 Define (i) transconductance, gm (ii) drain resistance, rd and (iii) amplification factor of an FET.

4.7 Understand chopper amplifier
4.7.1 Explain the principle of chopper amplifier
4.7.2 Draw the block diagram of a chopper amplifier
4.7.3 Explain the function of each block of chopper amplifier.
4.7.4 Explain the operation of FET chopper amplifier.

5. SPECIAL DIODES.

5.1 Understand the characteristics and applications of diode used for a special purposes Zener Diode.
5.1.1 Explain the construction of Zener and draw its symbol
5.1.2 Draw the V-I characteristic of a Zener diode.
5.1.3 Identify the characteristic features of Zener diode.
5.1.4 Explain the working of Zener diode as voltage regulator.
5.1.5 Define the terms line regulation, and load regulation for Zener diode.
5.1.6 Compare formulae to find the range of series resistor (R_s) and load resistor (R_L) for a Zener regulator for given variations in line voltage and current.
5.1.7 List the applications of Zener diode.

5.2 Understand the characteristics of Optical Diodes (LED, LCD and Photodiode)
5.2.1 Define the term optical devices.
5.2.2 List the name of opto electronic devices.
5.2.3 Explain the electroluminescence process in LED.
5.2.4 List the materials with colour of emission used for LED
5.2.5 Explain the effect of bias on the operation of normal and colour emissive LED.
5.2.6 List the applications of LEDs.
5.2.7 Describe the term Liquid crystal.
5.2.8 Explain the working principle of both types of LCD.
5.2.9 Compare LCD with LED.
5.2.10 List the applications of LCDs.
5.2.11 Explain the operation of a photo diode.
5.2.12 List the materials used for photodiode with their colour sensitivity and characteristics
5.2.13 List the applications of photodiodes.
5.2.14 Draw a circuit of photoelectric relay using a photodiode.

6. THYRISTORS & SPECIAL DEVICES.

6.1 Understand thyristors UJT with their applications.
6.1.1 Explain the term thyristor
6.1.2 Name the important thyristor family devices
6.1.3 Sketch the construction of shockley diode
6.1.4 Draw and label the forward v-i characteristics for a shockley diode
6.1.5 List the methods to turn off and turn on shockley diode
6.1.6 Explain the working of a shockley diode relaxation oscillator.

6.1.7 Compare an SCR with a shockley diode.
6.1.8 Draw and label the schematic symbol for an SCR
6.1.9 Explain the turn-on process of SCR using transistor equivalent circuit.
6.1.10 Sketch and label the V-I characteristics for an SCR.
6.1.11 Interpret the SCR data sheet parameters.
6.1.12 Explain the phase-control of an SCR .
6.1.13 Draw basic circuits for SCR used in the areas of
a) power control
b) switching and
c) protection
6.1.14 Explain briefly the circuits drawn under 6.1.13.
6.1.15 Compare a Diac with a shockley diode in terms of
a) basic structure
b) symbol
c) operation
6.1.16 Compare a triac with an SCR in terms of
a) basic structure
b) symbol operation
6.1.17 Sketch and label the transistor equivalent circuit for a triac
6.1.18 Explain the phase-shift control of triac with a diac as a switching device as used in light for UJT.

6.2 Understand Unijunction Transistor characteristics.
6.2.1 Sketch the structure of a unijunction transistor (UJT).
6.2.2 Sketch the equivalent circuit and symbol for UJT.
6.2.3 Explain the working of UJT circuit of 6.2.2.
6.2.4 Draw the V-I characteristic curve for UJT.
6.2.5 Draw a circuit for UJT relaxation oscillator.
6.2.6 List the three factors controlling the period of oscillation freqquency of a relaxation oscillator
6.2.7 Sketch a UJT time delay circuit.

6.3 Understand properties of Photo-sensitive BJT&LASCR.
6.3.1 compare a photo-transistor with a conventional BJT.
6.3.2 List the factors controlling collector current of a photo transistor.
6.3.3 Draw the circuit for forward and reverse acting light operated relay using a phototransistor.
6.3.4 Sketch the circuit of a photo darlington pair
6.3.5 List the requirements to turn-on and turn-off of light activated SCR (LASCR).
6.3.6 List the types of input devices normally used in a opt coupler
6.3.7 List five types of output devices used in opto-coupler.
6.3.8 List the applications of opto-coupler.

El.TR.123 (Rev.): ELECTRONICS DEVICES

Total Contact Hours:

Practical: 96 Hours.

LIST OF PRACTICAL

1. Identify the various diodes, transistors & IC package, number system and terminals.
2. Draw the forward & reverse characteristics of a P.N. junction diode.
3. Assemble a half wave diode rectifier circuit and observe its input and out put waveforms.
4. Assemble a full wave diode rectifier circuit with center tab transformer and observe its input and out put waveforms.
5. Assemble a full wave bridge rectifier circuit and observe its input and out put waveforms.
6. Demonstrate the working of diode as a switch with LED as a load.
7. Assemble L type filter circuit and calculate its ripple factor.
8. Assemble π and T type filter circuits and calculate their ripple factors.
9. Troubleshoot a faulty diode rectifier circuit.
10. Assemble a voltage doubler circuit observe its input and out put.
11. Assemble a voltage tripler circuit observe its input and out put.
12. Assemble a voltage quadrupler circuit observe its input and out put.
13. Consult data sheet for a transistor to study its parameters and ratings.
14. Plot the input & output characteristics of a transistor in common base configuration.
15. Plot the input & output characteristics of a transistor in common emitter configuration.
16. Plot the input and output characteristics of transistor in common collector configuration.
17. Assemble a BJT Switch circuit and check it's in put and out put.
18. Plot the transfer characteristics curve of transistor in CE configuration.
19. Assemble a transistor voltage amplifier and find its voltage gain.
20. Demonstrate the characteristics of CB, CE & CC amplifier using curve tracer.
21. Consult data sheet for a FET to study its parameters and ratings.
22. Plot a characteristics curve for a common source FET amplifier.
23. Demonstrate MOSFET as a switch and study its performance.
24. Draw the forward and reveres characteristics of a Zener diode.
25. Use a Zener diode as voltage regulator with diode rectifier.
26. Assemble a Zener diode Limiter circuit and observe it's in put and out put waveforms.
27. Assemble a double Zener diode limiter circuit and observe it's in put and out put waveforms.
28. Assemble a seven segment display with the help of LEDs.
29. Assemble a circuit of photoelectric relay using a photodiode.
30. Plot the characteristics curves for SCR and UJT.
31. Assemble a UJT relaxation oscillator and observe its waveform.
32. Assemble a light dimmer with the help of Diac and Triac.

El.TR. 132 ENGINEERING DRAWING & COMPUTER AIDED DESIGN

T	P	C
0	6	2

Total contact Hours

Practical: 192 Hours.

Description: Lettering, Numbering, Conventional lines and dimensioning. Drawing symbols, simple circuits (Electrical and Electronics).

Objectives: To help the students in understanding the basic methods of drawing.

a) Pencil
b) Computer

COURSE CONTENTS.

LIST OF PRACTICAL

(a) CONVENTIAL DRAWING **128 Hrs.**

1. Use and care of drawing instruments.
2. Use of various grades of pencils.
3. Single stroke and inclined & gothic letters.
4. Practice in lettering, vertical and inclined.
5. Practice in numbering, vertical and inclined.
6. Alphabets of line.
7. Line values.
8. Tangency exercises.
9. One view drawing.
10. Dimensioning techniques.
11. System of dimensioning.
12. Kinds of dimensioning.
13. Preparation of multi-view drawing for the given models showing conventional placement of dimensions there upon.
14. Drawing tracing.
15. Simple pictorial drawings:
    a) Isometric
    b) Oblique.
    c) One point perspective.
16. Comparison of orthographic first angle and third angle methods of projection.
17. Production and use of simple standard working drawing.
18. Practice in the use of Electronics symbols.
19. Schematic drawing of simple circuits (resonant/filter circuits)
20. Practice in single line diagram schematic drawing.
21. Practice in line and curve tracing.
22. Drawing light, fan and plug circuit.
23. Drawing circuits, Hotel, Hospital call bell system.
24. Draw the circuit diagram of a fluorescent tube.
25. Circuit diagram of half wave rectifier.

26. Circuit diagram of full wave rectifier.
27. Circuit diagram of common emitter amplifier.
28. Circuit diagram of common collector amplifier
29. Circuit diagram of common base amplifier.
30. Circuit diagram Audio frequency amplifier.
31. Circuit diagram of Radio frequency amplifier.
32. Circuit diagram of push pull power amplifier.
33. Circuit diagram of intercom
34. Circuit diagram of thyristor, working as rectifier.
35. Block diagram of Oscilloscope.
36. Block diagram of TV receiver.
37. Block diagram of a radio transmitter.
38. Flow chart symbol.
39. Flow chart for a program in Basic language.

(b) <u>USE OF COMPUTER FOR DRAWING</u> 64 Hrs.

40. Introduction of computer aided drawing
41. Introduction of AutoCAD
42. Introduction of Work bench
43. Drawing of circuits given at Sr. No.25 to 34 above

TEXT /REFERENCE BOOKS:

1. Auto CAD 2005,2007 A Problem Solving Approach, Indian Edition
2. Auto CAD 2000 Fundamentals, Indian Edition
3. Understanding 2002 with Applications.

El.TR. 141(Rev.) ELECTRIC WIRING

T	P	C
0	3	1

Total contact Hours.

Practical: 96 Hours

ELECTRIC WIRING

LIST OF PRACTICAL:

1. Study of wiring tools, accessories and cables (types and sizes)
2. Handling of Wire
3. Handing of Cable
4. Introduction to International standards

5-6 Making straight, Tee and Duplex joints

7-12 ***Single Phase Wiring.***

a) Single lamp circuit controlled by SPST switch.
b) Single lamp controlled by two ways (SPDT) switches
c) Single lamp with 5A socket each controlled by individual SPST switches.
d) Wiring bell circuit controlled by single and three push buttons.
e) Fluorescent Lamps Circuit
f) Installation of Test Board

13-32 ***Three Phase Industrial Wiring.***

Making of Single Phase Motor Connection Reversing by Drum Switch
Making of 3 Phase Motor Connection by Drum Switch ON / OFF with Indicator
Making of 3-Phase Motor Connection Reversing by Drum Switch with indicator
Making of 3 Phase Motor Connection ON / OFF by Contactor
Making of 3 – Phase Connection Reversing by Contactor
Making of 3 Phase Motor Connection Star Delta by Drum Switch
Making of 3 Phase Motor Connection Star Delta by Contactor
Making of 3 Phase Motor Connection Star Delta Auto by Contactor
Making of 3 Phase Motor Connection Star Delta Reversing by Contactor
Making of 3 phase motor connection 2 speed by contactor

اسلامیات / مطالعہ پاکستان

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

موضوعات

1- سورۃ المومنون آیت ۱ تا ۱۱ مع ترجمہ

2- درس منتخب احادیث مع ترجمہ و تشریح

☆ خیارکم من تعلم القرآن وعلمہ

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

☆ وایاکم والظن فان الظن اکذب الحدیث

☆ من احدث فی امرنا ہذا ما لیس منہ فہو رد

☆ من حمل علینا السلاح فلیس منا

☆ انا و کافل الیتیم فی الجنۃ

☆ لا ضرر ولا ضرار فی الاسلام

☆ کلکم راع و کلکم راع و کلکم مسئول عن رعیتہ

3- سیرۃ طیبہ

☆ مکی زندگی۔ دارارقم۔ ہجرت حبشہ۔ ہجرت

☆ مدنی زندگی۔ مواخات۔ میثاق مدینہ۔ غزوہ بدر (اسباب و نتائج)

4- حضور ﷺ بحیثیت

☆ خطبہ حجۃ الوداع

معلم کامل، سربراہ خاندان

5- اسلامی معاشرہ

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

جہاد۔ کسب حلال۔ مسجد (اہمیت و فضیلت)

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

تدریس مقاصد

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

قرآن مجید — منتخب آیات قرآنی

خصوصی مقاصد:

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

احادیث نبویہ

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

خصوصی مقاصد:

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

سیرت طیبہ

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

خصوصی مقاصد:

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

☆ حضور ﷺ کی بطور سربراہ خاندان بیان کر سکے

اسلامی معاشرہ

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

خصوصی مقاصد:

☆ اسلامی معاشرہ کا معنی و مفہوم بیان کر سکے

☆ اسلامی معاشرہ کی امتیازی خصوصیات بیان کر سکے

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

☆ تبلیغ کے لغوی معنی بیان کر سکے

☆ تبلیغ کی اہمیت و ضرورت بیان کر سکے

☆ جہاد کے لفظی و اصطلاحی معنی بیان کر سکے

☆ جہاد کی اہمیت بیان کر سکے

☆ جہاد اور قتال میں فرق بیان کر سکے

☆ جہاد کی مختلف اقسام بیان کر سکے

☆ لفظ مسجد کی تعریف کر سکے

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

اسلامی ریاست

عمومی مقاصد: اسلامی ریاست کی خصوصیت بیان کر سکے

خصوصی مقاصد:

☆ ریاست کی تعریف بیان کر سکے

☆ اسلامی ریاست میں طرز حکومت سے آگاہی حاصل کر سکے

☆ اسلامی ریاست کی خصوصیات بیان کر سکے

☆ اسلامی ریاست کے اغراض و مقاصد بیان کر سکے

☆ اسلامی ریاست کے قیام کیلئے جدوجہد کر سکے

نصاب مطالعہ پاکستان

سال دوم

حصہ دوم

ٹی	پی	سی
1	0	1

کل وقت: 12 گھنٹے

موضوعات

- ☆ دو قومی نظریہ
- ☆ تحریک پاکستان
- ☆ اندین کانگریس
- ☆ مسلم لیگ
- ☆ تقسیم بنگال
- ☆ میثاق لکھنؤ
- ☆ تحریک خلافت
- ☆ سندھ تحریک
- ☆ تجاویز دہلی
- ☆ نہرو رپورٹ
- ☆ قائداعظم کے چودہ نکات
- ☆ خطبہ الہ آباد
- ☆ انتخابات 1936 اور انتخابی منشور
- ☆ قرارداد پاکستان

حصہ دوم

مطالعہ پاکستان

تدریس مقاصد

تحریک پاکستان

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

خصوصی مقاصد:

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

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات	ٹی	پی	سی
سال دوم	1	0	1

کل وقت: 20 گھنٹے

موضوعات

معاشرتی اقدار، اقدار، سماجی، قومی، قومی سطح، شہری سطح، صنعتی اداروں کی سطح، ضروریات، ورثہ

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

نصاب اخلاقیات

سال دوم

تدریس مقاصد

عمومی مقاصد :

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

خصوصی مقاصد: طالب علم اس قابل ہو کہ

☆ موضوعات کا مطلب بیان کر سکے

☆ عملی زندگی سے مثالوں کی نشاندہی کر سکے

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

☆ اعلیٰ اخلاقی اقدار میں سے

قوت برداشت۔ قوت ارادی۔ لگن جذبہ۔ وسیع النظری۔ بے غرضی۔ انسانی دوستی حفاظتی۔ شعور۔ پس آزادی۔

کامل اکائی اور خود شناسی کی اہمیت بیان کر سکے

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

MATHS-233 Applied Mathematics-II

	T	P	C
Total Contact Hrs:	3	0	3

Theory: 96 Hrs.
Practical: 0

Aims & Objectives:

After completing the course the students will be able to:

Solve the problems of calculus and analytical Geometry.

Course Contents:

1. **FUNCTIONS & LIMITS.** 6 Hours
   - 1.1 Constants and variables
   - 1.2 Functions & their types
   - 1.3 The concept of limit
   - 1.4 Limit of a function
   - 1.5 Fundamental theorems on limit
   - 1.6 Some important limits
   - 1.7 Continuous function
   - 1.8 Problems

2. **DIFFERENTIATION.** 06 Hours
   - 2.1 Increments
   - 2.2 Geometrical interpret
   - 2.3 Differentiation ab –initio by first principle.
   - 2.4 Geometrical interpretation of differential coeff.
   - 2.5 Differentiation coefficient of X^n and $(a+b)^n$
   - 2.6 Problems.

3. **DIFFERENTIATION OF ALGEBRAIC FUNCTIONS** 9 Hours
   - 3.1 Explicit Functions
   - 3.2 Implicit Functions
   - 3.3 Parametric Forms
   - 3.4 Problems

4. **DIFFERENTIATION OF TRIGONOMETRIC FUNCTIONS** 6 Hours
   - 4.1 Differential Coefficient of Sinx, Cosx, Tanx from first principle.
   - 4.2 Differential Coefficient of Cosecx, Secx, Cotx.
   - 4.3 Differential Coefficient of Inverse Trigonometric Functions
   - **4.4** Problems

5. **DIFFERENTIATION OF LOGARITHMIC & EXPONENTIAL FUNCTION** 15Hours
   - 5.1 Differentiation of lnx
   - 5.2 Differentiation of Log a^x
   - 5.3 Differentiation of a^x
   - 5.4 Differentiation of e^x
   - 5.5 Problems

6. RATE OF CHANGE OF VARIABLES. 6 Hours

6.1 Increasing and decreasing functions
6.2 Maxima and Minima
6.3 Criteria for maximum & minimum values
6.4 Methods of finding maximum & minimum
6.5 Rate measure
6.6 Slope of a line
6.7 Velocity and acceleration
6.8 Problems

7. INTEGRATION (SIMPLE BASIC RULES) 9 Hours

7.1 Concept
7.2 Fundamental Formulae
7.3 Important Rules
7.4 Problems

8. METHODS OF INTEGRATION 9 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. DIFFERENTIAL EQUATION. 6 Hours

10.1 Introduction
10.2 Order and Degree
10.3 First Order Differential Equation of 1^{st} Degree
10.4 Solution of Problems
10.5 Problems

11. LAPLACE TRANSFORMATION. 9 Hours

11.1 Laplace Transformations
11.2 Inverse Laplace Transformations
11.3 Problems

12. FOURIER SERIES 9 Hours

12.1 Introduction
12.2 Periodic Functions
12.3 Even and Odd Functions
12.4 Problems

13. STATISTICS 6 Hours

13.1 Concept of mean, median and mode
13.2 Standard Deviation
13.3 Laws of probability
13.4 Problems

RECOMMENDED BOOKS

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

ComS -211 COMMUNICATION SKILLS

T	P	C
1	0	1

Total contact hours

Theory: 32 Hours.

Prerequisites: The students shall already be familiar with the language concerned.

AIMS The course has been designed to enable the students to.

1. Develop communication skills.
2. Understand basic principles of good and effective business writing in commercial and industrial fields.
3. Develop knowledge and skill to write technical report with confidence and accuracy.

1. Use of simple engineering drawings/circuit/network diagrams and sketches to communicate technical information. (06 Hours)

- 1.1 Obtain information and describe features
- 1.2 Identify manufacturing/assembly/ process instructions
- 1.3 Graphical information used to aid understanding of written or verbal communication
- 1.4 Working documents
  - 1.4.1 First and third angle projections,
  - 1.4.2 Detail and assembly drawings,
  - 1.4.3 plant/process layout diagrams,
  - 1.4.4 electrical/electronic/communications/circuit diagrams,
  - 1.4.5 system/network diagrams;
- 1.5 Use of common drawing/circuit/network diagram conventions and standards
- 1.6 Sketches
  - 1.6.1 Free-hand illustration of engineering arrangements using 2D and 3D techniques.

2. Use of verbal and written communication skills in engineering settings. (16 Hours)

- 2.1 Written work
  - 2.1.1 Note taking
    - 2.1.1.1 Lists,
    - 2.1.1.2 Mind mapping/flow diagrams
  - 2.1.2 Writing style
    - 2.1.2.1 Business letter,
    - 2.1.2.2 Memo writing,
    - 2.1.2.3 Report styles and format,
    - 2.1.2.4 email, fax
  - 2.1.3 Proofreading and amending text;
  - 2.1.4 Use of diary/logbook for planning and prioritizing work schedules
  - 2.1.5 Graphical presentation techniques
- 2.2 Verbal methods
  - 2.2.1 Speaking with peers, supervisors and public

2.2.2 Use of appropriate technical language,
2.2.3 Tone and manner
2.2.4 Listening
2.2.4.1 Use of paraphrasing and note taking to clarify meaning 2.2.5 Impact and use of body language in verbal communication

3. Use engineering information (03 Hours)

3.1 Information sources
- 3.1.1 Non-computer-based sources
- 3.1.2 Computer-based sources

3.2 Use of information
- 3.2.1 for the solution of engineering problems,
- 3.2.2 for product/service/topic research,
- 3.2.3 gathering data or material to support own work,
- 3.2.4 checking validity of own work/findings

4. Use of information and communication technology (ICT) to present information in engineering settings (07 Hours)

4.1 Software packages
- 4.1.1 Word processing;
- 4.1.2 Computer Aided Drawing
- 4.1.3 Graphics package
- 4.1.4 data handling and processing

4.2 Hardware devices

4.3 Present information
- 4.3.1 Report
- 4.3.2 Visual presentation
  - 4.3.2.1 Overhead transparencies,
  - 4.3.2.2 Charts,
  - 4.3.2.3 Computer-based presentations (PowerPoint)

Textbooks

Tooley M and Dingle L — *BTEC National Engineering, First Edition* (Newnes, 2002) ISBN 0750651660

ComS -211 COMMUNICATION SKILLS

INSTRUCTIONAL OBJECTIVES.

1. Able to use of simple engineering drawings/circuit/network diagrams and sketches to communicate technical information.

- 1.1 Describe the ways to obtain information and describe features such as component features, dimensions and tolerances, surface finish.
- 1.2 Able to identify manufacturing/assembly/ process instructions such as cutting lists, assembly arrangements, plant/process layout or operating procedures, electrical/electronic/communication circuit requirements.
- 1.3 Able to use Graphical information used to aid understanding of written or verbal communication such as illustrations, technical diagrams and sketches.
- 1.4 Describe working documents
  - 1.4.1 Express the role of First and third angle projections,
  - 1.4.2 Express the role of Detail and assembly drawings,
  - 1.4.3 Express the role of plant/process layout diagrams,
  - 1.4.4 Express the role of electrical/electronic/communications/circuit diagrams,
  - 1.4.5 Express the role of system/network diagrams;
- 1.5 Able to use common drawing/circuit/network diagram conventions and standards such as layout and presentation, line types, hatching, dimensions and tolerances, surface finish, symbols, parts lists, circuit/component symbols.
- 1.6 Describe Sketches
  - 1.6.1 Express the role of Free-hand illustration of engineering arrangements using 2D and 3D techniques.

2. Use of verbal and written communication skills in engineering settings.

- 2.1 Understand written work
  - 2.1.1 Describe note taking activity.
    - 2.1.1.1 Express Lists,
    - 2.1.1.2 Express Mind mapping/flow diagrams
  - 2.1.2 Describe Writing style
    - 2.1.2.1 Understand Business letter,
    - 2.1.2.2 Understand Memo writing,
    - 2.1.2.3 Understand Report styles and format,
    - 2.1.2.4 Understand use of email and fax
  - 2.1.3 Understand the process of proofreading and amending text;
  - 2.1.4 Use of diary/logbook for planning and prioritizing work schedules
  - 2.1.5 Describe graphical presentation techniques
- 2.2 Understand Verbal methods of communication.
  - 2.2.1 Discuss how to speak with peers, supervisors and public.
  - 2.2.2 Describe the use of appropriate technical language.
  - 2.2.3 Describe the tone and manner
  - 2.2.4 Describe the Listening process.
    - 2.2.4.1 Discuss the process of paraphrasing and note taking to clarify meaning
  - 2.2.5 Describe the impact and use of body language in verbal communication

3. Understand the use of engineering information

3.1 Understand Information sources

3.1.1 Describe the Non-computer-based sources such as books, technical reports, institute and trade journals, data sheets and test/experimental results data and manufacturers' catalogues

3.1.2 Describe the Computer-based sources such as intranet, CD ROM- based information (manuals, data, analytical software, and manufacturers' catalogues), spreadsheets, and databases

3.2 Express the use of information

3.2.1 for the solution of engineering problems,

3.2.2 for product/service/topic research,

3.2.3 gathering data or material to support own work,

3.2.4 checking validity of own work/findings

4. Express the use of information and communication technology (ICT) to present information in engineering settings

4.1 Discuss Software packages

4.1.1 Understand the role of Word processing;

4.1.2 Understand the role of Computer Aided Drawing

4.1.3 Understand the role of Graphics package

4.1.4 Understand the role of data handling and processing

4.2 Discuss the Hardware devices such as personal computer, network, plant/process control system; input/output devices eg keyboard, scanner, optical/speech recognition device, printer, plotter

4.3 Able to Present information

4.3.1 Develop a Report includes written and technical data eg letters, memos, technical product/service specification, fax/email, tabulated test data, graphical data

4.3.2 Develop a Visual presentation with the help of

4.3.2.1 Overhead transparencies,

4.3.2.2 Charts,

4.3.2.3 Computer-based presentations (PowerPoint)

El.TR-212(Rev.) PROPAGATION OF ELECTROMAGNETIC WAVES

T	P	C
2	0	2

Total Contact Hours:

Theory: 64 Hours.
Practical: 00 Hours.

Pre-requisites: Electrical Circuits

AIMS After studying the subject the student will be able to:

1. Understand a vector-calculus based description of static electric fields in cases of fixed charges, conductors, and dielectrics.
2. Describe the moving charges (for the case of steady electric currents) and resulting static magnetic fields are also presented.
3. Understand the Maxwell equations and the classical description of electromagnetic fields. Problem solving makes frequent use of symmetry and invariance.

COURSE CONTENTS

1. INTRODUCTION TO VECTORS (04 Hours)

1.1 Scalars and Vectors
1.2 Unit Vector
1.3 Vector addition and Subtraction
1.4 Position and Distance Vectors
1.5 Vector Multiplication
1.6 Components of a Vector

2. Coordinate Systems and Transformation (06 Hours)

2.1 Cartesian Coordinates (x, y, z)
2.2 Circular Cylindrical Coordinates (ρ, Φ, z)
2.3 Spherical Coordinates (r, θ, z)

3. Vector Calculus (08 Hours)

3.1 Differential Length, Area and Volume (for all three coordinates)
3.2 Line, Surface and Volume integrals
3.3 Del Operator
3.4 Gradient of a scalar
3.5 Divergence of vector and divergence theorem
3.6 Curl of a vector and Stocks theorem.
3.7 Laplacian of a scalar.

4. Electrostatic Fields (08 Hours)

Coulomb's Law and field intensity.
4.2 Electric Field due to continuous charge distribution formuli.
4.3 Electric Flux density
4.4 Gauss's Law and its application to a point charge
4.5 Electric potential
4.6 Relationship between E & V
4.7 Electric Dipole
4.8 Electric Flux lines and Equipotential Surfaces

5. Electric Fields in Material Space (08Hours)

5.1 Properties of Materials
5.2 Convection and conduction currents
5.3 Polarization in Dielectrics
5.4 Boundary Conditions

5.5 Maxwell Equations

6. Electromagnetic Wave Propagation (06 Hours)

6.1 Introduction of EM Waves.
6.2 Electromagnetic Spectrum
6.3 Wave Propagation in Lossy Dielectrics
6.4 Plane Waves in Free Space
6.5 Plane Waves in Good Conductors

7. Transmission Lines (08 Hours)

7.1 Introduction to Transmission Lines
7.2 Transmission Line Parameters
7.3 Transmission Line Equations
7.4 Input Impedance, SWR and Power

8. Waveguides (08 Hours)

8.1 Introduction to Waveguides
8.2 Rectangular Wave Guide
8.3 Rectangular Wave Guide Modes
8.4 Circular Waveguides

9. Antennas (08 Hours)

9.1 Hertzian Dipole
9.2 Half Wave Dipole Antenna
9.3 Quarter Wave mono pole Antenna
9.4 Antenna Characteristics

Textbook:

1) Elements of Electromagnetics, by Sadiku, 2nd edition , Oxford University Press, 1995.
2) Electromagnetics Explained, A Handbook for Wireless/ RF, EMC & High Speed Electronics by Ron Schmitt, Elsevier, 2002.

El.TR-212(Rev.) ELECTROMAGNETICS

INSTRUCTIONAL OBJECTIVES

1. Understand vector algebra
1.1 Describe Scalars and Vectors
1.2 Discuss Unit Vector
1.3 Apply the concept of Vector addition and Subtraction
1.4 Describe Position and Distance Vectors
1.5 Apply the concept of Vector Multiplication
1.6 Describe Components of a Vector

2. Understand Coordinate Systems and Transformation
2.1 Discuss Cartesian Coordinates (x, y, z)
2.2 Discuss Circular Cylindrical Coordinates (ρ, Φ, z)
2.3 Describe Spherical Coordinates (r, θ, z)

3. Apply Vector Calculus
3.1 Discuss Differential Length, Area and Volume (for all three coordinates)
3.2 Describe Line, Surface and Volume integrals
3.3 Describe Del Operator
3.4 Understand Gradient of a scalar
3.5 Discuss Divergence of vector and divergence theorem
3.6 Understand Curl of a vector and Stocks theorem.
3.7 Describe Laplacian of a scalar.

4. Understand Electrostatic Fields
4.1 State Coulomb's Law and field intensity.
4.2 Describe Electric Field due to continuous charge distribution formuli.
4.3 Discuss Electric Flux density
4.4 Describe Gauss's Law and its application to a point charge
4.5 State Electric potential
4.6 Describe Relationship between E & V
4.7 Discuss Electric Dipole
4.8 Discuss Electric Flux lines and Equipotential Surfaces

5. Understand Electric Fields in Material Space
5.1 Discuss Properties of Materials
5.2 Differentiate between Convection and conduction currents
5.3 Discuss Polarization in Dielectrics
5.4 Describe Boundary Conditions
5.5 Discuss Maxwell Equations.

6. Understand Electromagnetic Wave Propagation
6.1 Understand the term of EM Waves.
6.2 Discuss Electromagnetic Spectrum
6.3 Describe Wave Propagation in Lossy Dielectrics
6.4 Understand Plane Waves in Free Space
6.5 Understand Plane Waves in Good Conductors

7. Understand Transmission Lines
7.1 Understand the term Transmission Lines

7.2 Discuss Transmission Line Parameters
7.3 Describe Transmission Line Equations
7.4 Describe Input Impedance, SWR and Power

8. Waveguides
8.1 Understand the term of Waveguides
8.2 Discuss Rectangular Wave Guide
8.3 Discuss Rectangular Wave Guide Modes
8.4 Define Circular Waveguides

9. Understand Antennas
9.1 Understand the term of Antenna
9.2 Discuss Hertzian Dipole
9.2 Describe Half Wave Dipole Antenna
9.2 Describe Quarter Wave mono pole Antenna
9.3 Discuss Antenna Characteristics

El.TR. 225 ANALOG ELECTRONICS.

T	P	C
3	6	5

Total contact hours:

Theory: 96 Hours.
Practical: 192 Hours.

Pre-requisites: Electrical Circuits
Electronics Devices

AIMS: This course has been designed to enable the students to understand the working of:

1. Transistor and FET Amplifiers.
2. Coupling of Amplifiers
3. Audio, Feedback, RF and IF Amplifiers.
4. Electronic Oscillators Circuits.
5. Operational amplifier circuits.
6. Monostable and Astable Multivibrators
7. Ramp, pulse and Function Generators Circuits
8. Comparator and Schmitt Trigger circuits.

COURSE CONTENTS

1. INTRODUCTION TO AMPLIFIER. (20 Hours)

1.1 Audio voltage amplifier: classification of amplifiers w.r.t. ground, frequency and operation.
1.2 Basic amplifier concept using transistors (BJT & FET).
1.3 Common emitter, common base and common collector circuit configurations and CD, CS, and CG configurations.
1.4 Comparison of CE, CB, CC circuits and CD, CS, CG circuit configurations.
1.5 Equivalent circuit for CE amplifier and calculations for its voltage, current and power gain by using graphical and parameter method.
1.6 Common Base amplifier equivalent circuit and gain calculation by graphical and parameter method.
1.7 Common collector amplifier equivalent act and gain calculation by graphical analysis and using parameter.
1.8 Biasing methods, thermal run away & instability of Q-point.
1.9 Calculation of stability factor and for CE, CB and CC circuits.
1.10 Method of stabilization of Q-point.

2. COUPLING OF AMPLIFIER. (08 Hours)

2.1 Methods of coupling of amplifier: RC, direct , transformer and impedance coupling.
2.2 R.C. coupled amplifier, its characteristics and frequency response.
2.3 Transformers coupled amplifier, its gain, efficiency and frequency response. Comparison of RC and transformer coupling.
2.4 Direct coupled amplifier: Drift and offset voltage. Its merits and demerits.

3. AUDIO POWER AMPLIFIERS. (06 Hours)

3.1 Distinction between voltage and power amplifier.
3.2 Classification of power amplifier, class A, Single ended, Push-Pull.
3.3 Complementary pair push-pull power amplifier circuit. Requirements of heat sinks for power amplifier.
3.4. IC power amplifier. Heat sinks for power amplifier.

4. FEEDBACK AMPLIFIERS. (08 Hours)

4.1 Principle of feed back in amplifiers, types of feed back amplifier. Series and shunt feedback, feedback factor, effect of feedback on gain, band width, distortion, stability and frequency response.
4.2 Emitter follower and differential amplifiers.

5. R.F. AMPLIFIER. (08 Hours)

5.1 Requirements of RF amplifier.
5.2 Principle and characteristics of R.F. Amplifier.
5.3 R.C. coupled R.F. amplifier.
5.4 Impedance coupled R.F. amplifier.
5.5 Transformer coupled R.F. amplifier.
5.6. Multistage R.F. amplifier.
5.7 Class-C R.F. power amplifier using tuned circuit as load.
5.8 Grounded base R.F amplifier.
5.9 Feed back in R.F. amplifier.
5.10 Regeneration and de-generation in feed back amplifier.
5.11 Calculation of band width.
5.12 Troubles in R.F. amplifier.

6. I.F. AMPLIFIER. (04 Hours)

6.1 Need and requirement of I.F amplifier.
6.2 Single stage I.F. amplifier.
6.3 Multistage I.F amplifier.
6.4 Methods of neutralization.
6.5 Integrated Circuit IFA
6.6 Troubles in I.F. amplifier.

7. OSCILLATORS. (08 Hours)

7.1 Conditions for an amplifier to work as an oscillator.
7.2 Requisites of an oscillator.
7.3 Classification of oscillator circuits.
7.4 RC phase shift and Wien bridge oscillator circuits.
7.5 Condition of sustained oscillation.
7.6 Voltage controlled oscillator using 555 timer
7.7 Pulse tone oscillator using 555 timer.
7.8 Voltage controlled oscillator using 555 timer.
7.9 Reasons of instability in oscillator circuit.
7.10 Remedies of instability in oscillator.
7.11 Applications of oscillator.

8. OPERATIONAL AMPLIFIER. (16 Hours)

8.1 Introduction to operational Amplifier.

8.2 The differential Amplifier.
8.3 OP-AMP Data Sheet Parameters.
8.4 OP-AMP with negative Feedback.
8.5 Inverting and non-inverting amplifiers.
8.6 Voltage follower.
8.7 Summing and difference amplifiers.
8.8 Introduction to 741 OP AMP.

9. MONOSTABLE AND STABLE MULTIVIBRATOR. (08 Hours)

9.1 Monostable Multivibrator.

9.1.1 Introduction
9.1.2 Emitter coupled monostable multivibrator
9.1.3 OP-AMP monostable multivibrator.
9.1.4 IC monostable multivibrator.
9.1.5 Applications of monostable multivibrator.

9.2 Stable Multivibrator.

9.2.1 Emitter coupled stable multivibrator.
9.2.2 Generation of square, rectangular, sawtooth and pulse by using stable multivibrator.
9.2.3 Synchronization of the stable MV
9.2.4 Control of period and frequency of stable MV
9.2.5 Effect of amplitude of sync pulse on period and frequency of stable MV
9.2.6 Applications of stable MV.
9.2.7 The 555 IC timer.
9.2.8 Use of 555 timer as a monostable MV.
9.2.9 Use of 555 timer as an stable MV.

10. RAMP, PULSE AND FUNCTION GENERATORS. (06 Hours)

10.1 RC ramp generator.
10.2 Constant current ramp generator.
10.3 UJT relaxation oscillator.
10.4 Bootstrap ramp generator.
10.5 Miller integrator ramp generator.
10.6 Pulse generator circuit.
10.7 OP-AMP Function generator.
10.8 IC Function generator.

11. COMPARATOR AND SCHMITT TRIGGER. (04 Hours)

11.1 Introduction to comparator.
11.2 Diode comparator.
11.3 Transistor Schmitt trigger circuit.
11.4 Output/Input characteristics.
11.5 OP-AMP Schmitt trigger circuits.
11.6 IC Schmitt
11.7 IC voltage comparators.

TEXT AND REFERENCE BOOKS.

1. TL Floyd " Electronics Devices" 8th ed. Prentice Hall, ISBN 0131140809
2. Analog Circuit Design by William, Jim. ISBN 075069401

El.TR. -225 ANALOG ELECTRONICS.

INSTRUCTIONAL OBJECTIVES

1. INTRODUCTION TO AMPLIFIERS.

1.1 Understand the principle & need of amplification of signals.

1.1.1 Explain the need and principle of amplification .

1.1.2 Define the terms current gain, voltage and power gain.

1.2 Classification of Amplifiers

1.2.1 Identify the function of current, voltage and power amplifiers

1.2.2 Classify the amplifiers with respect to:

i) Device used
ii) Circuit configuration
iii) Band of frequency handled
iv) Class of biasing employed
v) Type of application

1.2.3 Describe the characteristics of BJT & FET amplifiers.

1.2.4 Explain the class of biasing i.e. class A, class B and class C and class AB amplifiers.

1.3 Amplifier Circuit Configurations.

1.3.1 Identify CB, CE and CC configurations of BJT amplifiers in terms of

i) common terminal
ii) Input & output ports
iii) Input and output currents

1.3.2 Identify CG, CS and CD configuration of FET amplifiers in terms of

i) Common terminal
ii) Input and output ports

1.3.3 Compare the characteristics of CB, CE, CC configurations of amplifiers in terms of

i) Input impedance,
ii) Output impedance
iii) Terminal to which input is applied
iv) Terminal from which output is taken
v) Current gain
vi) Voltage gain
vii) Power gain
viii) Applications

1.3.4 Compare the characteristics of CG, CS and CD configuration of amplifiers in terms of

i) Input impedance
ii) Output impedance
iii) Input terminal
iv) Output terminal
v) Voltage Gain
vi) Applications

1.4 Equivalent Circuit & Graphical Analysis for CE Circuit

1.4.1 Write the formulae for Ai, Av, Ap, Zi, and Zo for CE circuit.

1.4.2 Calculate the gains and impedances for given values of h-parameters and load resistance(using formula).
1.4.3 Use the input, output characteristics for CE circuit for computing transfer characteristics.
1.4.4 Calculate the gains and impedances for CE circuit by using the three characteristics curves.

1.5 Equivalent Circuit & Graphical Analysis for CB Circuit

1.5.1 Calculate Zi, Zo, Ai, Av, and Ap for CB circuit by using h-parameter equations (using formula).
1.5.2 Compute Zi, Zo, Ai, Av, Ap for CB circuit by using input, output and transfer characteristic curves.

1.6 Equivalent Circuit & Graphical Analysis for CC Circuit

1.6.1 Calculate Zi, Zo, Ai, Av and Ap for CC circuit by using h-parameter equations(using formula).
1.6.2 Compute Zi, Zo, Ai, Av and Ap for CC circuit by using input, output and transfer characteristic curves.

1.7 Biasing Techniques for CE Amplifiers.

1.7.1 Identify the fixed biasing method for CE amplifier.
1.7.2 Explain the instability of Q-point and hazard of thermal runaway for fixed bias.
1.7.3 Identify the collector biasing technique for CE amplifier.
1.7.4 Enlist the merits and demerits of collector bias method.
1.7.5 Identify the voltage divider bias technique.
1.7.6 Identify the emitter bias technique.
1.7.7 Describe the working of voltage divider & emitter bias for stability of Q-point and protection against thermal runaway.
1.7.8 Calculate the stability factor for each of the above biasing techniques.
1.7.9 List the methods of bias stabilization.
1.7.10 Identify the function of thermistor in CE amplifier circuit for protection against thermal runaway.

2. UNDERSTAND THE WORKING & ADVANTAGES OF CASCADED AMPLIFIERS.

2.1 Identify the need of cascaded amplifier.
2.2 List the types of coupling for cascaded amplifiers.
2.3 Explain the construction and working of RC-coupled amplifier.
2.4 Discuss the characteristics of RC-cooped amplifier.
2.5 Draw the equivalent circuit for RC-cooped amplifier.
2.6 Calculate Zi, Zo, Ai, Av and Ap for RC-coupled amplifier(using formula).
2.7 Draw the frequency response curve for an RC-coupled amplifier.
2.8 Explain the frequency response of an RC-coupled amplifier.
2.9 List the applications of RC coupled amplifier.
2.10 Explain the working of impedance-coupled amplifier.
2.11 List the merits and demerits of the amplifier.
2.12 Draw the circuit of transformer-coupled amplifier.
2.13 Explain the construction and working transformer coupled amplifier.
2.14 Discuss the characteristics of transformer-coupled amplifier.
2.15 Draw the frequency response of transformer-coupled amplifier.
2.16 Explain the frequency of transformer-coupled amplifier.

2.17 List the applications of transformer coupled amplifier.
2.18 Explain need & principle of DC amplifiers.
2.19 Explain drift and off set voltage for DC amplifier.
2.20 Enlist merits and demerits of DC amplifiers.
2.21 List the uses of DC amplifier.

3. UNDERSTAND THE WORKING OF VARIOUS AF POWER AMPLIFIER.

3.1 Compare the voltage, current and power amplifiers.
3.2 Classify AF amplifiers.
3.3 Classify AF power amplifiers:
- i) Class-A single ended
- ii) Push-pull transformer-coupled
- iii) Push pull complementary pair
- iv) IC power amplifier

3.4 Explain the operation of single ended class-A power amplifier.
3.5 Write down the formula for efficiency of the above circuit with resistance and transformer collector loads.
3.6 List the application of class-A AF power amplifier
3.7 Describe the class B and class AB push-pull amplifiers.
3.8 Explain the working of transformer-coupled push-pull amplifier.
3.9 Explain the working of complementary pair push-pull amplifier
3.10 Compare the transformer-coupled - and complementary pair power amplifiers.
3.11 State the characteristic IC power amplifier like CA 810.
3.12 Discuss the block diagram of IC power amplifier with function of each block.
3.13 State the necessity of heat sink for power amplifiers.
3.14 List the types of heat sink.
3.15 Determine the size and type of heat sink for power transistors & power IC devices.

4. UNDERSTAND WORKING OF FEEDBACK AMPLIFIERS

4.1 Understand the function of feed back and operational amplifier.
- 4.1.1 List the problems faced in amplifier without feedback with reference to distortion, instability and bandwidth.
- 4.1.2 Explain the principle of negative feedback in amplifiers.
- 4.1.3 Discuss the effect of negative feedback on amplifier:
  - i) Gain
  - ii) Bandwidth
  - iii) Distortion
  - iv) Stability
- 4.1.4 Classify different type of negative feedback amplifiers .
- 4.1.5 Compare the characteristics of different negative feedback amplifiers.

4.2 Understand the working and application of differential amplifier.
- 4.2.1 Draw the circuit diagram of a differential amplifier.
- 4.2.2 Explain the working of Differential amplifier
- 4.2.3 Discuss the characteristic of differential amplifier
- 4.2.4 List the application of differential amplifier

5. UNDERSTAND THE WORKING OF R.F AMPLIFIERS.

5.1 Describe requirement of R.F amplifier

5.2 Names different methods of coupling in R.F amplifier.
5.3 List the applications muti-stage RF amplifiers.
5.4 Draw the circuit diagram of class C power amplifier with tunned load.
5.5 Explain the working of class C power amplifier using tunned load.
5.6 Draw the circuit diagram of grounded base R.F amplifier.
5.7 Explain the working of grounded base R.F amplifier.
5.8 Explain feedback in R.F amplifiers.
5.9 Explain regeneration and de-generation in feed back amplifier.
5.10 List the common faults that occur in R.F. amplifier.

6. UNDERSTAND OPERATION OF I.F AMPLIFIER.

6.1 Understand the working of single stage and multistage IF amplifier.

6.1.1. Describe need and requirement of I.F. amplifier.
6.1.2 Draw the circuit, diagram of single stage I.F. amplifier.
6.1.3 Explain the working principle of single stage I.F. amplifier.
6.1.4 Draw the circuit diagram of multistage I.F. amplifier.
6.1.5 Explain the working of multistage I.F. amplifier.
6.1.6 Compare the characteristics of single stage with multi stage I.F. amplifier.

6.2 Understand neutralization in IF amplifier.

6.2.1 Define the term neutralization.
6.2.2 Discuss the method to implement neutralization in IF amplifier.
6.2.3 List common faults that occur in I.F. amplifier.

7. OSCILLATORS.

7.1 To understand the types and working of oscillators.

7.1.1 Define an oscillator.
7.1.2 Enlist the basic requirements of an oscillator.
7.1.3 Explain conditions for an amplifier to work as an oscillator.
7.1.4 Classify the oscillator circuits.
7.1.5 Explain the working of R C phase shift & Wien bridge oscillators.
7.1.6 Explain the working of Hartley and colpitis oscillators.
7.1.7 Explain the working of crystal and tuned collector oscillators.
7.1.8 Explain the working of pulse-tone oscillator using 555 timer.
7.1.9 Explain the working of voltage controlled oscillator.
7.1.10 Enlist the sources of instability of an oscillator.
7.1.11 Explain the method of oscillator stability.
7.1.12 Enlist the applications of oscillators.

8. OPERATIONAL AMPLIFIER (LINEAR INTEGRATED CIRCUIT).

Understand the working and applications of operational amplifier.

8.1.1List of available Opamp IC
8.1.2 Draw the block diagram and symbol for an operational amplifier (OP AMP).
8.1.3 Identify the function of each block of an OP AMP.
8.1.4 List ten important OP AMP parameters.
8.1.5 Define the terms (a) bias current (b) offset voltage for an OP AMP.
8.1.6 Explain the method of bias current compensation for an OP AMP.
8.1.7 Draw inverting and non-inverting amplifier using op amp.
8.1.8 Explain the inverting and non-inverting amplifier.
8.1.9 Identify the virtual ground point of an OP AMP for calculating gain.

8.1.10 Derive expression for voltage gain of both types of amplifiers discussed under 8.1.7.
8.1.11 Sketch a voltage follower circuit using an OP AMP.
8.1.12 Explain the working of an OP AMP comparator.
8.1.13 List the applications of OP AMP (741 OP AMP).

9. UNDERSTAND TYPES AND WORKING OF MULTIVIBRATOR CIRCUITS.

9.1 Define the term "multivibrator (MV)."
9.2 Enlist the types of multivibrators.
9.3 Draw the circuit of a collector-coupled monostable MV.
9.4 Explain the working of collector-coupled monostable MV.
9.5 List methods of triggering a transistor monostable MV.
9.6 Sketch the circuit of collector triggering using an additional transistor.
9.7 Explain the collector triggering action of a monostable MV.
9.8 Draw the circuit of an emitter-coupled monostable MV.
9.9 Explain the operation of an emitter-coupled monostable MV.
9.10 Compare emitter-coupled and collector -coupled MV circuits.
9.11 Sketch three circuit of an op-amp monostable MV.
9.12 Explain the operation of an op-amp monostable MV.
9.13 Draw the circuits of collector-coupled and emitter-coupled stable multivibrator.
9.14 Explain the operation of the above stable multivibator circuits.
9.15 Draw the circuit of an op-amp stable MV .
9.16 Explain the operation of an op-amp stable MV.
9.17 Draw the circuits of monostable and stable Mvs using an IC voltage comparator.
9.18 Explain briefly the above circuits of monostable & stable MVs.
9.19 Use the 555 timer as monostable & stable MVs.

10. RAMP, PULSE & FUNCTION GENERATOR.

10.1 Understand the methods of ramp generation.
10.1.1 Enlist the methods of ramp generation.
10.1.2 Explain the working of RC ramp generator with its merits and demerits.
10.1.3 Explain the working of constant current ramp generator.
10.1.4 Explain the working of a UJT relaxation oscillator followed by an integrator.
10.1.5 Explain the working of bootstrap ramp generator.
10.1.6 Explain the operation of Miller ramp generator.

10.2 Understand the function of pulse and function generators.

10.2.1 Explain pulse generation by using square wave generator and a monostable multivibrator.
10.2.2 Explain the working of op-amp function generator .
10.2.3 Explain the working of IC function generator.

11. UNDERSTAND THE COMPARATOR AND SCHMITT TRIGGER CIRCUITS AND THEIR APPLICATIONS.

11.1 Define comparator & Schmitt trigger.
11.2 Explain the operation of diode and transistor comparator.
11.3 Explain transistor Schmitt trigger.
11.4 Explain the working of op/amp and IC Schmitt trigger circuit.
11.5 Explain the working of IC voltage comparator.

El.TR. 225 ANALOG ELECTRONICS

Practical: 192 Hours.

LIST OF PRACTICAL:

1. Study the parameters of BJTs with the help of data sheet.
2. Study the parameters of FETs with the help of data sheet.
3. Plot the characteristics curves for a common source FET amplifier.
4. Demonstrate MOSFET as a switch and study the performance .
5. Assemble a single stage transistor amplifier and measure voltage gain of class A amplifier.
6. Plot the frequency response of class A transistor amplifier
7. Assemble a class A power amplifier and measure its power gain.
8. Assemble a CE Amplifier circuit and study its characteristics.
9. Assemble a CC Amplifier circuit and study its characteristics.
10. Assemble a CB Amplifier circuit and study its characteristics.
11. Assemble a CD Amplifier circuit and study its characteristics.
12. Assemble a CS Amplifier circuit and study its characteristics.
13. Assemble a CG Amplifier circuit and study its characteristics.
14. Assemble a 25-W and 50-W power amplifier using IC amplifiers.
15. Measurement the power, distortion, gain and efficiency the previously assembled IC power amplifier.
16. Assemble a transistorized regulated low voltage (12- V) 1-A power supply and study its voltage regulation.
17. Study the frequency response of directed coupled audio amplifier and calculate its bandwidth.
18. Study the frequency response of R.C coupled audio amplifier and calculate its bandwidth.
19. Study the frequency response of transformer coupled amplifier and calculate its bandwidth
20. Assemble a R.F amplifier and measure its voltage gain..
21. Assemble and study the class C operation of RF amplifier and measure its power output.
22. Study the frequency response of R.C-coupled R.F amplifier.
23. Study the frequency response of impedance-coupled RF amplifier.
24. Study the frequency response of transformer-coupled RF amplifier.
25. Study of frequency response of R.F amplifier using tuned load.
26. Assemble a RC Phase Shift oscillator and study its working.
27. Assemble a Hartley oscillator and study its working.
28. Assemble a Colpite oscillator and study its working.
29. Assemble a Crystal oscillator and study its working.
30. Assemble a Pulse-tone oscillator by using 555 IC and study its working.
31. Consult data sheet for opamps.
32. Demonstrate the working of an operational amplifier.
33. Study the characteristics of OP Amp.
34. Draw the frequency response of an opamp.
35. Construct Non-Inverting amplifier with the help of Op-Amp. and study its operation.
36. Construct Inverting amplifier with the help of Op-Amp. and study its operation.
37. Construct an Op-Amp Summer and study its operation.
38. Construct an Op-Amp Unity follower and study its operation.
39. Construct an Op-Amp Multiplier and study its operation.
40. Construct an Op-Amp Integrator and study its operation.
41. Construct an Op-Amp Differentiator and study its operation.
42. Construct an Op-Amp Comparator and study its operation.

43. Study the working of an emitter-coupled stable multivibrator.
44. Assemble an emitter-coupled monostable multivibrator.
45. Study the method of pulse width control of monostable MV.
46. Assemble a bistable multivibrator with collector triggering.
47. Construct a astable multivibrator with the help of 555 IC and study its output wave form.
48. Construct a monostable multivibrator with the help of 555 IC and study its output wave form.
49. Study the behavior of RC differentiator and integrator circuits for step, square, and pulse input.
50. Study the performance of RC Ramp generator.
51. Study the performance of a constant current sweep generator.
52. Assemble a UJT Relaxation oscillator and observe its output wave forms.
53. Assemble a bootstrap ramp generator.
54. Assemble a Miller integrator ramp generator.
55. Study the function of Op-amp function generator.
56. Study the function of IC function generator.
57. Assemble a diode comparator and study its working.
58. Assemble a transistor comparator and study its working.
59. Construct a Schmitt trigger using OP AMP.

El.TR. 233(Rev.) ELECTRICAL INSTRUMENTS & MEASUREMENTS

T	P	C
2	3	3

TOTAL CONTACT HOURS:
Theory: 64 Hours
Practical: 96 Hours

Prerequisite: Electrical Circuits, Electronics Devices and Mathematics

AIMS 1. To understand the working principle, types, and construction of different analog and digital instruments and their accessories.
2. To Manipulate skills of proper selection, use, handling, maintaining and repairing of various electrical and electronic instruments.

COURSE CONTENTS

1. Identify the different electrical meters.
2. Identify the various electronic instruments.
3. Describe the functions of each measuring instrument.
4. Use the most proper measuring instrument for a given job.
5. Perform measurements using test instruments.
6. Observe proper safety and care in using measuring instruments.
7. Calibrate measuring instruments.
8. Mend/ repair defective measuring instruments.

1. MEASUREMENTS AND ERRORS. (02 Hours)
- 1.1 Precision of measurements.
- 1.2 Types of errors.
- 1.3 Accuracy rating of instruments.
- 1.4 Application of the concepts .

2. INDICATING INSTRUMENTS. (07 Hours)
- 2.1 Introduction to meters.
- 2.2 D`Ansonval Meter movements
- 2.3 Ammeters, millimeters, micrometer and shunts.
- 2.4 Shunt calculations.
- 2.5 Voltmeter, multiplier and sensitivity.
- 2.6 Basic Ohmmeter (Conversion of ammeter into ohmmeter)
- 2.7 Ac meters (rectifier, moving iron-vane, electrodynamometer, thermocouple and clamp-on type)

3. VOLT-OHM MILLIAMMETER (VOM). (03 Hours)
- 3.1 Basic requirements.
- 3.2 Ranges and Subfunctions.
- 3.3 Basic types of Volt-Ohm-Milliammeter.
- 3.4 Application.

4. TRANSISTOR VOLTMETER. (03 Hours)
- 4.1 Basic BJT TVM .

4.2 Basic FET TVM.
4.4 Application.

5. BRIDGES AND BRIDGE-TYPE EQUIPMENT. (07 Hours)

5.1 Introduction.
5.2 Whetstone bridge and Guarded Whetstone Bridge.
5.3 AC bridges (magnitude and phase balancing).
5.4 Maxwell bridge.
5.5 Hay bridge
5.6 Schering bridge
5.7 Wien bridges.
5.8 Universal bridge.
5.9 Q meter
5.10 LC meter.

6. SIGNAL GENERATORS. (08 Hours)

6.1 Review of oscillator circuit operation.
6.2 AF generator.
6.3 RF generator.
6.4 AM generator.
6.5 FM generator.
6.6 Sweep / Marker Generator.
6.7 Square and Pulse generator.
6.8 Function generator.
6.9 TV pattern generator.

7. OSCILLOSCOPES. (07 Hours)

7.1 Theory and operation.
7.2 Single/dual trace (general purposes).
7.3 Triggered Sweep.
7.4 Introduction of Storage and Sampling
7.6 Vector Scope
7.5 Curve tracer
7.6 Storage Oscilloscope

8. DIGITAL INSTRUMENTS. (07 Hours)

8.1 Digital Voltmeter
8.2 Digital Multimeter
8.3 Frequency Counter
8.4 Digital LCR meter.
8.5 Digital I.C. tester.
8.6 Signal Tracer
8.7 X- Y Recorder

9. ANALYZERS. (04 Hours)

9.1 Logic Analyzer
9.2 Spectrum Analyzer
9.3 Signature Analyzer
9.4 Application

10. MISCELLANEOUS TEST INSTRUMENTS. (04 Hours)

10.1 Wattmeter, electro-dynamometer type

10.2 Energy meter, induction type
10.3 Watt meter, RF
10.4 V U meter
10.5 Sound level meter
10.6 Field strength meter
10.7 Dip meter

11. PROBES. (04 Hours)

11.1 High Voltage probes
11.2 RF probes
11.3 Logic probes
11.4 Logic pulser
11.5 Logic clip
11.6 Application

12. CALIBRATION OF INSTRUMENTS (04 Hours)

12.1 Standards of Calibration.
12.2 Techniques of Calibration.
12.3 Report of Calibration.

13. VIRTUAL INSTRUMENTATION. (04 Hours)

13.1 Introduction of Virtual Instrumentation.
13.2 Virtual Instrumentation Architecture.
13.3 Applications of Virtual Instrumentation.

TEXT & REFERENCE BOOKS.

1. Cycle N. Herrick Instruments & Measurement for Electronics.
2. Bernard Grob & Milton Kiver, Application of Electronics
3. Malvino, Electronic Instrumentation Fundamentals

El.TR. 233(Rev.) ELECTRICAL INSTRUMENTS & MEASUREMENTS

INSTRUCTIONAL OBJECTIVES.

1. UNDERSTAND PURPOSE AND TERMINOLOGY OF MEASUREMENT.

1.1 Define the terms: Instrument, Accuracy, Precision, Sensitivity, Resolution and Error.
1.2 Differentiate accuracy from precision.
1.3 List four sources of errors in instruments.
1.4 Describe the three general classes of errors in measurements.

2. TO UNDERSTAND THE CONSTRUCTION, WORKING AND USES OF DC AND AC METERS.

2.1 List the types of indicating instruments.
2.2 Draw and label the constructional elements of different types (types of magnets and suspensions) of permanent magnet moving coil (PMMC) mechanism.
2.3 Explain the working of PMMC (D'Arsonval) movement.
2.4 Compare the external magnet construction with core magnet for PMMC mechanism.
2.5 Compare a taut band suspension with the suspension with the jewel bearing mounting of moving coil.
2.6 Identify the function of swamping resistor.
2.7 List the merits and demerits of PMMC mechanism.
2.8 Enlist the uses of (PMMC) mechanism.
2.9 Identify the constructional features and importance of zero-centered galvanometer movement.
2.10 Identify the function of PMMC galvanometer as dc micro-ammeter.
2.11 Explain the function of shunt resistor to extend the range of micro-ammeter to milli-ammeter and ammeter.
2.12 Derive the formula to find the value of shunt resistor, Rs= Rm.Im / (I- Im).
2.13 Compute the value of shunt resistance for a desired extension in range.
2.14 Draw the circuit of a multi-range ammeter using universal or Ayrton shunt.
2.15 List three precautions to be observed in using a DC ammeter.
2.16 Enlist the uses of DC ammeter.
2.17 Identify the function of multiplier resistor.
2.18 Derive the formula to find the value of multiplier resistance, Rm = (V- Im Rm)/ Im.
2.19 Compute the value of multiplier resistor for a desired f.s.d. of DC volts using above formula.
2.20 Draw a circuit arrangement of a multi-range voltmeter using multiplier resistors.
2.21 Explain the sensitivity and load effect of a voltmeter.
2.22 List the precautions in using DC Voltmeter.
2.23 List the uses of DC voltmeter.
2.24 List the method of measuring a resistance.
2.25 Explain the voltmeter-ammeter method of measuring resistance.
2.26 Draw the circuit of a basic Ohmmeter.
2.27 Explain the working of a basic Ohmmeter.
2.28 List the uses of Ohmmeter.
2.29 List the classes of AC meters.
2.30 Name the type of instrument mechanism used for each class of AC meter.
2.31 Draw the schematic diagram a rectifier type AC meter.
2.32 Explain the working of rectifier type AC meter.

2.33 Describe the working principle of a clamp-on AC meter.
2.34 Explain the working principal of moving iron-vane mechanism.
2.35 Draw the schematic diagram of an electrodynamometer movement.
2.36 Compare the rectifier, moving iron-vane and electrodynamometer type AC meter.
2.37 Draw the schematic diagram of a basic thermocouple instrument.
2.38 Explain the working of thermocouple instrument.
2.39 List the uses of above four types of AC meters.

3. UNDERSTAND THE IMPORTANCE, TYPES AND CONSTRUCTION OF VOLT-OHM-MILLIAMMETER.

3.1 Identify the importance of volt-ohm milliammeter (Multimeter)
3.2 Draw and label the block diagram showing three functions of multimeter (VOM).
3.3 List the types of volt-ohm-milliammeter.
3.4 Describe the faction of operating controls and scales of a typical VOM.
3.5 Identify the meter protections in an analog VOM
3.6 Describe the use of VOM in making:
  a. Voltage measurement (AC + / - and DC)
  b. Current measurement.
  c. Decibel measurement

4. UNDERSTAND THE TYPES, CONSTRUCTION AND WORKING OF TVM, UNDERSTAND THE WORKING OF ELECTRONIC VOM.

4.1 Draw the schematic diagram of basic BJT input TVM.
4.2 Explain the working of BJT input TVM.
4.3 Draw the schematic diagram of basic FET input TVM.
4.4 Explain the working of FET input TVM.
4.5 Compare the FET input TVM with BJT input TVM.
4.6 Draw the schematic diagram of BJT bridge TVM.
4.7 Explain the working of BJT bridge TVM.
4.8 Draw the schematic diagram of FET bridge TVM.
4.9 Explain the working of FET bridge TVM.
4.10 Compare the BJT bridge TVM with FET bridge TVM.
4.11 List the applications of TVM.
4.12 List important considerations in choosing a voltmeter.
4.13 List the major elements of an electronic VOM.

5. UNDERSTAND THE CONSTRUCTION AND WORKING OF BRIDGE -TYPE TEST INSTRUMENTS.

DC Bridges

5.1 Draw the circuit diagram of Wheatstone bridge.
5.2 Explain the working of Wheatstone bridge.
5.3 Identify the function of Guard terminal in a Guarded Wheatstone bridge.
5.4 List the applications of Wheatstone bridge

AC Bridges

5.5 List the electrical quantities measured by an AC bridge.
5.6 Draw the general diagram of an AC bridge.
5.7 State the balance (Magnitude and Phase) equation for a general AC bridge.
5.8 Draw the schematic diagram of Maxwell Bridge.
5.9 Describe the procedure of balancing Maxwell bridge

5.10 Derive the balance equation of Maxwell bridge to find the unknown inductance.
5.11 Draw the schematic diagram of Hay bridge
5.12 Drive the equation to find the unknown inductance.
5.13 Draw the schematic diagram of Schering bridge.
5.14 Write the balance equation for Schering bridge to find Cx, p.f, D and Q of series RC circuit.
5.15 Draw the schematic diagram of Wien bridge.
5.16 Describe the procedure of balancing Wien bridge to find the value of unknown frequency of a signal.
5.17 List the application of Wien bridge.

Q & LC meters and Universal Bridge

5.18 Draw the schematic diagram of basic Q-meter.
5.19 Explain the working of Q-meter.
5.20 Draw a block diagram of LC meter.
5.21 Identify the function of each block of LC meter.
5.22 Describe the universal bridge.
5.23 Enlist the control and scales of universal bridge.

6. SIGNAL GENERATORS.

6.1 Understand the basics and need of a signal generators.

6.1.1 Describe the need and the basic requirements of a signal generator.
6.1.2 List the major types of signal generators used for electronics testing and troubleshooting.
6.1.3 List the desired characteristics common to all the signal generators.

6.2 Understand the construction and working of AF generator.

6.2.1 Identify the similarities and differences between an audio oscillator and audio generator.
6.2.2 List the types of Oscillators.
6.2.3 Draw the schematic diagram of RC Wien bridge oscillator.
6.2.4 Explain the working of Wien Bridge Oscillator.
6.2.5 Identify the functions of controls and indicators of AF Generator.
6.2.6 List the applications of AF generator.

6.3 Understanding the construction and working of RF Generator.

6.3.1 Draw the basic circuit of a shop type RF generator.
6.3.2 Explain the working of the RF generator.
6.3.3 Identify the functions of each control and indicator of RF Generator.
6.3.4 List the applications of RF generator.

6.4 Understand the construction and working of AM & FM generators.

6.4.1 Draw the block diagram of an AM generator.
6.4.2 Identify the function of each block of an AM generator.
6.4.3 List the applications of AM generator.
6.4.4 Draw the basic diagram of FM generator.
6.4.5 Describe the function of FM generator.
6.4.6 List the applications of FM generator.

6.5 Understand the construction and working of sweep, marker and pulse generators.

6.5.1 Draw the block diagram of sweep generator.
6.5.2 Describe the function of each block of sweep generator.
6.5.3 List the types of voltage sweep generations.
6.5.4 Enlist the applications of sweep generator.
6.5.5 Draw the block diagram of marker generator.
6.5.6 Describe the function of each block of the marker generator.
6.7.7 Identify the purpose of marker generator controls and indicators.
6.5.8 List the two basic methods for injection of marker signal into sweep generator.
6.5.9 Enlist the applications of marker generator.
6.5.10 List the methods of square wave generation.
6.5.11 Draw the block diagram of a square wave generator.
6.5.12 Explain the function of each block of the square wave generator.
6.5.13 Draw the block diagram of pulse generator using square wave generator and monostable multivibrator.
6.5.14 Explain the working of a pulse generator.
6.5.15 List the applications of square wave and pulse generator.
6.5.16 Draw the schematic diagram of an OP-AMP Function generator.
6.5.17 Explain the working of the Function generator.
6.5.18 Draw the functional diagram of IC function generator.
6.5.19 Identify the function of each block of IC function generator.

6.6 Understand the construction of TV pattern and special effects generators.

6.6.1 Explain the need of TV pattern generator.
6.6.2 Describe the working of TV pattern generator using a block diagram.
6.6.3 Enlist special effect generator.
6.6.4 State uses of special effect generator.

7. OSCILLOSCOPE (CRO).

7.1 Understand the working principle, types and applications of oscilloscope.

7.1.1 List the four fundamental parameters that may be represented by an oscilloscope.
7.1.2 Sketch a cathode ray tube (CRT) and label the most important parts.
7.1.3 Describe the function of each part of a CRT.
7.1.4 Sketch the control circuit of a CRT.
7.1.5 Explain the purpose of each control of CRT.

7.2 General Purpose Oscilloscope.

7.2.1 Draw the block diagram of general purpose oscilloscope.
7.2.2 Explain the function of each block of the oscilloscope.
7.2.3 Draw the block diagram of vertical section of an oscilloscope.
7.2.4 Explain the function of each block of vertical section of CRO.
7.2.5 Describe the purpose of delay line in the vertical section of a CRO.
7.2.6 Draw the block diagram of the horizontal section of a CRO.
7.2.7 Explain the function of each block of horizontal section of a CRO.
7.2.8 Define the terms: fluorescence, phosphorescence, persistence, luminance, graticules and deflection sensitivity.
7.2.9 Identify the function of a sweep generator in an oscilloscope.
7.2.10 List the types of sweep generator used in oscilloscopes.

7.2.11 Identify the differentiator circuit following a clipper in the sync section of a CRO.
7.2.12 Identify the action of Schmitt trigger circuit in a triggered oscilloscope.
7.2.13 List the application for which triggered sweep is superior to a recurrent type of sweep.

7.3 Dual Trace Oscilloscope

7.3.1 Describe the importance of dual trace oscilloscope.
7.3.2 Differentiate a dual beam CRT from a dual trace CRT.
7.3.3 Conversion single trace into a dual trace display.
7.3.4 Explain the working of electronic switch circuit for a dual trace display.
7.3.5 List the controls and connectors of a shop oscilloscope.
7.3.6 Describe the function of each control and connector of a shop CRO.
7.3.7 List the applications of CRO.

7.4 Storage Oscilloscope

7.4.1 Identify the purpose of storage oscilloscope.
7.4.2 List the types of storage CRT.
7.4.3 Draw and label the simplified diagram of storage CRT.
7.4.4 Explain the function of each part of a storage CRT.
7.4.5 Identify the function of writing and flood guns in a storage oscilloscope.
7.4.6 Describe the method of erasing a target of a storage oscilloscope.
7.4.7 Describe the function of controls and connectors of a storage oscilloscope
7.4.8 Enlist the advantages of storage oscilloscope.

7.5 Sampling Oscilloscope

7.5.1 Identify the importance of sampling oscilloscope.
7.5.2 Sketch and label the block diagram of a random sampling oscilloscope.
7.5.3 Describe the function of each block of the above diagram.

7.6 Vector Scope

7.6.1 Identify the function of Vector scope to check a color TV receiver's response.
7.6.2 Describe the use of conventional oscilloscope as a vector scope.

7.7 Curve Tracer

7.7.1 Identify the function of a modern curve tracer.
7.7.2 Draw the block diagram of a transistor curve tracer.

8. DIGITAL INSTRUMENTS.

8.1 Understand the operation and applications of digital meters.

8.1.1 List the major types of digital test instruments.
8.1.2 Enlist the types of digital voltmeter (DVM).
8.1.3 Illustrate the voltage-to-time conversion principle of ramp-type DVM.
8.1.4 Draw the block diagram of ramp-type DVM.
8.1.4 Identify the function of each block of the ramp-type DVM.
8.1.5 Draw the block diagram of staircase ramp type DVM.
8.1.6 Identify the function of its each block.

8.1.7 Draw the block diagram of dual-slope type DVM.
8.1.8 Explain the function of its each block.
8.1.9 Compare the above three types of DVMs.
8.1.10 Draw the block diagram of dual-slope type digital multimeter.
8.1.11 Identify the function of its each block.
8.1.12 Draw the block diagram of digital LCR meter.
8.1.13 Identify the function of its each block.
8.1.14 Identify the function of each control of DVM and digital multimeter

8.2 Understand the working and uses of electronic counters.

8.2.1 Define the term "Electronic Counter"
8.2.2 Draw the block diagram of basic counter.
8.2.3 Identify the blocks of basic counter involved in frequency measurement operation.
8.2.4 Draw the basic counter block diagram for period measurement operation.
8.2.5 Explain the working of basic counter for frequency and period measurements.
8.2.6 Identify the function of panel controls and indicators of electronic counter.

8.3 Understand the function of digital IC tester.

8.3.1 Draw the block diagram of digital IC tester.
8.3.2 Explain the operation of each block of digital IC tester.
8.3.3 Explain the application of digital IC tester.

8.4 Understand the function of Signal Tracer.

8.4.1 Draw the block diagram of Signal Tracer.
8.4.2 Explain the operation of each block of Signal Tracer..
8.4.3 Explain the application of Signal Tracer..

8.5 X-Y Recorders

8.5.1 List the two basic types of recorders used as electronic test equipment.
8.5.2 Draw the block diagram of a basic strip or roll chart recorder system.
8.5.3 Describe the working of strip chart recorder.
8.5.4 Draw the block diagram of a basic X-Y recorder or plotter system.
8.5.5 Describe the function of each block of X-Y recorder.

9. ANALYZERS.

9.1 Understand the function of Spectrum Analyzer.

9.1.1 Draw the block diagram of spectrum analyzer.
9.1.2 Explain the function of each block of spectrum analyzer.
9.1.3 Enlist the application of spectrum analyzer.

9.2 Understand the working of logic and signature analyzers.

9.2.1 Draw the block diagram of logic analyzer
9.2.2 Explain the operation of each block of logic analyzer.
9.2.3 Identify the function of the controls & indicators of the analyzer.
9.2.4 List the application of logic analyzer
9.2.5 Draw the block diagram of signature analyzer.
9.2.6 Explain the function of each block of signature analyzer.
9.2.7 Identify the function of the controls & indicators of the analyzer.

9.2.8 List the application of signature analyzer

10. MISCELLANEOUS INSTRUMENTS.

10.1 Understand electrical power & energy meters.

10.1.1 Draw the schematic diagram of electrodynamometer type watt meter.
10.1.2 Explain the working of the watt meter.
10.1.3 Draw the circuit diagram of induction type energy meter.
10.1.4 Explain the working of energy meter.

10.2 Understand the working of RF power meter.

10.2.1 Draw the diagram of RF watt meter
10.2.2 Explain the operation of RF watt meter
10.2.3 List the uses of RF watt meter

10.3 Understand the function of level and field strength meters.

10.3.1 Draw the block diagram of VU meter.
10.3.2 Explain the operation of each block of VU Meter.
10.3.3 List the applications of VU Meter.
10.3.4 Draw the block diagram of sound level meter
10.3.5 Explain the operation of each block of sound level meter
10.3.6 Explain the application of sound level meter
10.3.7 Draw the block diagram of field strength meter.
10.3.8 Explain the operation of each block of field strength meter.
10.3.9 List the applications of field strength meter.

10.4 Understand the function of Dip meter.

10.4.1 Draw the schematic diagram of a dip meter.
10.4.2 Describe the working of a dip meter circuit.
10.4.3 List the applications of dip meter.

11. PROBES .

11.1 Understand the working of meter and scope probes.

11.1.1 List the major types of meter and scope probes.
11.1.2 Draw the circuit diagram of low capacitance probe.
11.1.3 Explain the function of low capacitance probe.
11.1.4 Draw the circuit diagram of high voltage probe (resistance & capacitance types).
11.1.5 Explain the working of high voltage probe.
11.1.6 Draw the circuit diagram of RF probe .
11.1.7 Explain the function of RF probe.
11.1.8 Draw the block diagram of a basic logic probe. .
11.1.9 Explain the working of basic logic probe.
11.1.10 Draw the block diagram of a simple logic pulser.
11.1.11 Explain the working of logic pulser.
11.1.12 List the applications of logic probe and pulser.
11.1.13 Explain the working of logic clip.

12. Understand the need and Methods of Calibration of Measuring Instruments.

- 12.1 Explain Standards of Calibration of Measuring Instruments.
- 12.2 Explain the techniques of calibration of Measuring Instruments.
- 12.3 Describe the report of calibration of Measuring Instruments.
- 12.4 Explain the common faults in Digital Instruments with their symptoms, causes and remedies.

13. Understand the need, architecture and applications of Virtual Instrumentations.

- 13.1 Describe the need of Virtual Instrumentation.
- 13.2 Discuss architecture of Virtual Instrument.
- 13.3 Discuss sensor, computing and processing modules.
- 13.4 Describe applications of Virtual Instrumentations.

El.TR. 233(Rev.) ELECTRICAL INSTRUMENTS & MEASUREMENTS

LIST OF PRACTICAL: **96 Hours.**

1. Study the construction of permanent magnet moving coil meter.
2. Conversion of micrometer to milliammeter and ammeter using shunts.
3. Conversion of ammeter into voltmeter using multiplier resistance.
4. Conversion of ammeter into ohmmeter.
5. Study and use of transistor voltmeter.
6. Study and use of transistor tester for the testing for different semiconductor devices.
7. Study of whetstone bridge and its use to measure unknown resistor.
8. Study of universal bridge and its use to measure unknown inductances and capacitances.
9. Use digital LCR meter to measure the unknown values of L, C and R.
10. Study of oscilloscope controls and connectors.
11. Use of oscilloscope in measuring voltage, frequency, phase shift
12. Study of different stages of CRO and their identification. Study and use of storage and sampling oscilloscopes.
13. Use of A.F. generator and measurement of its output wave with CRO.
14. Use wattmeter to measure single phase a-c power.
15. Use of frequency counter to measure unknown frequency.
16. Use of sound level meter.
17. Use of Q meter to measure Q factor of a circuit
18. Use of X-Y recorder.
19. Use of clamp-on meter to measure AC current.
20. Measure high tension voltage of a CRT using high voltage probe.
21. Test logic signals using logic probe/logic clip and logic pulser.
22. Study the working of digital circuits using a logic analyzer.
23. Demonstrate voltmeter test and calibration:
    i) against a standard voltmeter.
    ii) using the balance method.
24. Demonstrate the analog ammeter calibration by:
    i) using precision resistance & precision voltmeter.
25. Check an AF generator for:
    i) frequency stability.
    ii) output uniformity

iii) attenuator action

iv) output hum

v) output distortion

vi) load sensitivity

26. Check oscilloscope for voltage calibration with:

i) external DC and AC

ii) internal AC

iii) internal square wave

27. Locate & rectify common faults in meters (available in Lab)

28. Locate & rectify common faults in Oscilloscope.

29. Locate & rectify common faults in digital instruments (available in Lab)

30. Locate & troubleshoot common faults in bridges and analyzers.

31. Use virtual instruments for the measurement of voltage and current.

32. Use virtual instruments for the measurement of frequency and time period.

El.TR. 243 (Rev.): ELECTRICAL MACHINES

T	P	C
2	3	3

Total Contact Hours:

Theory: 64 Hours.
Practical: 96 Hours.

Pre-requisites: Electrical Circuits

AIMS: After studying the subject the students will be able to understand the construction, working and application of DC and AC machines.

Define laws of electromagnetic induction
Explain the function of dc generator
Describe the principle of dc motor
Identify the types of dc generators and dc motors
List of applications of dc motors in the electronics field
Describe the working of alternator
Explain the function of three phase as motor
List of types of single phase as motor
Identify the working principle of various types of single phase as motor
Explain the function of special ac motors

1. ELECTROMAGNETIC INDUCTION (04 Hours)

1.1 Review of Faraday's Law and Lenz's Law
1.2 Principle of simple loop generator

2. DC GENERATOR (10 Hours)

2.1 Construction
2.2 Field and armature winding and commutator
2.3 EMF Equation,
2.4 Simple calculations
2.5 Types and brief description of dc generator,
2.6 Methods of excitation and their characteristics

3. DC MOTOR (12 Hours)

3.1 Principle and construction of dc motor
3.2 Back emf, cause and effect
3.3 Torque Equation of dc motor and simple problems
3.4 Types of dc motors, fractional h.p & miniature dc motor
3.5 Methods and need of motor starters

4. ALTERNATOR (10 Hours)

4.1 Construction of alternator,
4.2 Importance of stationary armature,
4.3 Comparison with DC generator
4.4 Methods of field excitation
4.5 Brief introduction to 3-Phase as generation

5. SINGLE PHASE AC MOTORS (08 Hours)

5.1 Classification of single phase ac motors
5.2 Single phase induction motor
5.3 Double field revolving concept
5.4 Split phase and capacitor start-run induction motor
5.5 Shaded pole motor

6. THREE PHASE AC MOTORS (16 Hours)

6.1 Introduction to three phase rotating magnetic field
6.2 Types of three phase ac motors
6.3 Working principle of induction motor
6.4 Types of three phase induction motors
6.5 Methods of starting and speed control of three phase induction motors
6.6 Line diagram of induction motor starters and connections
6.7 Applications/uses of three induction motors

7. SPECIAL MOTORS (04 Hours)

7.1 Stepper Motor
7.2 Servo Motor
7.3 Linear Motor

TEXT/REFERENCE BOOKS.

1. Hughes A — *Electric Motors and Drives*: *Fundamentals, Types and Applications* (Newnes, 2005) ISBN 0750647183
2. Schultz, G — *Transformers and Motors* (Newnes, 1997) ISBN 0750699485

El.TR. 243(Rev.): ELECTRICAL MACHINES

INSTRUCTIONAL OBJECTIVES.

1. UNDERSTAND FARADAY'S LAWS OF ELECTROMAGNETIC INDUCTION AND LENZ'S LAW.

1.1 Describe Faraday's law of electromagnetic induction and Lenz's law.
1.2 Explain the principle of simple loop generator.

2. DC GENERATORS.

2.1 Understand the construction and working of DC generator.
2.1 Draw the construction of DC generators
2.2 Explain the working of field and armature winding
2.3 Draw the construction of commutator
2.4 Explain the operation of commutator
2.5 Derive the E.M.F. Equation for DC generator
2.6 Solve problems based on EMF equitation
2.7 Enlist the types of DC generator
2.8 Explain the method of field excitation, and characteristics of each.

3. UNDERSTAND THE WORKING OF D.C. MOTORS.

3.1 Draw the construction of DC motor
3.2 Explain the working principle of d.c. motor
3.3 Explain back E.M.F (cause and effect of back EMF)
3.4 Write and explain the torque equation of d.c. motor.
3.5 Solve simple problems based on the torque equation of d.c. motor
3.6 Enlist the types of d.c. motors
3.7 Enlist the applications of each type of d.c motor
3.8 Describe the starting methods for d.c. motors

4. UNDERSTAND THE WORKING PRINCIPLE OF AN ALTERNATOR (AC GENERATOR).

4.1 Introduction to an alternator.
4.2 Sketch the constructional view of an alternator.
4.3 Compare an alternator with dc generator
4.4 Explain three phase AC generation.
4.5 State the conditions for parallel operation of Alternators.

5. UNDERSTAND THE WORKING PRINCIPLE , TYPES AND USES OF THREE PHASE AC MOTORS.

5.1 Describe 3-phase rotating magnetic field
5.2 Enlist the types of 3-Phase AC motors.
5.3 Enlist the types of 3-Phase induction motors
5.4 Explain the principle of induction motor
5.5 Explain the methods of starting 3- Phase induction motors.
5.6 Explain the speed control of induction motors.
5.7 Draw the line diagram of induction motor connected to a motor starter.

5.8 Explain the line diagram of induction motor connected to a starter.
5.9 Explain the remote Start and Stop of Motors.
5.10 List the uses of three phase induction motors.

6. UNDERSTAND THE WORKING PRINCIPLES, CONSTRUCTION, TYPES AND USES OF SINGLE AC PHASE MOTORS.

6.1 Classify single phase AC motor.
6.2 Draw the constructional view of single phase induction motor.
6.3 Explain the working of single phase induction motor.
6.4 Enlist the uses of single phase induction motor
6.5 Describe the uses of single phase induction motor.
6.6 Explain double field revolving concept (split phase rotating field).
6.7 Draw the construction of capacitor -start -run motor.
6.8 Explain the working of capacitor –start- run motor
6.9 Enlist the uses of capacitor start-run- motor.
6.10 Draw the construction of shaded pole motor.
6.11 Explain the working of shaded pole motor.
6.12 Enlist the uses of shaded pole motor.
6.20 Lists its uses.

7. UNDERSTAND THE TYPES, CONSTRUCTION, WORKING AND USES OF STEPPER AND SERVO MOTOR.

7.1 Draw the construction of stepper motor.
7.2 Explain the working operation of stepper motor.
7.3 List the uses of stepper motor.
7.4 Draw the construction of servo motor.
7.5 Explain the working of servo motor.
7.6 List the uses of servo motor.

El.TR. 243(Rev.) ELECTRICAL MACHINES

LIST OF PRACTICAL:

1. Verify the Faraday's Laws of electromagnetic induction by using a simple loop generator.
2. Study of main part of a d.c. generator.
3. Study of dc shunt generator
4. Study of dc series generator
5. Study of dc Compound generator
6. Measurement of Resistance of Different windings
7. Plot the O.C.C. of a d.c. shunt generator.
8. Plot the load characteristics of d.c. shunt generators.
9. Study the effect of back e.m.f. of a d.c. motor.
10. Plotting of load characteristics of d.c. series motor.
11. Starting a d.c. series and shunt motors through starters.
12. Practice speed control of d.c. series and shunt motors.
13. Study the operation of an alternator (effect of variation field excitation and rotor speed.
14. Study of rotating magnetic field.
15. Study the operation of 3-phase squirrel cage induction motor.
16. Study the operation of 3-phases synchronous motor.
17. Practice reversal of direction of rotation of 3-phase induction motor.
18. Study the line diagram of direct-on 3-phase motor starter.
19. Connect a 3-phase induction motor to supply line through a direct-on starter.
20. Study the line and connection diagram of a starter-delta starter.
21 Connect a 3-phase squirrel cage induction motor to supply line through a star-delta starter.
22. Study operation of split-phase single phase a-c motor.
23. Study the operation of capacitor-start -and-run single phase a-c motor.
24. Study the operation of shaded pole single phase motor.
25. Study the operation of a-c series motor.
26. Study the speed control of a-c series motor.
27. Study the working of miniature (reluctance and hystersis) single phase a-c motors.
28. Study the construction of stepper motor.
29. Study the operation of stepper motor.
30. Study the construction of servo motor.
31. Study the operation of servo motor.
32. Develop a control circuit with the help of servo motor.

EL.TR. 253 Communication Systems

T	P	C
2	3	3

Total contact hours:

Theory: 64 Hours.
Practical: 96 Hours.

Pre-requisites: Electrical Circuits

AIMS this subject has been designed so that the student will be able to understand the working of telephone and wireless communication.

Describe Modulation and Demodulation
Discuss Modulators and Demodulators.
Describe the principle and working of standard telephone set.
Explain Telephone exchanges.
Describe the working of fiber optics and microwave communication.
Describe satellite communication.

SPECIFIC OBJECTIVES:

1. Modulation and Demodulation (22 Hours)

1.1 Definition of Modulation and De-Modulation
1.2 Needs of Modulation and De-Modulation
1.3 Types of Modulation
1.4 AM Receiver
- 1.4.1 Essential function of a receiver. .
- 1.4.2 Principle of A.M. reception.
- 1.4.3 Block diagram of super-heterodyne receiver.
- 1.4.4 Principle of super-heterodyning.
- 1.4.5 Operation of each stage of super-heterodyne receiver

1.5 FM Receiver
- 1.5.1 Principle of F.M Microphone.
- 1.5.2 Principle of F.M reception.
- 1.5.3 Block diagram explanation of F.M receiver.
- 1.5.4 Circuit explanation of amplitude limiter.
- 1.5.5 Circuit explanation of phase discriminator.
- 1.5.6 Circuit explanation of ratio detector.

1.6 AM Transmitter
- 1.6.1 AM Transmission system (Block Diagram).
- 1.6.2 Amplitude modulation.
- 1.6.3 Analysis of AM modulated wave.
- 1.6.4 Modulation Index and Bandwidth.
- 1.6.5 Transmission Techniques, SSB, DSB with the help of block diagram.

Noise, Types of noise and its calculation.
AM modulators and types of AM modulators.
Modulated Class-C power amplifier.

FM Transmitter

1.7.1 Principles of frequency modulation.

1.7.2 Concept of Index of modulation, frequency deviation, frequency swing effect on side band and band width, bassel functions graph and application.

1.7.3 System of FM modulation block diagram.

Reactance Modulator

Phase Shift

Phasitron

1.7.4 Merits and demerits of FM.

1.7.5 Block diagram of FM transmission with automatic arrangement of controlled modulation.

1.7.6 Stereo broadcasting transmission.

1.7.7 Significance of Pre-emphasis and de-emphasis and their explanation.

2 Telephony. (10 Hours)

2.1 Introduction to telephony.
2.2 Introduction to Automatic telephone system.
2.3 Telephone Instruments, receiver, transmitter, bell.
2.4 Side tone and Anti side tone circuits.
2.5 Telephone dial and its type.
2.6 Tone dialing, TDMF (dual tone multifrequency).
2.7 Standard telephone set.
2.8 Automatic telephone exchange.
2.9 Telephone traffic & trunking principle.
2.10 NWD system block diagram.
2.11 Block diagram of NWD exchange and its function.
2.12 Introduction to gateway exchange.

3. INTRODUCTION TO DIGITAL TELEPHONE EXCHANGE. (16 Hours)
(03 Hours)

3.1 Block diagram of digital Telephone Exchange and explain each block.
3.2 Multiplexing and De multiplexing, ADC, DAC
3.3 Stored program control concept.
3.4 Advantages of computer application in telephony.
3.5 matrix switches, PABXs.
3.6 pulse code modulation (PCM)
3.7 PCM transmission system
3.8 Multiplexing, Time Division Multiplexing (TDM)
3.9 Space Division Multiplexing (SDM) or Pulse Duration Multiplexing (PDM)
3.10 Frequency Division Multiplexing and Demultiplexing
3.11 PCM based PABXs
3.12 Digital Switching Time Switching and Space switching.
3.13 Data Communication.
3.14 Modem, Fax Machine
3.15 Internet Communication.
3.16 VoIP

4. Fiber Optics. (08 Hours)

4.1 Optical Fiber for light wave communication.
4.2 Propagation Mode

4.3 Fiber Optics transmission system.
4.4 Video Telephone & Video conferencing.
4.5 Merits and Demerits of Fiber Optic Communication.
4.6 Optical Transmitting and Receiving Devices
4.7 Wave Division Multiplexing

5. Satellites Communication. (08 Hours)

5.1 Block diagram of satellite communication system.
5.2 Earth Station.
5.3 Geo stationary satellites.
5.4 Telephone link via satellite.
5.5 Television Link via satellite.
5.6 Merits and Demerits of satellite communication.

TEXT AND REFERENCE BOOKS:

1. Telecommunication by Warren Hioki (ISBN # 0-13-632043-0)
2. Advance Electronics Communication System by Wayne Tomasi (ISBN # 81-297-0107-3)

ELTR. 253 Communication Systems

INSTRUCTIONAL OBJECTIVES

1. Understand Modulation and Demodulation

1.1 Define of Modulation and De-Modulation
1.2 Discuss needs of Modulation and De-Modulation
1.3 Describe types of Modulation
1.4 Understand the construction and working of A.M. radio receiver.
- 1.4.1 Identify the essential function of a radio receiver.
- 1.4.2 Know the basic concept of superheterodyne receiver.
- 1.4.3 Draw the block diagram of super heterodyne receiver.
- 1.4.4 Explain the function of each stage in a superhetrodyne radio receiver.

1.5 Understand the construction and working of F.M. radio receiver.
- 1.5.1 Describe the principle of F.M. microphone.
- 1.5.2 Describe principle of F.M. reception.
- 1.5.3 Draw block diagram of F.M. receiver.
- 1.5.4 Explain function of each stage in F.M. receiver.
- 1.5.5 Explain the working of amplitude limiter.
- 1.5.6 Draw circuit diagram of phase discriminator.
- 1.5.7 Explain the working of phase discriminator.
- 1.5.8 Explain the working of ratio detector.

1.6 Understand the construction and working of AM Transmitter
- 1.6.1 Draw the block diagram of AM Transmission system
- 1.6.2 Describe Amplitude modulation.
- 1.6.3 Analyze AM modulated wave.
- 1.6.4 Express Modulation Index and Bandwidth.
- 1.6.5 Describe Transmission Techniques, SSB, DSB with the help of block diagram.
- 1.6.6 Discuss Noise, Types of noise and solve its calculation.
- 1.6.7 Discuss AM modulators and types of AM modulators.
- 1.6.8 Discuss Modulated Class-C power amplifier.

Understand the construction and working of FM Transmitter
- 1.7.1 Discuss principles of frequency modulation.
- 1.7.2 Describe the concept of Index of modulation, frequency deviation, frequency swing effect on side band and band width, bassel functions graph and application.
- 1.7.3 Explain system of FM modulation block diagram for:
  - Reactance Modulator
  - Phase Shift
  - Phasitron
- 1.7.4 Discuss merits and demerits of FM.
- 1.7.5 Draw block diagram of FM transmission with automatic arrangement of controlled modulation.
- 1.7.6 Discuss stereo broadcasting transmission.
- 1.7.7 Describe the significance of Pre-emphasis and de-emphasis and their explanation.

2 Understand Telephony system.

2.1 Define telephony.
2.2 Understand Automatic telephone system.
2.3 Discuss Telephone Instruments, receiver, transmitter, and bell.
2.4 Describe Side tone and Anti side tone circuits.
2.5 Describe the construction and function of Telephone dial and its type.
2.6 Discuss the tone dialing, TDMF (dual tone multifrequency).
2.7 Discuss Standard telephone set.
2.8 Discuss Automatic telephone exchange.
2.9 Describe Telephone traffic & trunking principle.
2.10 Draw NWD system block diagram.
2.11 Draw Block diagram of NWD exchange and discuss its function.
2.12 Discuss the function of gateway exchange.

3. Understand the function of Digital Telephone Exchange.

(03 Hours)

3.1 Draw the block diagram of digital Telephone Exchange and explain each block.
3.2 Discuss Multiplexing and De multiplexing, ADC, DAC
3.3 Describe stored program control concept.
3.4 Discuss advantages of computer application in telephony.
3.5 Describe matrix switches and PABXs.
3.6 Explain pulse code modulation (PCM)
3.7 Explain PCM transmission system
3.8 Describe Multiplexing and Time Division Multiplexing (TDM)
3.9 Describe Space Division Multiplexing (SDM) or Pulse Duration Multiplexing (PDM)
3.10 Describe Frequency Division Multiplexing and Demultiplexing
3.11 Discuss PCM based PABXs
3.12 Describe Digital Switching Time Switching and Space switching.
3.13 Discuss Data Communication.
3.14 Discuss construction and working of Modem and Fax Machine
3.15 Discuss Internet Communication.

4. Understand the role of Fiber Optics in communication system.

4.1 Discuss the role of Optical Fiber for light wave communication.
4.2 Describe the Fiber Optics transmission system.
4.3 Express Video Telephone & Video conferencing.
4.4 Discuss merits and Demerits of Fiber Optic Communication.
4.5 Discuss Optical Transmitting and Receiving Devices
4.6 Describe Propagation Mode

5. Understand Satellites Communication.

5.1 Draw the block diagram of satellite communication system.
5.2 Discuss Earth Station.
5.3 Discuss Geo stationary satellites.
5.4 Discuss Telephone link via satellite.
5.5 Describe Television Link via satellite.
5.6 Discuss merits and demerits of satellite communication.

ELTR. 253 Communication Systems

LIST OF PRACTICALS

1. Assembly a simple A.M. radio receiver.
2. Align the assembled A.M radio receiver.
3. Assemble a F.M radio receiver.
4. Align the assembled F.M radio receiver.
5. Generation of AM double side band waveforms
6. Calculate the bandwidth and modulation index of the A.M. wave
7. Construct a transistorized class c amplitude modulator
8. Measure signal to noise ratio in A.M. signal.
9. Generation of single sideband A.M. signal.
10. Assemble a simple A.M. transmitter and observe on C.R.O.
11. Construct a reactance modulator using transistor.
12. Construct FM Modulator using varactor diode
13. Measure the frequency swing and deviation of a FM signal
14. Demonstrate a frequency modulated wave on C.R.O.
15. Demonstrate the performance of FM Transmitter using C.R.O.
16. Study the automatic frequency control circuit.
17. Study the function of pre-emphasis and de-emphasis
18. Study the working of phase shift modulator
19. Assemble a simple FM Transmitter
20. Demonstrate the parts of automatic telephone set.
21. Familiarize with the operation of Telephone Transmitter and Receiver
22. Demonstrate the parts of Digital Telephone Set.
23. Study the function of rotary and digital dials.
24. Demonstrate the operation of Telephone Buzzer.
25. Visit of a digital telephone exchange and write a report.
26. Study the operation of the PCM Transmitter.
27. Study the construction of the optical fiber cable.
28. Study the transmission & Reception with optical fiber.
29. Study digital signal transmission with optical fiber.
30. Study the different parts of a FAX machine and observe their operations
31. Visit a internet service provider station and write report.
32. Study the cordless Telephone system.

El.TR 264: DIGITAL ELECTRONICS

T	P	C
3	3	4

Total contact hours:

Theory: 96 Hours
Practical: 96 Hours

Pre-requisite: Electrical Circuits & Electronics Devices

AIM. Apply the principles of operation and function of various electronic components and devices to practical circuits.

SPECIFIC:

1. Identify various logic gates with their operation and applications.
2. Apply principles of Boolean Algebra.
3. Explain the principle of operation of Combinational and Sequential logic circuits
4. Identify the function of digital registers and counters.
5. Identify different logic families.
6. Identify different memories.
7. Understand the interfacing of Digital world with Analog world.
8. Understand Digital Troubleshooting.

COURSE CONTENTS.

1. NUMBER SYSTEM. (Review) (03 Hours)

1.1 Conversion
- 1.1.1 Binary to Decimal.
- 1.1.2 Decimal to Binary.
- 1.1.3 Hexadecimal to Binary.
- 1.1.4 Binary to Hexadecimal.
- 1.1.5 Hexadecimal to Decimal.
- 1.1.6 Decimal to Hexadecimal.

2. LOGIC GATES. (10 Hours)

2.1 Logic Gates.
- 2.1.1 Symbols, Circuits and functions of OR, AND, NOT, NAND, NOR Gates.
- 2.1.2 Truth Table and Boolean expression of each above mentioned Gates.
- 2.1.3 Creating Multiple Input Gates.

2.2 Duality of Logic Functions.
- 2.2.1 Using NOR Gates to emulate all Logic Functions.
- 2.2.2 Using NAND Gates to Emulate all Logic Functions.

2.3 The Exclusive OR and Exclusive NOR Functions.
- 2.3.1 Symbols, Circuits and functions of XOR, XNOR Gates.
- 2.3.2 Truth Table and Boolean expression of both above mentioned Gates.

3. BOOLEAN ALGEBRA. (08 Hours)

3.1 Boolean Expressions.
- 3.1.1 Boolean Expressions and Truth Tables.
- 3.1.2 Minterm Expressions, Sum of Products

3.1.3 Maxterm Expressions, Product of Sums.
3.1.4 Un-simplified Boolean Expression and Schematic Circuits

3.2 Logic Simplifications.
3.2.1 Boolean Simplification.
3.2.2 DeMorgan's Theorems.
3.2.3 Karnaugh Mapping

4. BINARY ARITHMATIC CIRCIUTS. (08 Hours)

4.1 Binary Addition
4.1.1 Half Adder Design
4.1.2 Full Adder Design
4.1.3 N bit Binary Adder Circuit

4.2 Binary Arithmetic functions with complements
4.2.1 2's and 1's Complement Notation, Addition and Subtraction.
4.2.2 Binary Subtractor Circuit
4.2.3 Binary Adder/ Subtractor Circuit.

5. COMBINATIONAL CIRCUIT DESIGN. (10 Hours)
(12 Hours)

5.1 Paradigm for Combinational Logic Problems.
5.1.1 Word Problem.
5.1.2 Construct Truth Table
5.1.3 Create a Logic Equation from a Truth Table
5.1.4 Simplify the logic Equation
5.1.5 Development of Combinational Logic Circuit

5.2 Specific Application MSI Gates
5.2.1 Level of Integration (SSI, MSI, LSI)
5.2.2 Display Drivers
5.2.3 Code Converters
5.2.3.1 BCD to Decimal
5.2.3.2 Decimal to BCD
5.2.3.3 Binary to Hexadecimal
5.2.3.4 BCD to seven segment decoder.
5.2.3.5 Decoding Circuits
5.2.3.6 Multiplexing Circuits
5.2.3.7 Demultiplexing Circuits

6. SEQUENTIAL CIRCUITS. (15 Hours)

6.1 Introduction to Sequential Logic.
6.1.1 Latches
6.1.2 RS Flip Flop
6.1.3 Clocked RS Flip Flop

6.2 JK Flip Flop
6.2.1 Operation of JK Flip Flop
6.2.2 Asynchronous Inputs
6.2.3 Synchronous Inputs

6.3 Triggers
6.3.1 Positive-Edge Trigger
6.3.2 Negative-Edge Trigger

6.3.3 Positive-Level Trigger (Latch)
6.3.4 Negative-Level Trigger (Latch)

6.4 Other Flip Flops
6.4.1 Master Slave Flip Flop
6.4.2 D type Flip Flop
6.4.3 T type Flip Flop

6.5 Flip Flop timing considerations.
6.5.1 Setup and Hold Times
6.5.2 Propagation Delays
6.5.3 Timing Limitations (Minimum Pulse Width)

6.6 Elementary applications of Flip Flops
6.6.1 Data Storage
6.6.2 Logic Synchronizing
6.6.3 Frequency Division
6.6.4 Switch Debouncing

6.7 Multivibrators.
6.7.1 555 Timer
6.7.2 555 Timer as Monostable Multivibrator (One Shot)
6.7.3 555 Timer as Astable Multivibrator (Free Running)
6.7.4 Produce Square waves with different duty cycles with a Timer.

7. SHIFT REGISTERS AND COUNTERS. (12 Hours)

7.1 Shift Register
7.1.1 Function of Shift register
7.1.2 Types of Shift registers
7.1.3 Integrated Shift register

7.2 Asynchronous Counters.
7.2.1 Discrete Ripple Counter
7.2.2 Discrete Modulus- N Ripple Counter
7.2.3 Integrated Ripple Counter (7493)

7.3 Synchronous Counter.
7.3.1 Discrete Up Counter.
7.3.2 Discrete Down Counter.
7.3.3 Discrete Modulus-Synchronous Counter.
7.3.4 Integrated 4-bit Binary Counter (74163)
7.3.5 Integrated 4-bit Up/ Down Counter (74193)

8. FAMILIES AND SPECIFICATIONS (08 Hours)

8.1 Introduction of different Logic Families
8.1.1 RTL
8.1.2 DTL
8.1.3 ECL
8.1.4 TTL
8.1.5 IIL
8.1.6 MOS
8.1.7 CMOS
8.1.8 Interfacing Different Logic Families.

8.2 Specification Sheets
8.2.1 Electronic Sites

8.2.2 Voltage Levels
8.2.3 Current Levels
8.2.4 Fan-out, Fan-in
8.2.5 Switching Characteristics- Propagation Delay, Noise Margin, Power dissipation.

9. Interfacing with Analog World (08 Hours)

9.1 Digital to Analog Conversion.
- 9.1.1 Introduction and needs
- 9.1.2 Binary weighted DAC
- 9.1.3 Ladder type DAC

9.2 Analog to Digital Conversion.
- 9.2.1 Introduction and needs ADC
- 9.2.2 Simultaneous ADC
- 9.2.3 Counter Type ADC
- 9.2.4 Dual Slope ADC
- 9.2.5 Successive Approximation ADC

10. Memory (08 Hours)

10.1 Memory Technology
10.2 General Memory Operation.
10.3 Memory Considerations
10.4 Types of Memories
- 10.4.1 ROM
- 10.4.2 RAM
- 10.4.3 SRAM
- 10.4.4 DRAM
- 10.4.5 PLDs.
- 10.4.6 Magnetic and Optical Memories

10.5 Applications in Digital systems.

11. Introduction to Digital Troubleshooting (06 Hours)

11.1 Classification of Faults
- 11.1.1 Intermittent versus Permanent
- 11.1.2 External versus Internal
- 11.1.3 Parametric versus Logic
- 11.1.4 Static versus Dynamic

11.2 Test Equipment
11.3 Static and Dynamic Measurements
11.4 Fault Localization, Fault Isolation
11.5 Testing for Dynamic Faults

TEXT /REFERENCE BOOKS:

1. Floyd "Electronic Fundamentals"
2. Floyd "Digital Fundamentals"

El.TR. 264: DIGITAL ELECTRONICS

INSTRUCTIONAL OBJECTIVES.

1. NUMBER SYSTEM.

1.1 Convert one number system to another system
- 1.1.1 Convert Binary numbers into Decimal numbers.
- 1.1.2 Convert Decimal numbers into Binary numbers.
- 1.1.3 Convert Hexadecimal numbers into Binary numbers.
- 1.1.4 Convert Binary numbers into Hexadecimal numbers.
- 1.1.5 Convert Hexadecimal numbers into Decimal numbers.
- 1.1.6 Convert Decimal numbers into Hexadecimal numbers.

2. LOGIC GATES.

2.1 Explain Logic Gates.
- 2.1.1 Draw Symbols of OR gate.
- 2.1.2 Draw Circuit of two input OR gate.
- 2.1.3 Discuss function of OR gate.
- 2.1.4 Describe Truth Table of OR gate.
- 2.1.5 Describe Boolean expression for OR gate.
- 2.1.6 Repeat instructional objectives no. 2.1.1 to 2.1.5 for AND gate.
- 2.1.7 Repeat instructional objectives no. 2.1.1 to 2.1.5 for NOT circuit.
- 2.1.8 Repeat instructional objectives no. 2.1.1 to 2.1.5 for NOR gate.
- 2.1.9 Repeat instructional objectives no. 2.1.1 to 2.1.5 for NAND gate.
- 2.1.10 Create Multiple Input Gates.

2.2 Describe duality of Logic Functions.
- 2.2.1 Use NOR Gates to emulate all Logic Functions.
- 2.2.2 Use NAND Gates to emulate all Logic Functions.

2.3 Understand Exclusive OR and Exclusive NOR Functions.
- 2.3.1 Draw Symbols of XOR gate.
- 2.3.2 Draw Circuit of two input XOR gate.
- 2.3.3 Discuss function of XOR gate.
- 2.3.4 Describe Truth Table of XOR gate.
- 2.3.5 Describe Boolean expression for XOR gate.
- 2.3.6 Repeat instructional objectives no. 2.3.1 to 2.3.5 for XNOR gate.

3. BOOLEAN ALGEBRA.

3.1 Use Boolean Expressions.
- 3.1.1 Use Boolean Expressions and Truth Tables.
- 3.1.2 Use Minterm Expressions, Sum of Products
- 3.1.3 Use Maxterm Expressions, Product of Sums.
- 3.1.4 Describe Un-simplified Boolean Expression & develop Schematic Circuits

3.2 Apply Logic Simplifications.
- 3.2.1 Use Boolean Simplification.
- 3.2.2 Use DeMorgan's Theorems.
- 3.2.3 Use Karnaugh Mapping

4. BINARY ARITHMATIC CIRCIUTS.

4.1 Apply Binary Addition Concepts.

4.1.1 Discuss Half Adder Circuit.
4.1.2 Discuss Full Adder Circuit.
4.1.3 Discuss N bit Binary Adder Circuit

4.2 Understand Binary Arithmetic functions with complements
4.2.1 Apply 2's and 1's Complement Notation in Addition and Subtraction.
4.2.2 Discuss Binary Subtractor Circuit
4.2.3 Discuss Binary Adder/ Subtractor Circuit.

5. COMBINATIONAL CIRCUIT DESIGN.

5.1 Discuss Paradigm for Combinational Logic Problems.
5.1.1 Describe Word Problem.
5.1.2 Construct Truth Table
5.1.3 Create a Logic Equation from a Truth Table
5.1.4 Simplify the logic Equation
5.1.5 Develop Combinational Logic Circuits

5.2 Understand specific Application MSI Gates
5.2.1 Differentiate Level of Integration (SSI, MSI, LSI)
5.2.2 Discuss Display Drivers
5.2.3 Discuss Code Converters
5.2.3.1 Describe BCD to Decimal Converter.
5.2.3.2 Describe Decimal to BCD Converter.
5.2.3.3 Describe Binary to Hexadecimal Converter.
5.2.3.4 Describe BCD to seven segment Decoder.

6. SEQUENTIAL CIRCUITS.

6.1 Understand Sequential Logic.
6.1.1 Describe Latches
6.1.2 Describe RS Flip Flop
6.1.3 Describe Clocked RS Flip Flop

6.2 Understand JK Flip Flop
6.2.1 Describe Operation of JK Flip Flop
6.2.2 Describe Asynchronous Inputs
6.2.3 Describe Synchronous Inputs

6.3 Understand Triggers
6.3.1 Describe Positive-Edge Trigger
6.3.2 Describe Negative-Edge Trigger
6.3.3 Describe Positive-Level Trigger (Latch)
6.3.4 Describe Negative-Level Trigger (Latch)

6.4 Discuss Flip Flops
6.4.1 Describe Master Slave Flip Flop
6.4.2 Describe D type Flip Flop
6.4.3 Describe T type Flip Flop

6.5 Flip Flop timing considerations.
6.5.1 Setup and Hold Times
6.5.2 Propagation Delays
6.5.3 Timing Limitations (Minimum Pulse Width)

6.6 Elementary applications of Flip Flops
6.6.1 Data Storage

6.6.2 Logic Synchronizing
6.6.3 Frequency Division
6.6.4 Switch Debouncing

6.7 Multivibrators.
6.7.1 555 Timer
6.7.2 555 Timer as Monostable Multivibrator (One Shot)
6.7.3 555 Timer as Astable Multivibrator (Free Running)
6.7.4 Produce Square waves with different duty cycles with a Timer.

7. SHIFT REGISTERS AND COUNTERS.

7.1 Shift Register
7.1.1 Function of Shift register
7.1.2 Types of Shift registers
7.1.3 Integrated Shift register

7.2 Asynchronous Counters.
7.2.1 Discrete Ripple Counter
7.2.2 Discrete Modulus- N Ripple Counter
7.2.3 Integrated Ripple Counter (7493)

7.3 Synchronous Counter.
7.3.1 Discrete Up Counter.
7.3.2 Discrete Down Counter.
7.3.3 Discrete Modulus-Synchronous Counter.
7.3.4 Discuss Integrated 4-bit Binary Counter (74163)
7.3.5 Discuss Integrated 4-bit Up/ Down Counter (74193)

8. FAMILIES AND SPECIFICATIONS

8.1 Understand Logic Families
8.1.1 Discuss RTL
8.1.2 Discuss DTL
8.1.3 Discuss ECL
8.1.4 Discuss TTL
8.1.5 Discuss IIL
8.1.6 Discuss MOS
8.1.7 Discuss CMOS
8.1.8 Describe Interfacing Different Logic Families.

8.2 Understand Specification Sheets
8.2.1 List Electronic Sites
8.2.2 Discuss Voltage Levels
8.2.3 Discuss Current Levels
8.2.4 Discuss Fan-out, Fan-in
8.2.5 Understand Switching Characteristics- Propagation Delay, Noise Margin, Power dissipation.

9. INTERFACING WITH ANALOG WORLD

9.1 Understand Digital to Analog Conversion.
9.1.1 Discuss needs and applications of DACs
9.1.2 Describe Binary weighted DAC
9.1.3 Describe Ladder type DAC

9.2 Analog to Digital Conversion.
9.2.1 Discuss needs and applications of ADCs

9.2.2 Describe the construction and working of Simultaneous ADC
9.2.3 Describe the construction and working of Counter type ADC
9.2.4 Describe the construction and working of Dual slop ADC
9.2.5 Describe the construction and working of Successive Approximation ADC

10. MEMORY

10.1 Discuss Memory Technologies.
10.2 Discuss General Memory Operation.
10.3 Describe Memory Considerations
10.4 List Types of Memories
10.4.1 Describe ROM
10.4.2 Describe RAM
10.4.3 Describe SRAM
10.4.4 Describe DRAM
10.4.5 Describe PLDs.
10.4.6 Describe Magnetic and Optical Memories
10.5 Discuss applications in Digital systems.

11. INTRODUCTION TO DIGITAL TROUBLESHOOTING

11.1 Classify Digital Faults
11.1.1 Differentiate between Intermittent versus Permanent faults.
11.1.2 Differentiate between External versus Internal faults.
11.1.3 Differentiate between Parametric versus Logic faults.
11.1.4 Differentiate between Static versus Dynamic faults.
11.2 Discuss Test Equipment
11.3 Describe Static and Dynamic Measurements
11.4 Discuss Fault Localization, Fault Isolation
11.5 Discuss Testing for Dynamic Faults

El.TR 264: DIGITAL ELECTRONICS

Total Contact Hours:

Practical: 96 Hours.

LIST OF PRACTICAL

1. Use the data book for digital ICs and Reading of Pin-out Diagram.
2. Assemble two inputs OR gate with the help of discrete components and verify its logic operation.
3. Assemble two inputs AND gate with the help of discrete components and verify its logic operation.
4. Assemble Binary Subtractor Circuit and verify its operation. NOT, OR and AND IC Gates.
5. Verify the operation of NAND gate.
6. Verify the operation of NOR gate.
7. Use NOR and NAND gates to emulate all logic functions.
8. Assemble XOR gate and verify its operation.
9. Assemble XNOR gate and verify its operation.
10. Assemble Half Adder and verify its operation.
11. Assemble Full Adder and verify its operation.
12. Assemble Binary Subtractor Circuit and verify its operation.
13. Assemble Binary Adder/ Subtractor Circuit and verify its operation.
14. Verify the operation of BCD to Decimal Converter.
15. Verify the operation of Decimal to BCD Converter.
16. Construct an RS Flip Flop using NAND gates.
17. Demonstrate the logical properties of clocked JK master/slave flip-flop.
18. Demonstrate the logical properties of D Type Flip Flop.
19. Demonstrate the logical properties of T Type Flip Flop.
20. Use of flip-flop as data storage element and frequency divider.
21. Assemble a Monostable Multivibrator with the help of 555 Timer.
22. Assemble a Astable Multivibrator with the help of 555 Timer.
23. Construct a 4 bit shift register and study its operation.
24. Construct an 8 bit binary counter and study its operation.
25. Study the operation of Integrated Ripple Counter (7493)
26. Construct an Up counter and study its operation.

27. Construct a Down counter and study its operation.

28. Interfacing TTL with CMOS and CMOS with TTL ICs.

29. Construct a Binary weighted DAC and study its operation.

30. Construct a Ladder ADC and study its operation.

31-32. Apply Digital Troubleshooting for various circuits

El.TR 271 PCB FABRICATION

	T	P	C
Total Contact hours:	0	3	1

Practical 96 Hours

PRINTED CIRCUIT BOARD FEBRICATION

Practice Printed Circuit Board Making **32 Hrs.**

1-2. Draw circuit lay out on copper coated laminated sheet.

3-4. Practice of etching

5-6. Silk screen-printing

7-8. Use of CAD in drawing PCB layout with PC.

9-10. Practice soldering and de-soldering on PCB.

ELECTRONIC COMPONENTS, APPLICATION & ASSEMBLY 64 Hrs. (PCB Application)

Testing of the radio components and their assembly.

11. Construct AF and RF chokes

12. Check a junction diode and construct a bridge rectifier circuit PCB.

13. Study number system of diodes, transistors, and ICs using data books.

14-15 Construct a voltage doubler & tripler with the help of PCB.

16. Check radio components

17. Construct a AC/DC power supply PCB

18-25. Construct the superhetrodyne receiver sections, with the help of PCB:

a) Construct a simple voltage and power amplifiers

b) Use diodes and transistor as detector

c) Construct a local oscillator

d) Construct converter stage and check its performance

e) Construct the I.F and R.F amplifier

26-27. Align I.F and R.F stages

28-30. Practice troubleshooting a superheterodyne radio receiver.

31-32. Develop a simple PCB project.

اسلامیات / مطالعہ پاکستان

نصاب (سال سوئم)	CODE:	ن	پ	ک
حصہ اول اسلامیات		1	0	1
حصہ دوم مطالعہ پاکستان		کل وقت : 200 گھنٹے		

موضوعات:

1- قرآن مجید

سورۃ الفاتحہ۔ آیۃ الکرسی۔ سورۃ البقرۃ کی آخری آیات از امن الرسول سے تا آخر اور سورۃ الاخلاق مع ترجمہ و تشریح

2- منتخب احادیث مع ترجمہ و تشریح

سال سوئم

حصہ اول اسلامیات

تدریس مقاصد

قرآن حکیم

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

خصوصی مقاصد: طالب علم اس قابل ہو جائے گا کہ

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

طالب علم درج ذیل کا مفہوم بیان کر سکے

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

طالب علم درج ذیل کا مفہوم بیان کر سکے

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

منتخب احادیث

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

خصوصی مقصد:

☆ احادیث کا ترجمہ بیان کر سکے

☆ احادیث کی تشریح کر سکے

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

حقوق و فرائض

عمومی مقصد: اسلامی معاشرے کا ایک اچھا فرد بن سکے

خصوصی مقاصد:

☆ والدین کے حقوق و فرائض بیان کر سکے

☆ ہمسایوں کے حقوق بیان کر سکے

☆ اسلام میں حقوق و فرائض کی صورت میں اپنے اندر خدمت خلق کا جذبہ پیدا کر سکے

اسلامی اقدار

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

خصوصی مقاصد

☆ اخلاق کے معنی و مفہوم کو بیان کر سکے

☆ اسلام میں حسن اخلاق کی اہمیت بیان کر سکے

☆ قرآن و سنت کی روشنی میں صبر و استقلال کی اہمیت بیان کر سکے

☆ اسلام میں عفو و درگزر کی اہمیت بیان کر سکے

☆ ایفائے عہد کی اہمیت بیان کر سکے

☆ اخوت کے معنی و مفہوم کو بیان کر سکے

☆ اخوت اسلامی کی اہمیت بیان کر سکے

☆ اسلام کی اعلیٰ اقدار کو اپنا کر مثالی معاشرہ پیدا کر سکے

نصاب (سال سوئم)	GEN 311	ٹی پی سی
مطالعہ پاکستان		1 0 1
حصہ دوئم		کل وقت: 20 گھنٹے

موضوعات

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

مطالعہ پاکستان (حصہ دوئم)

قیام پاکستان

تدریس مقاصد

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

☆ خصوصی مقصد:

☆ باؤنڈری کمیشن تشکیل اور اس کے فرائض بیان کر سکے

☆ ریڈ کلف اور اس کے ایوارڈ کے بارے میں بیان کر سکے

☆ بنگال اور کلکتہ کی تقسیم کی وجوہات بیان کر سکے

☆ پنجاب کی تقسیم کی تفصیل بیان کر سکے

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

☆ ریاستوں کے الحاق کے بارہ میں تفصیل بیان کر سکے

☆ ریاست جموں کشمیر کے بارے میں بیان کر سکے

☆ نہری پانی کے تنازعہ کو بیان کر سکے

☆ قرار داد مقاصد کی تفصیلات بیان کر سکے

☆ 22 علماء کے متفقہ اسلامی نکات بیان کر سکے

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

☆ پاکستان کے محل وقوع اور اس کی جغرافیائی اہمیت بیان کر سکے

☆ پاکستان میں قدرتی وسائل (تیل۔ گیس۔ کوئلہ) کے بارہ میں بیان کر سکے

(غیر مسلم طلباء کے لئے)

ٹی	پی	سی
1	0	1

کل وقت: 20

نصاب اخلاقیات

سال سوئم Gen 311

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 ادارہ)

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات

سال سوئم

تدریس مقاصد

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

خصوصی مقاصد: طالب علم اس قابل ہو گا کہ

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

Mgm-311 INDUSTRIAL MANAGEMENT AND HUMAN RELATIONS.

Total Contact Hours		T	P	C
Theory	32	1	0	1

AIMS The study of this subject will enable the student to develop the management skill, acquaint him with the principles of management and human relations and develop psychological approach to solve the labour problems.

COURSE CONTENTS

1. INDUSTRIAL PSYCHOLOGY. 2 Hours
- 1.1 History and definition.
- 1.2 Nature and scope.

2. LEADERSHIP 1 Hour
- 2.1 Definition and types.
- 2.3 Qualities of a good leader.

3. MOTIVATION 2 Hours
- 3.1 Definition.
- 3.2 Types (Financial and non- financial motives).
- 3.3 Conflict of motives.

4. MORALE 1 Hour
- 4.1 Importance.
- 4.2 Development.
- 4.3 Measurement.

5. HUMAN ENGINEERING. 1 Hour
- 5.1 Importance of human factor in industry.
- 5.2 Man-machine system.
- 5.3 Strategy for making allocation decisions.

6. INDUSTRIAL FATIGUE AND BOREDOM. 2 Hours
- 6.1 Definition and distinction.
- 6.2 Psychological causes.
- 6.3 Objective causes.
- 6.4 Prevention

7. INDUSTRIAL ACCIDENTS 2 Hours
- 7.1 Psychological causes.
- 7.2 Objective causes.
- 7.3 Prevention

8. INDUSTRIAL PREJUDICE 2 Hours
- 8.1 Causes
- 8.2 Remedies

9. PUBLIC RELATIONS. 2 Hours
- 9.1 Importance

9.2 Functions

10. GUIDANCE AND COUNSELLING **2 Hours**

10.1 Importance
10.2 Choice of job.
10.3 During service.

11. JOB EVALUATION **2 Hours**

11.1 Importance
11.2 Methods
11.3 Job satisfaction
11.4 Work simplification.

12. INDUSTRIAL MANAGEMENT **2 Hours**

12.1 Introduction
12.2 Functions of management.
12.3 Subdivisions of management
12.4 Objectives of industrial management.

13. PERSONNEL SELECTION. **2 Hours**

13.1 Recruitment of employees.
13.2 Training.
13.3 Effects of training on production and product cost.

14. WORKING CONDITIONS. **2 Hours**

14.1 Importance and consideration.
14.2 Effects on efficiency and per unit cost.

15. TIME AND MOTION STUDY. **3 Hours**

15.1 Concept and importance.
15.2 Sequence of motion study.
15.3 Principles of motion study.
15.4 Steps to time study.
15.5 Determination of operations time.

16. QUALITY CONTROL. **2 Hours**

16.1 Concept and advantages
16.2 Methods.

17. ROLE OF FOREMAN IN MANAGEMENT. **2 Hours**

17.1 Foreman's abilities.
17.2 Duties and functions.

BOOKS RECOMMENDED:

1 C.S. Meyers, Industrial Psychology, Oxford University Press, London.
2. Smith Wakley, Psychology of Industrial Behaviors, Mc-Graw Hill, New York.
3. Ghulam Hussain, Nizamat-e-Sanaat Aur Insani Rawabat, Ilmi Kitab Khana, Urdu Bazar, Lahore.
4. Andrew R. Megill, The Process of Management William M New Man.
5. Richard N Omen, Management of Industrial Enterprises.

Mgm-311 INDUSTRIAL MANAGEMENT AND HUMAN RELATIONS.

INSTRUCTIONAL OBJECTIVES

At the completion of this course, the students will be able to:

1. KNOW INDUSTRIAL PSYCHOLOGY.
- 1.1 Describe brief history if industrial psychology.
- 1.2 Describe in detail definition of industrial psychology.
- 1.3 State nature and scope of industrial psychology.

2. KNOW LEADERSHIP.
- 2.1 Define leadership.
- 2.2 Describe types of leadership.
- 2.3 State qualities of a good leader.

3. UNDERSTAND MOTIVATION.
- 3.1 Define motivation.
- 3.2 Describe financial and non-financial motives.
- 3.3 Explain conflict of motives.

4. KNOW MORALE.
- 4.1 State importance of morale.
- 4.2 Describe development of morale.
- 4.3 State the method of measurement of morale.

5. UNDERSTAND HUMAN ENGINEERING.
- 5.1 Explain importance of human engineering in the industry.
- 5.2 Explain man-machine system.
- 5.3 Explain strategy for making allocation decisions.

6. UNDERSTAND INDUSTRIAL FATIGUE AND BOREDOM.
- 6.1 Define fatigue and boredom.
- 6.2 Describe psychological causes of fatigue and boredom.
- 6.3 Describe objective causes of fatigue and boredom.
- 6.4 Explain measures to prevent fatigue and boredom.

7. UNDERSTAND INDUSTRIAL ACCIDENTS.
- 7.1 Explain psychological causes of industrial accidents.
- 7.2 Explain objective causes of industrial accidents.
- 7.3 Explain measures to prevent industrial accidents.

8. UNDERSTAND INDUSTRIAL PREJUDICE.
- 8.1 Define prejudice
- 8.2 Explain causes of industrial prejudice.
- 8.3 Explain remedies of industrial prejudice.

9. UNDERSTAND THE SIGNIFICANCE OF PUBLIC RELATIONS.
- 9.1 Explain importance of public relations.
- 9.2 Explain functions of public relations.

10. UNDERSTAND THE NEED FOR GUIDANCE AND COUNSELLING.

10.1 State importance of guidance and counselling.
10.2 Explain the role of guidance and counselling in choosing the job.
10.3 Describe help of guidance and counselling during service.

11. UNDERSTAND JOB EVALUATION.

11.1 Explain importance of job evaluation.
11.2 Explain methods of job evaluation.
11.3 Explain job satisfaction.
11.4 Explain work simplification.

12. UNDERSTAND INDUSTRIAL MANAGEMENT.

12.1 Define management.
12.2 State functions of management.
12.3 Enlist subdivision of management.
12.4 Explain objectives of industrial management.

13. UNDERSTAND TRAINING AND ITS EFFECTS.

13.1 Describe the recruitment procedure of employees in an industrial concern.
13.2 Explain training.
13.3 Identify the kinds of training.
13.4 Explain the effects of training on production and product cost.

14. UNDERSTAND THE EFFECT OF WORKING CONDITION ON EFFICIENCY.

15.1 Explain importance of working condition.
15.2 Describe air-conditioning, ventilation, lighting and noise.
15.3 State the effects of good working conditions on efficiency and per unit cost.

15. UNDERSTAND TIME AND MOTION STUDY.

15.1 Explain the concept.
15.2 Describe the importance of work study.
15.3 Explain the sequence of motion study.
15.4 State the principles of motion study.
15.5 Describe the steps for carrying out time study.
15.6 Explain the method of determination of operations time.

16. UNDERSTAND THE METHODS OF QUALITY CONTROL.

16.1 Define quality control
16.2 State the advantages of quality control.
16.2 Explain methods of quality control.

17. UNDERSTAND THE ROLE OF FOREMAN IN AN INDUSTRIAL UNDERTAKING.

17.1 Explain ability of the foreman.
17.2 Enlist duties of foreman.
17.3 Describe functions of foreman as middle management.

OHSE -311 OCCUPATIONAL SAFETY, HEALTH AND ENVIRONMENT

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

AIMS After completion of the course, the student will be able to

1. Know how to identify and control hazards in the workplace.
2. Carry out a risk assessment and identify control measures.
3. Understand the methods used when reporting and recording accidents and incidents.
4. Understand the key features of health and safety legislation and regulations.

COURSE CONTENTS

1. Identification and control of Hazards (15 Hours)

- 1.1 Methods of identify hazards with in the work place.
  - 1.1.1 Statements
  - 1.1.2 Analysis of significant risks
  - 1.1.3 Prediction of results or outcomes of those risks
  - 1.1.4 Use of accident data
  - 1.1.5 Careful consideration of work methods
- 1.2 Consideration of the workplace and its potential for harm.
  - 1.2.1 Confined spaces
  - 1.2.2 Working at heights
  - 1.2.3 Electrical hazards
  - 1.2.4 Chemicals
  - 1.2.5 Noise
- 1.3 Hazards which become risks:
  - 1.3.1 Identification of minor or major risk
  - 1.3.2 Potential to cause harm
  - 1.3.3 Choosing appropriate control measures
  - 1.3.4 Electrical safety
    - 1.3.4.1 Cause of injury in electrical work
    - 1.3.4.2 Effects of electricity on the body
    - 1.3.4.3 Circuit overloading
  - 1.3.5 Mechanical safety
    - 1.3.5.1 Cause of injury in mechanical work
    - 1.3.5.2 Rotating equipment
    - 1.3.5.3 Sharp edges
- 1.4 Safety Devices
  - 1.4.1 Residual current device (RCD)
  - 1.4.2 Fuses
  - 1.4.3 Guards
  - 1.4.4 Sensors

2. Risk assessment and identify control measures (07 Hours)

- 2.1 Risk assessments: five steps
  - 2.1.1 Principal hazards
  - 2.1.2 Who is likely to be injured/ harmed?
  - 2.1.3 Evaluate the risks and decide on adequacy of precautions

2.1.4 Recording findings
2.1.5 Review assessment

2.2 Use of control measures:
2.2.1 Use of recognized procedures
2.2.2 Substances control
2.2.3 Guarding
2.2.4 Lifting assessments and manual handling assessments
2.2.5 Regular inspection
2.2.6 Use of Personal Protective Equipment (PPE)
2.2.7 Training of personnel
2.2.8 Other personal procedures for health, safety and welfare

3. Methods used when reporting and recording accidents and incidents. (06 Hours)

3.1 Why employers keep records of serious accidents, incidents and emergencies
3.2 Responsibilities of competent persons
3.3 Cost of accidents
3.4 Recording of trends such as major causes, fatal and serious injury
3.5 Methods of classification
3.6 Statistics
3.7 Recording and reporting procedures
3.7.1 Accident book, company procedures
3.7.2 Procedures to deal with near miss or dangerous occurrences

4. Key features of health and safety legislation and regulations. (04 Hours)

4.1 General Safety, health & Condition of work
4.1.1 Labour Code of Pakistan 1986

4.2 Industries and Occupations
4.2.1 Hazardous Occupation Rules 1963
4.2.2 The Factories Act 1934
4.2.3 Punjab Factories Rules 1978

Reference Books.

Safety Practices and Procedures by NISTE

Health and Safety Executive — *A Guide to Risk Assessment Requirements: Common Provisions in Health and Safety Law* (HSE Books, 1996) ISBN 0717612112

Health and Safety Executive — *Management of Health and Safety at Work* (HSE Books, 2000) ISBN 0717624889

OHSE -311 OCCUPATIONAL SAFETY, HEALTH AND ENVIRONMENT

INSTRUCTIONAL OBJECTIVES

1. Understand how to Identify and control of Hazards

1.1 Understand methods of identify hazards with in the work place.
- 1.1.1 Discuss the role of statements
- 1.1.2 Describe the analysis of significant risks
- 1.1.3 Discuss the prediction of results or outcomes of the risks
- 1.1.4 Discuss the use of accident data
- 1.1.5 Describe the careful consideration of work methods

1.2 Understand the consideration of the workplace and its potential for harm.
- 1.2.1 Describe confined spaces
- 1.2.2 Discuss working at heights
- 1.2.3 Discuss Electrical hazards
- 1.2.4 Discuss Chemicals related to hazards
- 1.2.5 Discus role of noise.

1.3 Understand Hazards which become risks:
- 1.3.1 Able to identification of minor or major risk
- 1.3.2 Describe potential to cause harm
- 1.3.3 Able to choosing appropriate control measures
- 1.3.4 Understand Electrical safety
  - 1.3.4.1 Describe cause of injury in electrical work
  - 1.3.4.2 Describe effects of electricity on the body
  - 1.3.4.3 Describe circuit overloading
- 1.3.5 Understand Mechanical safety
  - 1.3.5.1 Describe cause of injury in mechanical work
  - 1.3.5.2 Discuss the role of rotating equipment in hazards.
  - 1.3.5.3 Discuss the role of sharp edges in hazards.

1.4 Understand role of Safety Devices
- 1.4.1 Understand the role of residual current device (RCD)
- 1.4.2 Understand the role of fuses
- 1.4.3 Understand the role of guards
- 1.4.4 Understand the role of sensors

2. Risk assessment and identify control measures

2.1 Understand five steps Risk assessments
- 2.1.1 principal hazards
- 2.1.2 who is likely to be injured/harmed
- 2.1.3 evaluate the risks and decide on adequacy of precautions
- 2.1.4 recording findings
- 2.1.5 review assessment

2.2 Understand the use of control measures
- 2.2.1 Discuss use of recognized procedures
- 2.2.2 Discuss substances control
- 2.2.3 Discuss guarding
- 2.2.4 Discuss lifting assessments and manual handling assessments
- 2.2.5 Discuss regular inspection
- 2.2.6 Discuss use of Personal Protective Equipment (PPE)

2.2.7 Discuss training of personnel
2.2.8 Discuss other personal procedures for health, safety and welfare

3. Understand the Methods used when reporting and recording accidents and incidents.

3.1 Discuss why employers keep records of serious accidents, incidents and emergencies
3.2 Describe the responsibilities of competent persons
3.3 Discuss cost of accidents
3.4 Discuss recording of trends such as major causes, fatal and serious injury
3.5 Discuss methods of classification
3.6 Discuss statistics used in recording
3.7 Understand Recording and reporting procedures
3.7.1 Describe accident book, company procedures
3.7.2 Discuss the procedures to deal with near miss or dangerous occurrences

4. Key features of health and safety legislation and regulations.

4.1 Understand General Safety, health & Condition of work mentioned in rules in Pakistan
4.1.1 Understand related clauses of Labour Code of Pakistan 1986
4.2 Understand the related clauses in Industries and Occupations rules in Pakistan.
4.2.1 Understand related clauses of Hazardous Occupation Rules 1963
4.2.2 Understand related clauses of The Factories Act 1934
4.2.3 Understand related clauses of Punjab Factories Rules 1978

El.TR. 314 COMPUTER ARCHITECTURE

T	P	C
3	3	4

Total contact hours:

Theory: 96 Hours
Practical: 96 Hours

Pre-requisite: Electrical Circuits
Digital Electronics

AIMS This subject has been designed so as to enable the student:

1. Understand digital computation.
2. Understand microprocessor architecture, programming and interfacing.
3. Understand the microcomputer hardware.

COURSE CONTENTS

1. Solve the digital problems related to computer.
2. Program a Intel 8086 microprocessor using assembly and Machine language.
3. Debug and program.
4. Differentiate a 16 bit and 32 microprocessor.
5. Identify the function of standard interfaces.
6. Explain the memory organization.
7. Describe the stored program concept.
8. Identify the units of digital computer.
9. Describe computer peripheral devices.
10. Describe microcontroller's role.

1. BASIC MICROPROCESSOR ARCHITECTURE. (16 Hours)

1.1 Introduction of Microprocessor

. 1.2 Basic Architecture of a 16 bit Microprocessor (8086/88)

1.2.1 Block Diagram
1.2.2 Function of each Block
1.2.3 Buses
1.2.3.1Data Bus
1.2.3.2Address Bus
1.2.3.3Control Bus
1.2.4 Bus Timing
1.2.5 Pin Configuration of 8086/88
1.2.6 Clocking and Power requirements.
1.2.5 Bus Buffering and Latching

1.3 Processor features

1.3.1 Pipelining
1.3.2 Multiprocessing.
1.3.3 Parallel Processing.

1.4 Programming Models
1.4.1 General Purpose Registers
1.4.2 Segment register
1.4.3 Pointer register
1.4.4 Flag Register

1.5 Memory
1.5.1 ROM
1.5.2 Cache Memory
1.5.3 RAM and its Types
1.5.3.1 Static
1.5.3.2 Dynamic
1.5.3.3 Flash

1.6 Components of Processor
1.6.1 Control Unit
1.6.2 ALU

2. ASSEMBLY LANGUAUE. (20 Hours)

2.1 Instruction set
2.2 Programming language
2.3 Difference between Assembler, Interpreter and Compiler
2.4 Comparison between assembly language and machine language.
2.5 Data Addressing Modes.
2.6 Data Movement Instructions.
2.7 Arithmetic and Logic Instructions.
2.8 Program Control Instructions.

3. MEMORY AND BASIC I/O INTERFACE. (16 Hours)

3.1 Memory Devices.
3.2 Address Decoding.
3.3 8088 and 80188 (8 bit) Memory Interface.
3.4 8086, 80186 (16 bit) Memory Interface.
3.5 32 bit and 64 bit Memory Interface.
3.6 Dynamic RAM
3.7 Introduction to I/O Interface.
3.8 I/O Port Address Decoding.
3.9 8254 Programmable Interval Timer.
3.10 Programmable Communications Interface
3.11 ADC and DAC Converters
3.12 Basic USB Interface
3.13 COMPUTER PERIPHERALS.

3.13.1 Introduction to computer peripherals.
3.13.2 key Board, VDU
3.13.3 Hard disk.
3.13.4 Pointer.
3.13.5 Mouse.
3.13.6 Plotter.
3.13.7 Digitizer and Scanner.

4. INTERRUPTS. (04 Hours)

4.1 Basic Interrupt Processing
4.2 Types of Interrupts.
4.3 Hardware Interrupts.
4.4 Software Interrupts.
4.5 Programmable Interrupt Controller (8259A).

5. DIRECT MEMORY ACCESS. (04 Hours)

5.1 Basic DMA Operation.
5.2 DMA Controller (8237).

6. BUS INTERFACE. (05 Hours)

6.1 The ISA Bus.
6.2 The Extended ISA (EIAS) and VESA Local Buses.
6.3 The Peripheral Component Interconnect (PCI) Bus.
6.4 The Universal Serial Bus (USB)
6.5 Accelerated Graphics Port (AGP).

7. THE PENTIUM MICROPROCESORS. (05 Hours)

7.1 Summary of growth from 808186 to 80486.
7.2 Introduction to the Pentium Microprocessors.
7.3 Special Pentium Registers.
7.4 Pentium Memory Management.
7.5 New Pentium Instructions

8. THE MICROCONTROLLER (06 Hours)

8.1 Single-chip Microprocessor.
8.2 Introduction to microcontrollers.
8.3 8051 internal RAM and registers.
8.4 8051 interrupts systems.
8.5 8051 instruction set.
8.6 Microcontrollers on the 8051 family.

TEXT AND REFERENCE BOOKS:

1. Barry B. Brey "The Intel Microprocessors (8086/8088, 80186, 80286, 80386, 80486)".

2. The Essentials of Computer Organization and Architecture by NULL, Linda, Lobur, Julia (2006) (ISBN # 0763737696)

El.TR. 314 COMPUTER ARCHITECTURE

INSTRUCTIONAL OBJECTIVES

1. UNDERSTANDING BASIC MICROPROCESSOR ARCHITECTURE.

- 1.1 Understand the term of Microprocessor
- 1.2 Understand Basic Architecture of a 16 bit Microprocessor (8086/88)
  - 1.2.1 Draw Block Diagram
  - 1.2.2 Discuss Function of each Block
  - 1.2.3 Discuss Buses
  - 1.2.3.1 Describe Data Bus
  - 1.2.3.2 Describe Address Bus
  - 1.2.3.3 Describe Control Bus
  - 1.2.4 Discuss Bus Timing
  - 1.2.5 Discuss Pin Configuration of 8086/88
  - 1.2.6 Discuss Clocking and Power requirements.
  - 1.2.5 Describe Bus Buffering and Latching
- 1.3 Understand Processor features
  - 1.3.1 Describe Pipelining
  - 1.3.2 Describe Multiprocessing.
  - 1.3.3 Describe Parallel Processing.
- 1.4 Understand Programming Models
  - 1.4.1 Describe General Purpose Registers
  - 1.4.2 Describe Segment register
  - 1.4.3 Describe Pointer register
  - 1.4.4 Describe Flag Register
- 1.5 Understand Memory
  - 1.5.1 Discuss ROM
  - 1.5.2 Describe Cache Memory
  - 1.5.3 Describe RAM and its Types
    - 1.5.3.1 Describe Static
    - 1.5.3.2 Describe Dynamic
    - 1.5.3.3 Describe Flash
- 1.6 Understand Components of Processor
  - 1.6.1 Discuss Control Unit
  - 1.6.2 Discuss ALU

2. UNDERSTAND THE APPLICATIONS OF ASSEMBLY LANGUAUE.

2.1 Discuss the Instruction set.
2.2 Discuss Programming languages.
2.3 List three programming languages for a microcomputer.
2.4 Differentiate between Assembler, Interpreter and Compiler
2.5 Discuss Fields of Assemble language statement.
2.6 Compare assembly language with machine language.
2.7 Describe Data Addressing Modes.
2.8 Apply Data Movement Instructions.
2.9 Apply Arithmetic and Logic Instructions.
2.10 Apply Program Control Instructions.

3. UNDERSTAND THE USE OF MEMORY AND BASIC I/O INTERFACE.(02

3.1 Discuss Memory Devices.
3.2 Describe Address Decoding.
3.3 Discuss 8088 and 80188 (8 bit) Memory Interface.
3.4 Discuss 8086, 80186 (16 bit) Memory Interface.
3.5 Discuss 32 bit and 64 bit Memory Interface.
3.6 Discuss Dynamic construction and working of RAM
3.7 Describe Introduction to I/O Interface.
3.8 Describe I/O Port Address Decoding.
3.9 Discuss the construction and operation of 8254 Programmable Interval Timer.
3.10 Discuss the construction and operation of Programmable Communications Interface
3.11 Describe the operation of ADC and DAC Converters
3.12 Describe the operation of USB Interface
3.13 Describe the role of peripherals in computer system.
3.14 Discuss construction and working of key Board, VDU
3.15 Discuss construction and working of Hard disk.
3.16 Discuss construction and working of Pointer.
3.17 Discuss construction and working of Mouse.
3.18 Discuss construction and working of Plotter.
3.19 Discuss construction and working of Digitizer and Scanner.

4. UNDERSTAND INTERRUPTS.

4.1 Discuss basic Interrupt Processing
4.2 Discuss Types of Interrupts.
4.3 Describe Hardware Interrupts.
4.4 Describe Software Interrupts.
4.5 Discuss operation of Programmable Interrupt Controller (8295A).

5. UNDERSTAND THE CONCEPT OF DIRECT MEMORY ACCESS.

5.1 Discuss basic DMA Operation.
5.2 Discuss the construction and operation of DMA Controller (8237).
5.3 Describe Shared Bus Operation.

6. UNDERSTAND THE BUS INTERFACE.

6.1 Describe the operation of ISA Bus.
6.2 Discuss the Extended ISA (EIAS) and VESA Local Buses.
6.3 Describe the role of Peripheral Component Interconnect (PCI) Bus.
6.4 Describe the role of The Universal Serial Bus (USB)
6.5 Describe the role of Accelerated Graphics Port (AGP).

7. THE PENTIUM MICROPROCESORS.

7.1 Discuss summary of growth from 808186 to 80486.
7.2 Describe introduction to the Pentium Microprocessors.
7.3 Describe Special Pentium Registers.
7.4 Discuss Pentium Memory Management.
7.5 Describe New Pentium Instructions

8. THE MICROCONTROLLER

8.1 Define Single-chip Microprocessor.
8.2 Express microcontrollers.
8.3 Describe the role of 8051 internal RAM and registers.
8.4 Describe the role of 8051 interrupts systems.
8.5 Discuss 8051 instruction set.
8.6 Discuss Microcontrollers on the 8051 family.

El.TR.- 314 Computer Architecture

LIST OF PRACTICAL: 96 Hours

1. Introduction to 8086 Microprocessor Trainer . 03 hrs.
2. Run different short program using Arithmetic Instructions e.g. ADD, SUB, MUL, DIV, etc 06 hrs.
3. Run different short program using Arithmetic Instructions e.g. OR, AND NOT, etc. 06hrs.
4. Interface 8/4 Matrix with Processor. 12hrs.
5. 7 Segment display with Processor. 12hrs.
6. Control AC Power by processor 12hrs.
7. Using Trainer and Instructions of Assembly language Control Traffic Light. 12hrs.
8. Interfacing Keyboard, Mouse, Printer and scanner. 15hrs.
9. Sensor
   Using Microprocessor Trainer and Assembly Language Instructions develop following sensors
   - Temperature
   - Smoke 18+18 Hrs.

El.TR. 323 EQUIPMENT MAINENANCE & SERVICING

T	P	C
1	6	3

Total contact hours:

Practical: 192 Hours.

Prerequisites:- Analog Electronics
Digital Electronics
Electrical Instruments & Measurements

Objectives: After completion of this subject, the student will be able to
Acquire skill to maintain, service and troubleshoot electronics equipment
.

COURSE CONTENTS

1. **Colour TV Receiver. (16 Hours)**

1.1 VHF-UHF Tuner
1.2 IF Subsystem
1.3 Luminance Channel
1.4 Chroma Decoder
1.5 Colour Picture Tubes
1.6 Satellite TV Receivers

2. Camera Tubes (16 Hours)

2.1P

LIST OF PRACTICAL

1. Introduction to servicing, Methods of servicing, Workshop precautions
2-3 Introduction of tools, equipment and instruments used in servicing process.
4-5 General specifications of tools, equipment and instruments used in servicing process.
6-8. Fault and Symptoms of Different stages of radio receiver and measurement of voltages with the help of DVM
9-10 Servicing faulty Multimeter analog or digital and write report.
11-12 Identify and locate the different sections of AF & RF signal generator.
13-14 Identify and locate the different sections of CRO.
15-18 Identify and locate the different sections of TV Receiver
19-20 Write a report after servicing a TV set, which Blow-off Fuse.
21-22 Servicing faulty Lab Supply and write a report.
23. Servicing faulty EHT prob and write a report.
24-26 Write a report after servicing a TV Set which has no raster.
27-28 Servicing faulty CRO and write a report.
29-32 Servicing faulty over Head Projector/ Opaque Projector/ Slid Projector/ Film Projector/ Multimedia Projector and write report.
33-34 Servicing faulty Function Generator and write a report.
35-36 Familiarization and servicing of IC tester (both analog and digital) and write report.
37. Familiarization and servicing of Dip meter and write report.
38. Familiarization and servicing of Techometer (Stabroscope) and write report.

39. Familiarization and servicing of Digital Temperature measuring meter and write report.
40. Familiarization and servicing of Lux meter and write report.
41. Familiarization and servicing of Frequency Counter and write report.
42-43 Familiarization and servicing of X-Y recorder and write report.
44-46 Familiarization and practice on Hot air Soldering and desoldering station.
47-48 Introduction and location of different stages of colour monitor.
49-52 Servicing a faulty colour monitor set and write report.
53-56 Familiarization and servicing of Logic Analyzer and write report.
57-58 Familiarization and servicing of Pattern generator and write report.
59-60 Familiarization and servicing of VCD /DVD and write report.
61-64 Familiarization and servicing of Mobile phone and write report.

El.TR. 332 PROJECT

T	P	C
0	6	2

Total contact hours:

Practical: 192 Hours.

Objectives: After completion of this subject, the student will be able to:

Specify a project, agree procedures and choose a solution.

Plan and monitor a project.

Implement a project with in agreed procedures and to specification.

Present the Project outcomes.

Evaluation Criteria of Project:-

Presentation of Project after each and every 8 weeks (Fifty percent of sessional marks)

Final Presentation of Project (Fifty percent of sessional marks)

El.TR-343 INDUSTRIAL ELECTRONICS

T	P	C
2	3	3

Total Contact Hours:

Theory: 64 Hours.
Practical: 96 Hours.

AIMS After studying the subject the student will be able to:

1. To understand various industrial electronic circuits.
2. To understand control system and components.

COURSE CONTENTS

1. Apply electronic devices for industrial control.
2. Identify the function of of to-electronic devices in control circuits.
3. Identify the function of various type of transducers.
4. Identify the Principe of control system.
5. Explain the function of servomechanism.
6. Apply concepts of PLC Programming
7. Discuss the concept of DCS and SCADA
8. Identify the function of robotics
9. Explain the faction of Industrial Instrumentation.
10 Discus stability of control system

1. SWITCHING & PHOTO DEVICES AND TIMERS (REVIEW)
(05 Hours)

1.1. UJT ratings and UJT relaxation oscillator.
1.2 SCR ratings and SCR power control circuits.
1.3 Diac and Triac ratings and their use in power control.
1.4 Photo devices, photo transistor, LDR and LASCR.
1.5 LED, LED array, LCD and solar cell.
1.6 Opto-Couples.
1.7 Transistor timer.
1.8 IC timer (555 IC)
1.9 Sequential and long duration timer.

2. REGULATOR S OF VOLTAGE AND MOTOR SPEED. (05 Hours)

2.1 Voltage regulation of electric generators.
2.2 Speed Control of DC motor and light dimmers.
2.3 Speed control of a 3-phase induction motor.

3. TRANSDUCERS (10 Hours)

3.1 Introduction of Transducers.
3.2 Strain Gauge.
3.3 Displacement Transducers.
3.3.1. Potentiometric Transducer.
3.3.2. Capacitive Transducer.

3.3.3. Inductive Transducer.
3.3.4. LVDT

3.4 Thermal Transducers.
3.4.1. Resistance Temperature Detectors.
3.4.2. Thermister.
3.4.3. Thermocouple.
3.4.4. IC Temperature Sensor
3.4.5 Pyrometer

3.5 Optical Transducers

3.6 Pizo-Electric Transducer

3.7 Hall Effect Transducer

4. CONTROL OF SYSTEMS. (16 Hours)

4.1 Fundamentals of Control System.
4.1.1 Control variables
4.1.2 Open loop control system.
4.1.3 Closed loop control system.
4.1.4 Final control elements.
4.1.5 On-off control.

4.2 PI Controller.
4.2.1 Fundamentals
4.2.2 Proportional Band.
4.2.3 Application.

4.3 PD Controller.
4.3.1 Fundamentals
4.3.2 Integration time.

4.4 PI, PD and PID Controllers.
4.4.1 Calibration and application.
4.4.2 Characteristics

4.5 Servo System.
4.5.1 Loop presentation.
4.5.2 Armature and field controls.
4.5.3 Servo Block characteristics.
4.5.4 Synchors, transmitter and transformer.
4.5.5 Velocity feedback.
4.5.6 Speed control.
4.5.7 Transient response
4.5.8 Automatic voltage stabilizer (servo type)

5. PROGRAMMABLE LOGIC CONTROLLER. (08 Hours)

5.1 Introduction of PLC

5.2 Advantages and disadvantages of PLCs

5.3 PLC System Block Diagram

5.4 Structure of PLC system

5.5 Input and output modules

5.6 PLC Programming
5.6.1 Ladder diagram
5.6.2 Rules and symbols used in PLC Programming
5.6.3 Logics used in PLC programming (OR, AND, NOT, NOR,

NAND)
5.6.4 Timers
5.6.5 Counters
5.5.6 Simple PLC Programming.

6. ADVANCE SYSTEM CONTROLLERS (04 Hours)

6.1 Introduction to DCS Control
6.2 Basic structure of DCS Control
6.3 Advantages and disadvantages of DCS Control.
6.4 Introduction to SCADA
6.5 Basic structure of SCADA
6.6 Advantages and disadvantages of SCADA.
6.3 Comparison between PLC, DCS and SCADA

7. INTRODUCTION TO ROBBOTICS (04 Hours)

7.1 Introduction of robotics
7.2 Types of robots
7.3 Programming robots
7.4 Application of Robotics in Industry.

8. INDUSTRIAL INSTRUMENTATION. (10 Hours)

8.1 Definition of Industrial Instrumentation.
8.2 Types of Industrial Instrumentation.
8.3 Benefits of Industrial Instrumentation.
8.4 Costs of Industrial Instrumentation in Plants.
8.5 Speed of Signal
8.6 Standard supplies (Electronic and pneumatic)
8.7 Standard Signals
8.8 Signal Transmission and reception
8.9 errors in transmission
8.10 accuracy and precision.
8.11 Analog and Digital Instruments
8.12 Application of Industrial Instrumentation in Plant.

9. STABILITY OF CONTROL SYSTEM. (02 Hours)

9.1 Need of stability of control system.
9.2 Methods to improve stability.

TEXT AND REFERENCE BOOKS:

1. Modern Industrial Electronics, 5th Edition by Timothy J. Maloney, Prentice Hall, 2003.

2. Industrial Electronics by Petruzella, McGraw-Hill, 1995.

3. Electric Motors and Control Systems, by Petruzella, Career Education, 2009

4. Activities Manual for Electric Motors and Control System, 1st Edition by Petruzella, Career Education, 2009.

ELTR-343 INDUSTRIAL ELECTRONICS

INSTRUCTIONAL OBJECTIVES:

1. SWITCHING AND PHOTO DEVICES AND TIMERS(Review only).

1.1 Understand the industrial applications of switching, photo devices and timers.

1.1.1 State the operation of UJT relaxation oscillator and the terms V_{BB} ,ηV_E and stand off ratio.

1.1.2 State the rating & power control characteristics of an SCR (V_{AK}, V_{BR}, I_H, I_A, I_{GT}).

1.1.3 Explain the applications of Diac & Traic in power control circuit.

1.2 Photo Devices.

1.2.1 Explain the applications of photo diode, photo transistor, LDR & LASCR.

1.2.2 State the applications of LED, LED array, LCD, Solar cell and opto-coupler.

1.3 Timers & their Industrial Applications.

1.3.1 State the RC time constant.

1.3.2 Explain the delay time action of circuits.

1.3.3 Explain the transistor timer.

1.3.4 Explain timer using IC 555 & 556

1.3.5 Describe the application of 555 & 556 timer

1.3.6 Explain the operation of sequential and long duration timer and list their applications.

2. UNDERSTAND THE ELECTRONIC METHODS OF VOLTAGE REGULATION OF ELECTRICAL GENERATORS AND MOTOR SPEED CONTROL.

2.1 Draw the schematic diagram for basic voltage regulator for electrical generator using a transistor and zener diode (forming a closed loop).

2.2 Explain the working of the simple voltage regulator circuit.

2.3 Draw the schematic diagram of the car-alternator voltage regulator.

2.4 Explain the working of the car-alternator voltage regulator.

2.5 List the types of feedback regulator circuits for low voltage DC output.

2.6 Draw the schematic diagram of basic of-amp series regulator with current limiting element.

2.7 Explain the working of series voltage regulator circuit.

2.8 Draw the schematic diagram of a basic of-amp shunt regulator.

2.9 Explain the working of basic of-amp shunt regulator.

2.10 Draw the schematic diagram of a basic step-down switching (mode) regulator.

2.11 Explain the working of step-down switching regulator.

2.12 Review the armature control and field control of motor speed.

2.13 Draw the circuit diagram of electronic speed control of D.C. motor using SCR.

2.14 Explain the operation of the circuit of D.C. motor speed control.

2.15 Describe the voltage regulator method of speed control of a motor.

2.16 Draw the block diagram of three-phase SCR speed varietur.

2.17 Describe the working of three-phase SCR speed varietur.

2.18 Describe the working of adjustable frequency inverter for AC motor drive.

2.19 Draw the circuit diagrams of light dimmer using

(i) An SCR with a bridge rectifier.

(ii) a diac and a triac.

2.20 Explain the operation of both the above light dimmer circuits.

3. UNDERSTAND THE ROLE OF TRANSDUCERS IN INDUSTRY.

3.1 Explain Transducers.

3.1.1 Define Transducer

3.1.2 List basic types of transducer.

3.1.3 List and discuss different principles used in transducers.

3.1.4 Discuss different classifications of transducers.

3.2 Discuss construction, working and applications of Strain Gauge.

3.3 Explain construction and working of Displacement Transducers.

3.3.1. Discuss construction, working and applications of Potentiometric Transducer.

3.3.2. Discuss construction, working and applications of Capacitive Transducer.

3.3.3. Discuss construction, working and applications of Inductive Transducer.

3.3.4. Discuss construction, working and applications of LVDT

3.4 Explain Construction and working of Thermal Transducers.

3.4.1. Discuss construction, working and applications of Resistance Temperature Detectors.

3.4.2. Discuss construction, working and applications of Thermister.

3.4.3. Discuss construction, working and applications of Thermocouple.

3.4.4. Discuss construction, working and applications of IC Temperature Sensor

3.4.5 Discuss construction, working and applications of Pyrometer

3.5 Discuss construction, working and applications of Optical Transducers

3.6 Discuss construction, working principal and applications of Pizo-Electric Transducer

3.7 Discuss construction, working principal and applications of Hall Effect Transducer

4. UNDERSTAND THE FUNDAMENTALS OF VARIOUS TYPES OF CONTROL SYSTEM.

4.1 List the basic control variables.

4.1.1 Draw the block diagram of open-loop control system.

4.1.2 Identify the function of each block of the system.

4.1.3 List the applications of open-loop control system.

4.1.4 Draw the block diagram of closed-loop control system.

4.1.5 Identify the function of each block of closed-loop control system.

4.1.6 List the uses of closed-loop control system.

4.1.7 Describe the function of final control element.

4.1.8 Draw the diagram of on-off control system.

4.1.9 Explain the working of on-off control.

4.1.10 List the merits and demerits of on-off control system.

4.2 Understand the function of a proportional Integrator controller.

4.2.1 Explain the fundamentals of PI controller.
4.2.2 Explain the working of proportional Integral controller
4.2.3 List the applications of PI controller.

4.3 Understand the function of P.D. Controller.

4.3.1 Explain the fundamentals of PD controller.
4.3.2 Explain the differentiation time of PD controller.
4.3.3 List the applications of PD controller.

4.4 Understand the characteristics of PI, PD & PID controller.

4.4.1 Explain the characteristics of PI controller.
4.4.2 Explain the characteristics of PD controller.
4.4.3 Describe proportional Integral derivative (PID) controller.
4.4.4 Explain the working of PID controller.
4.4.5 Explain the calibration of PID controller.
4.4.6 List the uses of PID controller.

4.5 Understand the function of servo system.

4.5.1 Explain the loop presentation of servo system.
4.5.2 Explain the armature control of servo motor.
4.5.3 Explain the field control of servo motor.
4.5.4 Draw the block diagram of servo system.
4.5.5 Identify the function of each block of servo system.
4.5.6 Explain the operation of synchros in servo system.
4.5.7 Explain the operation of transmitter in servo system.
4.5.8 Explain the velocity feed-back.
4.5.9 Describe speed control in servo system.
4.5.10 Explain the transient response in servo system.
4.5.11 Draw the circuit diagram of Automatic voltage stabilizer (servo motor type).
4.5.12 Explain the circuit operation of Automatic voltage stabilizer (servo motor type).

5. UNDERSTAND PROGRAMMABLE LOGIC CONTROLLER.

5.1 Express the role of PLC in industry.
5.2 Discuss advantages and disadvantages of PLCs
5.3 Draw the block diagram of PLC System.
5.4 Explain the structure of PLC system
5.5 Discuss input and output modules
5.6 Apply PLC Programming
5.6.1 Understand and develop Ladder diagram
5.6.2 Describe rules and symbols used in PLC Programming
5.6.3 Discuss Logics used in PLC programming (OR, AND, NOT, NOR, NAND)
5.6.4 Describe Timers used in PLC Programming.
5.6.5 Describe Counters used in PLC Programming.
5.5.6 Develop simple PLC Programs.

6. UNDERSTAN ADVANCE SYSTEM CONTROLLERS

6.1 Discuss DCS Control system.

6.2 Describe basic structure of DCS Control
6.3 Discuss advantages and disadvantages of DCS Control.
6.4 Define SCADA
6.5 Describe basic structure of SCADA
6.6 Discuss advantages and disadvantages of SCADA.
6.3 Differentiate between PLC, DCS and SCADA

7. INTRODUCTION TO ROBBOTICS

7.1 Define robotics
7.2 Discuss types of robots
7.3 Describe Programming for robots
7.4 Discuss application of Robotics in Industry.

8. INDUSTRIAL INSTRUMENTATION.

8.1 Define of Industrial Instrumentation.
8.2 Describe Types of Industrial Instrumentation.
8.3 Discuss benefits of Industrial Instrumentation.
8.4 Discuss costs of Industrial Instrumentation in Plants.
8.5 Describe Speed of Signal
8.6 Discuss standard supplies (Electronic and Pneumatic)
8.7 Describe Standard Signals
8.8 Explain Signal Transmission and reception
8.9 Discuss errors in transmission
8.10 Discuss accuracy and precision.
8.11 Differentiate between Analog and Digital Instruments
8.12 Explain application of Industrial Instrumentation in Plant.

9. UNDERSTAND THE CRITERIA OF STABILITY OF A CONTROL SYSTEM.

9.1 List causes of control system stability.
9.2 Explain the methods to improve stability.

El.TR 343: INDUSTRIAL ELECTRONICS

LIST OF PRACTICAL: 96 Hours

1. Demonstrate the performance and parlington pair transistor circuit and enlist its specifications.

The study the performance of a transistor switching with an inductive load and determine the need of protective diode.

To construct a UJT relaxation oscillator, control its frequency

4. Use of UJT in practical circuit such as
   a) Seat Belt Reminder
   b) Pulse Stretcher.
   c) Temperature resistance heater control.
5. Study of SCR data sheet and test of a thyristor.
6. To study the diac and triac temperature control circuit.
7. Use of SCR in practical circuit such as
   a) Light back up circuit.
   b) Over voltage protection circuit
   c) Motor speed / temperature control
   d) Inverter control circuit
   e) Uninterrupted power supply (UPS)
8. Use of LED and LASCR in automatic battery charge.
9. Use of LED for seven segment display.
10. Use of photo transistor in:
    a) Light interruption alarm.
    b) Optical counting system.
11. Use of Photo darlington in remote and intrusion detector.
12. To study the working of Optocoupler for:
    a) interfacing computer with peripheral devices
    b) Floppy disk drive operation.
13. Demonstrate the working of timing in a photographic enlarge using 555 timer.
14. Demonstrate the working of Potentiometer Transducer.
15. Demonstrate the working of LVDT.
16. Demonstrate the working of resistance thermometer.

17. Calibrate a resistance thermometer.
18. Demonstrate the working of Pizo-electric Transducer.
19. Demonstrate the working of Optical Transducer.
20. Demonstrate the closed loop servo control system of a voltage stabilizer.
21. Industrial visit to : Demonstrate PI, PD, and PDI controllers. Write a visit report.
22. PLC Programming: Logic Gate verification.
23. PLC Programming: Use of different Timers
24. PLC Programming: Use of different Counter.
25. PLC Programming: Motor Control Program
25. PLC Programming: A simple Project.
27. Visit of PLC Control Plant.
28. Visit of DCS Control Plant.
29. To study the control circuit and working of a robotics arm.
30. Programming and application of a robotic system.
31. Study of use of Industrial Instrumentation.
32. Identification and working of Transmitter and Receivers.

El.TR-353 POWER ELECTRONICS

T	P	C
2	3	3

Total Contact Hours:

Theory: 64 Hours.
Practical: 96 Hours.

Pre-requisites: Electronics Devices
Electrical Machines

AIMS After studying the subject the student will be able to:

1. To understand the operation of Power Devices.
2. To understand the working of Power Electronics Circuits.

COURSE CONTENTS

1. Power Electronic Devices
2. Discuss the Power Semiconductor Diodes.
3. Discuss the function of Diode Rectification.
4. Identify the function of Power SCRs.
5. Explain the working of Controlled Rectifiers.
6. Identify the Principe of Choppers.
7. Explain the function of Inverters.

1. INTRODUCTION OF POWER ELECTRONICS. (04 Hours)

1.1. Applications of Power Electronics.
1.2 Power Semiconductor Devices.
1.3 Control Characteristics of Power Devices.
1.4 Types of Power Electronics Circuits.

2. POWER SEMICONDUCTOR DIODES. (10 Hours)

2.1 Characteristics of Power Diode.
2.2 Reverse Recovery Characteristics.
2.3 Types of Power Diodes.
  2.3.1 General Purpose Diode.
  2.3.2 Fast Recovery Diode.
  2.3.3 Schottky Diode.
2.4 Effects of Forward and Reverse Recovery Time.
2.5 Series Connected Diode.
2.6 Parallel Connected Diode.

3. DIODE CIRCUITS AND RECTIFIERS (AC TO DC CONVERSION). (10 Hours)

3.1 Rectifier Concepts.
3.2 Single Phase Half Wave Diode Rectifiers with;
  3.2.1 Resistive Load.
  3.2.2 Inductive Load.
  3.2.3 Capacitive Load.
3.3 Single Phase Full Wave Diode Rectifiers with;

3.3.1 Resistive Load.
3.3.2 Inductive Load.
3.3.3 Capacitive Load.
3.4 Three Phase Full- Wave Rectifier.

4. POWER THYRISTORS. (08 Hours)

4.1 Introduction to Power Thyristors.
4.2 Power SCR.
4.3 Characteristics of Power SCRs.
4.4 Series operation of Power SCRs.
4.5 Parallel operation of Power SCRs.
4.6 SCR firing circuits.

5. CONTROLLED RECTIFIERS. (10 Hours)

5.1 Introduction of controlled rectifiers.
5.2 Principles of Phase- Controlled Converter Operation.
5.3 Single Phase Semi converters.
5.3.1 Single Phase Semi converter with RL Load.
5.4 Single Phase Full Converters.
5.4.1 Single Phase Full converter with RL Load.
5.5 Three Phase Half Wave Converters.
5.6 Three Phase Semi Converters
5.6.1 Three Phase Semi converter with RL Load.
5.7 Three Phase Full Converters.
5.7.1 Three Phase Full converter with RL Load.

6 DC CHOPPERS (10 Hours)

6.1 Introduction to DC Choppers.
6.2 Principle of Step-Down Operation.
6.3 Step-Down Chopper with RL load
6.4 Principle of Step-Up Operation
6.5 Chopper Classification
6.6 Switching-Mode Regulators
6.6.1 Buck Regulators
6.6.2 Boost Regulators
6.6.3 Buck-Boost Regulators
6.6.4 Cuk Regulators
6.6.5 Limitations of Single-Stage Conversion

7 INVERTERS (12 Hours)

7.1 Introduction to Inverters.
7.2 Principle of Operation of Inverters.
7.3 Single Phase Bridge Inverters.
7.4 Three-Phase Inverters
7.4.1 180-Degree Conduction
7.4.2 120-Degree Conduction
7.5 Voltage Control of Single-Phase Inverters.
7.5.1 Single-Pulse Width Modulation
7.5.2 Multi-Pulse-Width Modulation

7.5.3 Sinusoidal Pulse-Width Modulation
7.5.4 Modified Sinusoidal Pulse-Width Modulation
7.5.5 Phase-Displacement Control

TEXT AND REFERENCE BOOKS:

1. Power Electronics for Technology, by Ashfaq Ahmad, Prentice Hall, 1998
2. Modern Industrial Electronics, 5th Edition by Timothy J. Maloney, Prentice Hall, 2003.
3. Power Electronics Circuit Devices and Applications by Muhammad H. Rashid
(ISBN # 0133344835)

ELTR-353 POWER ELECTRONICS

INSTRUCTIONAL OBJECTIVES:

1. INTRODUCTION OF POWER ELECTRONICS

1.1 State the Applications of Power Electronics.
1.2 State and explain the Power Semiconductor Devices (Description only).
1.3 Describe the Control Characteristics of Power Devices with suitable diagrams.
1.4 Enlist the Types of Power Electronics Circuits
1.4.1 State Diode Rectifiers,
1.4.2 State Controlled Rectifiers,
1.4.3 State AC voltage Controllers,
1.4.4 State DC Choppers,
1.4.5 State Inverters,
1.4.6 State Static Switches

2. POWER SEMICONDUCTOR DIODES.

2.1 Describe the construction of Power Diode and explain its working with the help of suitable diagrams.
2.1.2 Describe the Characteristics of Power Diode with graphs and equations.
2.2 Explain Reverse Recovery Characteristics with graphs and equations.
2.3 Enlist the Types of Power Diodes.
2.3.1 Describe General Purpose Diode.
2.3.2 Describe Fast Recovery Diode.
2.3.3 Describe Schottky Diode
2.4 Explain Effects of Forward and Reverse Recovery Time with circuit diagram, waveforms and equations.
2.5 State the need of connecting diodes in series with circuit diagrams and v-i characteristics.
2.6 State the need of connecting diodes in Parallel with circuit diagrams and v-i characteristics

3. DIODE CIRCUITS AND RECTIFIERS (AC TO DC CONVERSION).

3.1 Define Rectification and need of rectifiers with circuit diagram and equations.
3.2 Draw the circuit diagram of Single Phase Half Wave Diode Rectifiers.
3.2.1 Explain its working with circuit diagram, wave forms and equations with Resistive Load.
3.2.2 Explain its working with circuit diagram, wave forms and equations with Inductive Load.
3.2.3 Explain its working with circuit diagram, wave forms and equations with Capacitive Load.
3.2.4 State the Applications of Single Phase Half Wave Diode Rectifiers
3.2.5 Simple calculations.
3.3 Draw the circuit diagram of Single Phase Full Wave Diode Rectifiers (Bridge and Centre Tape Rectifiers).
3.3.1 Explain its working with circuit diagram, wave forms and equations with Resistive Load.

3.3.2 Explain its working with circuit diagram, wave forms and equations with Inductive Load.
3.3.3 Explain its working with circuit diagram, wave forms and equations with Capacitive Load.
3.3.4 State the Applications of Single Phase Full Wave Diode Rectifiers.
3.3.5 Simple calculations.

3.4 Draw the circuit diagram of Three Phase Full- Wave Bridge Rectifier. Explain its working with wave forms and equations.
3.4.1 State the Applications of Three Phase Full- Wave Bridge Rectifier.
3.4.2 Simple Calculations

4. POWER THYRISTORS.

4.1 Define the Power Thyristors.
4.1.1 Enlist the types of Power Thyristors.

4.2 Describe the construction of Power SCR with diagrams.
4.2.1 State the working of SCR
4.2.2 Describe the methods to Turn ON the SCR
4.2.3 Describe the methods of Turn OFF the SCR

4.3 State the v-i Characteristics of Power SCRs.
4.3.1 Explain the Two Transistor Model.

4.4 State the need of connecting Power SCRs in Series with circuit diagrams and v-i characteristics

4.5 State the need of connecting Power SCRs in Parallel with circuit diagrams and v-i characteristics.

4.6 Describe need of the SCR firing
4.6.1 State the types of SCR firing methods.

5. CONTROLLED RECTIFIERS.

5.1 Define the controlled rectifiers.
5.1.1 Enlist the types of rectifiers with respect to Supply and their operation

5.2 Explain the operation of Phase- Controlled Converter.

5.3 Define Single Phase Semi converters.
5.3.1 Draw the circuit diagram of Single Phase Semi converter
5.3.2 Explain its working with the help of waveforms with RL Load.
5.3.3 State the uses of Single Phase Semi Converters.
5.3.4 Simple calculations.

5.4 State Single Phase Full Converters.
5.4.1 Draw the circuit diagram of Single Phase Full converter.
5.4.2 Explain its working with the help of waveforms with RL Load.
5.4.3 State the uses of Single Phase Semi Converters.
5.4.3 State the uses of Single Phase Full converter.
5.4.4 Simple calculations.

5.5 Explain the working of Three Phase Half Wave Converters.

5.6 Describe the Three Phase Semi converters
5.6.1 Draw the circuit diagram of Three Phase Semi converter.
5.6.2 Explain its working with the help of waveforms with RL Load.
5.6.3 State the uses of Three Phase Semi converter.

5.6.4 Simple calculations.

5.7 Describe Three Phase Full Converters.

5.7.1 Draw the circuit diagram of Three Phase Full converter.

5.7.2 Explain its working with the help of waveforms with RL Load.

5.7.3 State the uses of Three Phase Full converter.

6 DC CHOPPERS

6.1 Define DC Choppers.

6.2 Describe the principle of Step-Down Operation.

6.2.1. Draw the circuit diagram of Step- Down chopper with resistive load.

6.2.2. Discuss operation of Step- Down chopper with resistive load.

6.2.3. Discuss constant frequency operation.

6.2.4. Discuss variable frequency operation.

6.3 Describe the operation of Step-Down Chopper with RL load.

6.3.1. Draw the circuit diagram of Step- Down chopper with RL load.

6.3.2. Discuss operation of Step- Down chopper with RL load.

6.4 Describe the principle of Step-Up Operation.

6.5 Discuss Chopper Classification

6.5.1. State the operation of Class A Chopper.

6.5.1. State the operation of Class B Chopper.

6.5.1. State the operation of Class C Chopper.

6.5.1. State the operation of Class D Chopper.

6.5.1. State the operation of Class E Chopper.

6.6 Explain the principle of Switching-Mode Regulators

6.6.1. Draw the block diagram of Switching-Mode Regulator

6.6.2. Discuss the operation of Switching-Mode Regulator.

6.6.3. List the four basic topologies of Switching-Mode Regulators

6.6.3.1 Discuss the operation of Buck Regulators

6.6.3.2. Discuss the operation of Boost Regulators

6.6.3.3. Discuss the operation of Buck-Boost Regulators

6.6.3.4. Discuss the operation of Cuk Regulators

6.6.5 Discuss the limitations of Single-Stage Conversion

7 INVERTERS

7.1 Define Inverter.

7.1.1 State Need of Inverters.

7.2 Explain the working Principle of Inverters.

7.2.1 Draw the circuit diagram of Inverters.

7.2.2 Explain the working of Inverter with waveforms.

7.3 Draw the circuit diagram of Single Phase Bridge Inverters.
Explain the working of Single Phase Bridge inverters with waveforms and equations.

7.3.1 Simple calculations of Single Phase Bridge Inverters.

7.4 Explain Three-Phase Inverters

7.4.1 Draw the circuit diagram of Three-Phase Inverters for 180-Degree Conduction

7.4.2 Describe its working with waveforms and equations.

7.4.3 Simple calculations of Three-Phase Inverters for 180-Degree

Conduction

7.4.5 Draw the circuit diagram of Three-Phase Inverters for 120-Degree Conduction

7.4.6 Explain its working with waveforms and equations.

7.4.7 Simple calculations of Three-Phase Inverters for 120-Degree Conduction

7.5 Enlist Techniques for Voltage Control of Single-Phase Inverters.

7.5.1 Explain the Single-Pulse Width Modulation to control voltage of Single-Phase Inverters.

7.5.2 Explain the Multi-Pulse-Width Modulation to control voltage of Single-Phase Inverters.

7.5.3 Explain the Sinusoidal Pulse-Width Modulation to control voltage of Single-Phase Inverters.

7.5.4 Explain the Modified Sinusoidal Pulse-Width Modulation to control voltage of Single-Phase Inverters.

7.5.5 Explain the Phase-Displacement Control to control voltage of Single-Phase Inverters.

El.TR 353: POWER ELECTRONICS

LIST OF PRACTICAL: 96 Hours

1. Study the characteristics of Power Diode.
2. Use Data book for studying characteristics of different types of power diodes
3. Study the operation of Power diodes in series.
4. Study the operation of Power diodes in parallel.
5. Assemble a Single Phase Half Wave Diode Rectifiers with resistive load and study its operation.
6. Assemble a Single Phase Half Wave Diode Rectifiers with inductive load and study its operation.
7. Assemble a Single Phase Half Wave Diode Rectifiers with capacitive load and study its operation.
8. Assemble a Single-Phase Diode-Bridge with resistive load and study its operation.
9. Assemble a Single-Phase Diode-Bridge with inductive load and study its operation.
10. Assemble a Single-Phase Diode-Bridge with capacitive load and study its operation.
11. Assemble a Three-Phase Diode-Bridge and study its operation.
12. Study the characteristics of Power SCR.
13. Study the operation of Power SCR in series.
14. Study the operation of Power SCR in parallel.
15. Assemble a Single-Phase Semi converter with RL Load and study its operation.
16. Study the operation of Single-Phase Full converter with RL Load.
17. Study the operation of Three-Phase Full converter with RL Load.
18. Study the operation of Step-Down (Buck) DC-DC Converters.
19. Study the operation of Step-Up (Boost) DC-DC Converter
20. Study the operation of Step-Down/Up (Buck-Boost) DC-DC Converter in CCM.
21. Study the operation of Step-Down/Up (Buck-Boost) DC-DC Converter in DCM.

22. Compare the frequency Response of a Buck-Boost converter in CCM and DCM.
23. Study the operation of Power Correction circuit.
24. Study of Pulse Width Modulation and filter characteristics.
25. Assemble a Single Phase Bridge Inverters and study its operation.
26. Study the operation of Three-Phase Inverters.
27. Study the operation of Voltage Control of Single-Phase Inverters.
28. Study the operation of Flyback DC-DC Converter.
29. Study the operation of Forward DC-DC Converter.
30. Study the operation of Full Bridge DC-DC Converter.

El.TR-363 Microcontrollers Programming and Applications

T	P	C
2	3	3

Total contact hours:

Theory: 64 Hours
Practical: 96 Hours.

Prerequisites:-

Digital Electronics

AIMS After studying the subject the student will be able to:

1. To understand the architecture of microcontroller.
2. To understand the role of microcontroller in control.
3. To develop a program for a microcontroller.

COURSE CONTENTS

1. Microcontroller Basics (08 Hours)

1.1. Difference between microprocessor and microcontroller
1.2. Use of microcontroller in industry and general life
1.3. Need of programming microcontroller
1.4. Use of flow chart in programming
1.5. Different parts of flow charts
1.6. Flow of flow charts

2. Microcontroller Architecture (06 Hours)

2.1. General Block Diagram of a microcontroller.
2.2. Operation of each block
2.3. Buses

3. Microcontroller Instruction Sets. (06 hours)

3.1. Data Transfer Instructions
3.2. Logic and Shift Instructions.
3.3. Arithmetic Instructions.

4. Memory Interface (03 Hours)

4.1. Basic concept of memory interfacing

5. Addressing Modes (04 hours)

5.1. Different Addressing Modes
5.2. Application of Addressing mode in programming

6. Assembly level Language programming (06 Hours)

6.1. Basic requirements of Assembly Language programming
6.2. Assembler Directives
6.3. Use of Instructions and modes of Addressing in Assembly language Programming.

7. Program development (12 Hours)

7.1. Data Structures and Program Loops
7.2. Stack and Subroutines
7.3. Timer Functions
7.4. Input Capture
7.5. Output Capture
7.6. Program development

8. Interrupts and interrupt applications (05 Hours)

8.1. Type of interrupts
8.2. Role of interrupts in programming
8.3. Real Time Interrupt Functions

9. Peripheral Support chip (04 Hours)

9.1. Need of peripheral devices for microcontrollers
9.2. Different peripheral support chip
9.3. Requirements for connecting support chip

10. Digital Interfacing (03 Hours)

10.1. Digital interfacing, concepts, needs and applications.

11. Analog interfacing and industrial control (03 Hours)

11.1. Interfacing Analog Inputs and Outputs
11.2. Application of microcontroller in industrial control

12. Microcontroller system applications. (04 Hours)

12.1. Microcontroller system application in Electronic System.
12.2. Microcontroller system application in Industrial Control.
12.3. Microcontroller system application in Automation.

TEXT AND REFERENCE BOOKS:

Bates M — *PIC Microcontrollers* (Newnes, 2004) ISBN 0750662670

Dogan I — *Microcontroller Based Applied Digital Control* (John Wiley and Sons, 2006) ISBN 0470863358

Han Way Huang – An Introduction Software and Hardware Interfacing, 2nd ed. ISBN 0-7668-1600-1

El.TR-363 Microcontrollers Programming and Applications

INSTRUCTIONAL OBJECTIVES

1. **Understand Microcontroller Basics**
   - 1.1. Differentiate between microprocessor and microcontroller
   - 1.2. Discuss the use of microcontroller in industry and general life
   - 1.3. Describe the need of programming microcontroller
   - 1.4. Discuss the use of flow chart in programming
     - 1.4.1. Express different parts of flow charts
     - 1.4.2. Express flow of flow charts

2. **Understand Microcontroller Architecture**
   - 2.1. Draw General Block Diagram of a microcontroller.
   - 2.2. Discuss operation of each block
   - 2.3. Discuss Buses in mirocontrollers

3. **Apply Microcontroller Instruction Sets.**
   - 2.1.Explain Data Transfer Instructions
   - 2.2. Explain Logic and Shift Instructions.
   - 2.3. Explain Arithmetic Instructions.

4. **Understand Memory Interface**
   - Describe basic concepts of memory interfacing.

5. **Apply Addressing Modes**
   - Explain different Addressing Modes
   - Apply of Addressing mode in programming.

6. **Understand Assembly level Language programming**
   - Explain basic requirements of Assembly Language programming
   - Describe Assembler Directives
   - Use of Instructions and modes of Addressing in Assembly language Programming.

7. **Understand Program development**
   - Discuss Data Structures and Program Loops
   - Discuss Stack and Subroutines
   - Describe Timer Functions
   - Describe Input Capture
   - Describe Output Capture
   - Explain Program development.

8. **Use Interrupts and interrupt applications**
   - Discuss type of interrupts
   - Discuss role of interrupts in programming
   - Describe Real Time Interrupt Functions.

9. **Understand Peripheral Support chip**

Discuss the need of peripheral devices for microcontrollers
Discuss different peripheral support chip
Describe requirements for connecting support chip.

10. Understand Digital Interfacing

Discuss digital interfacing, concepts, needs and applications.

11. Understand Analog interfacing and industrial control

Explain Interfacing Analog Inputs and Outputs
Discuss application of microcontroller in industrial control.

12. Understand Microcontroller system applications.

Explain Microcontroller system application in Electronic System.
Explain Microcontroller system application in Industrial Control.
Explain Microcontroller system application in Automation.

El.TR 363 Microcontrollers Programming and Applications

LIST OF PRACTICAL

1. Study of Microcontroller System
2. Develop a program for Flash LED on and off
3. Data transfer: load immediate and store direct (ext) to memory.
4. Data transfer: load immediate and store indexed to memory
5. Write a load, store and transfer data program from a description
6. Data transfer: Push/ Pull operations with the stack
7. Data transfer: Transfer and exchange operations
8. Logical AND operations
9. Logical OR operations
10. Logical EOR operations
11. Add two 2-byte numbers with a 3-byte sum
12. BCD Add
13. Subtract two 2-byte numbers with a 2-byte difference (positive result)
14. Subtract larger from a smaller two 2-byte number (negative result)
15. Add a array of eight numbers using a loop.
16. Average of sum of array by dividing.
17. Multiply and Divide convert F = (5/9)C+32
18. Reading Dipswitch/ display at port B LED's
19. Displaying LCD message using monitor LCD subroutines w/passing parameters
20. "ASCII" subroutine converting 0-F hex byte to an ASCII character byte.
21. "Through BCD" convertor, convert a 1-byte binary number into a 3-byte BCD number
22. Continuous read using a delay subroutine
23. SWI Interrupt function
24. Sequencer light show
25. Sequencer Traffic light controller.
26. IC3 interrupt program
27. Real Time Interrupt Function