اسلامیات / مطالعہ پاکستان

مضمون (سال دوم)	GEN 211	ٹی	پی	سی
حصہ اول اسلامیات		1	0	1
حصہ دوم مطالعہ پاکستان		کل وقت: 20 گھنٹے		

موضوعات

1. سورۃ المومنون آیت ۱ تا ۱۱ آیات کا مع ترجمہ
2. درس منتخب احادیث مع ترجمہ و تشریح
   - ☆ خیارکم من تعلم القرآن وعلمه
   - ☆ لا ایمان لمن لا امانة له ولا دین لمن لا عهد له
   - ☆ وایاکم والظن فان الظن اکذب الحدیث
   - ☆ من احدث فی امرنا ہذا ما لیس منه فهو رد
   - ☆ من حمل علینا السلاح فلیس منا
   - ☆ انا و کافل الیتیم فی الجنة
   - ☆ لا ضرر ولا ضرار فی الاسلام
   - ☆ کلکم راع وکلکم راع وکلکم مسئول عن رعیته
3. سیرۃ طیبہ
   - ☆ مکی زندگی۔ دارارقم۔ ہجرت
   - ☆ مدنی زندگی۔ مواخات۔ میثاق مدینہ۔ غزوہ بدر (اسباب و نتائج)
4. حضور ﷺ بحیثیت
   - ☆ خطیب، مبلغ، مدبر
   - معلم کامل، سربراہ خاندان
5. اسلامی معاشرہ
   - نظام تعلیم اور اس کے مقاصد۔ عدل و انصاف۔ امر بالمعروف۔ نہی عن المنکر
   - جہاد۔ کسب حلال۔ سچ (اہمیت و فضیلت)
6. 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 اختصار کے ساتھ بیان کر سکے
- ☆ حضور ﷺ کی ہجرت کا واقع بیان کر سکے
- ☆ حضور ﷺ کی مدنی زندگی اختصار سے بیان کر سکے
- ☆ حضور ﷺ کی بطور معلم خصوصیات بیان کر سکے

☆ حضور ﷺ کی بطور سربراہ خاندان بیان کر سکے

اسلامی معاشرہ

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

خصوصی مقاصد:

☆ اسلامی معاشرہ کا معنی و مفہوم بیان کر سکے

☆ اسلامی معاشرہ کی امتیازی خصوصیات بیان کر سکے

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

☆ تبلیغ کے لغوی معنی بیان کر سکے

☆ تبلیغ کی اہمیت و ضرورت بیان کر سکے

☆ جہاد کے لفظی و اصطلاحی معنی بیان کر سکے

☆ جہاد کی اہمیت بیان کر سکے

☆ جہاد اور قتال میں فرق بیان کر سکے

☆ جہاد کی مختلف اقسام بیان کر سکے

☆ لفظ مسجد کی تعریف کر سکے

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

اسلامی ریاست

عمومی مقاصد: اسلامی ریاست کی خصوصیت بیان کر سکے

خصوصی مقاصد:

☆ ریاست کی تعریف بیان کر سکے

☆ اسلامی ریاست میں طرز حکومت سے آگاہی حاصل کر سکے

☆ اسلامی ریاست کی خصوصیات بیان کر سکے

☆ اسلامی ریاست کے اغراض و مقاصد بیان کر سکے

☆ اسلامی ریاست کے قیام کیلئے جدوجہد کر سکے

نصاب مطالعہ پاکستان

سال دوم

حصہ دوم

ٹی	پی	سی
1	0	1

کل وقت: 32 گھنٹے

موضوعات

- ☆ دو قومی نظریہ
- ☆ تحریک پاکستان
- ☆ انڈین 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 اخلاقیت — ٹی ٹی سی

سال دوم — 1 D 1

کل وقت: 20 گھنٹے

موضوعات

معاشرتی اقدار، اخلاط بہمیہ۔ قوم۔ قومی سطح۔ شہری سطح۔ صنعتی ادارہ کی سطح۔ ضروریات۔ ورثہ

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

نصاب اخلاقیات

سال دوم

تدریس مقاصد

عمومی مقاصد :

طالب علم: اخلاقیات کی اہمیت و ضرورت سے سمجھ بوجھ 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

تحمل برداشت۔ قوت ارادی۔ لگن جذبہ۔ وسیع النظری۔ بے غرضی۔ انسانی دوستی حفاظتی۔ شعور۔ پسند آزادی۔ کامل اکائی اور خود شناسی کی اہمیت بیان کر سکے

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

DAE in Computer Information Technology

Course Code:	Mgm 211	**T**	**P**	**C**
Course Title:	**Business Communication**	1	0	1

Second course on English language focusing on business communication. It aims to develop communication skills as applied in business and commerce such as the writing and business correspondence. It covers oral communication and art of listening, interviewing, and report writing among others. It is a pure class discussion.

Course Objectives

At the end of the course the students are expected to be able to

- Understand the basic principles of good and effective business writing in commercial and industrial fields.
- Use the English language effectively for communication in business
- Apply knowledge and skill to write business communication with confidence and ease.
- Write legibly in handwriting and compose communication documents with correct formats.
- Appreciate the usefulness of written language

COURSE OUTLINE

Contents	**Hours**
1. Communication Process.	**6**
1.1. Purposes of communication	
1.2. Communication process	
1.3. Distortions in communication	
1.4. Consolidation of communication	
1.5. Communication flow	
1.6. Communication for self development	
2. Oral Communication Skills	**6**
2.1. Significance of Speaking	
2.2. Verbal and Non-verbal Messages	
2.3. Strategic Steps of Speaking	
2.4. Characteristics of Effective Oral Messages	
2.5. Communication Trafficking	
2.6. Oral Presentation	
3. Questioning Skills	**3**
3.1. Nature and Types of Questions	
3.2. Characteristics of a Good Questions	
3.3. Questioning Strategy	
4. Listening Skills	**5**
4.1. Principles of Active Listening	
4.2. Skills of Active Listening	
4.3. Barriers to Listening	
4.4. Reasons of Poor Listening.	
4.5. Giving Feedback.	

5. Interviewing Skills **3**

5.1. Significance of Interviews
5.2. Characteristics of Interviews
5.3. Activities in an Interviewing Situation
5.4. Types of Interviews.
5.5. Interviewing Strategy.

6. Report Writing **3**

6.1. Goals of Report Writing
6.2. Report Format
6.3. Types of Reports
6.4. Report Writing Strategy.

7. Reading Comprehension **2**

7.1. Reading Problems
7.2. Four Reading Skills

8. Group Communication **4**

8.1. Purposes of Conducting Meetings
8.2. Planning a Meeting
8.3. Types of Meetings
8.4. Selection of a Group for Meeting
8.5. Group Leadership Skills
8.6. Running a Successful Meeting
8.7. Active Participation Techniques

Total Hours: 32

References

- **Effective Business Communication and Report Writing**, Sh. Ata-ur-Rehman.
- **Technical Reporting**, Ulman J.N. Could JR..

Mgm-211 Business Communication

LEARNING OBJECTIVES

1. **Communication Process**
   - 1.1. Understand the communication process
   - 1.2. State the benefits of two way communication
   - 1.3. Describe a model of communication process.
   - 1.4. Explain the major communication methods used in organization
   - 1.5. Identify the barriers to communication and methods of overcoming these barriers
   - 1.6. Identify misconceptions about communication

2. Oral Communication Skills
   - 2.1. Understand the process of oral communication
   - 2.2. Identify speaking situations with other peoples.
   - 2.3. Identify the strategy steps of speaking.
   - 2.4. Identify the characteristics of effective speaking.
   - 2.5. State the principles of one-way communication.
   - 2.6. State the principles of two-way communication.
   - 2.7. Identify the elements of oral presentation skills.
   - 2.8. Determine the impact of non-verbal communication on oral communication.

3. Questioning Skills
   - 3.1. Determine the uses of questioning skills and clarify information in the oral communication process
   - 3.2. Identify different types of questions.
   - 3.3. Determine the purpose of each type of question and its application.
   - 3.4. Identify the hazards to be avoided when asking questions.
   - 3.5. Demonstrate questioning skills.

4. Listening Skills
   - 4.1. Demonstrate the use of active listening skill in the oral communication process
   - 4.2. State the principles of active listening.
   - 4.3. Identify skills of active listening.
   - 4.4. Identify barriers to active listening.
   - 4.5. State the benefits of active listening.
   - 4.6. Demonstrate listening skills.
   - 4.7. Explain the importance of giving and receiving feed back.

5. Interview Skills
   - 5.1. Determine the appropriate interview type for the specific work-related situation and conduct a work-related interview.
   - 5.2. State the significance of interviews.
   - 5.3. State the characteristics of interviews.
   - 5.4. Explain the activities in an interviewing situation.
   - 5.5. Describe the types of interviews
   - 5.6. Explain the interviewing strategy
   - 5.7. Prepare instrument for a structured interview

6. Report Writing

6.1. Prepare a report out-line, based on subject matter and audience
6.2. Identify the different types of reports
6.3. Determine when to use an informal or formal report presentation
6.4. Identify the stages of planning a report
6.5. Identify the parts of a report and choose the parts appropriate for each type of report
6.6. Draft a report outline

7. Reading Comprehension

7.1. Demonstrate reading comprehension
7.2. Identify major reading problems
7.3. Identify basic reading skills.
7.4. State methods of previewing written material
7.5. Identify methods of concentration when reading.
7.6. Demonstrate reading comprehension.

8. Group Communication

8.1. Understand the principles of group communications
8.2. State the purpose and characteristics of major types of meeting.
8.3. Explain responsibilities of a meeting/committee.
8.4. Identify problems likely to be faced at meeting and means to overcome these problems.
8.5. Distinguish between content and process at meetings.
8.6. Explain the key characteristics of a good group facilitator.

Course Code: **Math 213**	**T**	**P**	**C**
Course Title: **Applied Mathematics II**	3	0	3

The higher mathematics course of calculus. It provides the student the mathematical skills and knowledge applicable to technology. It covers standard topics of differential and integral calculus such as limits and differentiation of different functions, and their integration. This is all classroom discussion.

Course Objectives

At the end of the course the students are expected to be able to

- Understand the concepts of function and limits, differentiation, definite integral and integration.
- Perform differentiation and integration of algebraic, trigonometric, logarithmic and exponential functions.
- Apply methods of differentiation in solving problems of rates, minima and maxima.
- Solve technological problems of practical applications using the methods of differential and integral calculus.
- Manipulate mathematical expressions involving differentiation and integration with ease and confidence
- Demonstrate clarity and logic in expressing problems and their solutions

COURSE OUTLINE

Contents	**Hours**
1. Functions and Limits	**9**
1.1. Constant and Variable Quantities	
1.2. Functions and their classification	
1.3. The concept of Limit and Limit of a Function	
1.4. Fundamental Theorems on Limit and Some important Limits	
2. Differentiation	**9**
2.1. Increments	
2.2. Differential Coefficient or Derivative and Differentiation by first Principle	
2.3. Geometrical Interpretation of Differential Coefficient	
2.4. Differential Coefficient of Xn, (ax + b)n and Three important rules	
3. Differentiation of Algebraic Functions	**9**
3.1. Explicit Functions and Implicit Functions	
3.2. Parametric forms	

4. Differentiation of Trigonometric Functions **9**

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

5. Differentiation of Logarithmic and Exponential Functions **6**

5.1. Differentiation of ln x and Log ax
5.2. Differentiation of ax and ex

6. Rate Of Change of Variable **6**

6.1. Increasing and Decreasing Functions
6.2. Maxima and Minima Values
6.3. Criteria for maximum and Minimum Values
6.4. Methods of Finding Maxima and Minima

7. Integration **9**

7.1. Concept
7.2. Fundamental Formulas
7.3. Important Rules

8. Methods of Integration **9**

8.1. Integration by substitution
8.2. Integration by parts

9. Definite Integrals **6**

9.1. Properties
9.2. Application to area

10. Plane Analytic Geometry and Straight Line **9**

10.1. Coordinate System
10.2. Distance Formula and Ratio Formulas
10.3. Inclination and Slope of a Line
10.4. The slope Formula

11. Equations of Straight Line **6**

11.1. Some important Forms
11.2. General Form and Angle Formula
11.3. Parallelism and Perpendicularity

12. The Equations of Circle **9**

12.1. Standard form of Equation
12.2. Central form of Equation and General form of Equation
12.3. Radius and Coordinates of the Centre

Total Hours: 96

References

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

Math 233 – Applied Mathematics II

LEARNING OBJECTIVES

1. Functions and Limits

1.1. Use the concept of functions and their limits in solving simple problems.
1.2. Define a function.
1.3. List all types of functions.
1.4. Explain the concept of limit and limit of a function.
1.5. Explain fundamental theorems on limits.
1.6. Derive some important limits.
1.7. Solve simple problems on limits.

2. Differentiation

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

3. Differentiation of Algebraic Functions

3.1. Use rules of differentiation to solve problems of algebraic functions.
3.2. Differentiate xn and (ax+b)n.
3.3. Derive product, quotient and chain rules.
3.4. Find derivatives of implicit functions and explicit functions
3.5. Differentiate parametric forms, functions with respect to another function and by rationalization.
3.6. Solve problems using these formulas.

4. Differentiation of Trigonometric Functions

4.1. Use rules of differentiation to solve problems involving trigonometric functions.
4.2. Differentiate from first principle sin x, Cos x, tan x.
4.3. Derive formulas for derivation of Sec x, Cosec x, Cot x.
4.4. Find differential coefficients of inverse trigonometric functions.

5. Differentiation of Logarithmic and Exponential Functions

5.1. Use rules of differentiation to logarithmic and exponential functions.
5.2. Derive formulas for differential coefficient of logarithmic and exponential functions.
5.3. Solve problems using these formulas.

6. Rate of Change of Variable

6.1. Understand rate of change of one variable with respect to another.
6.2. Write expression for velocity, acceleration and slope of a line.
6.3. Define maxima and minima values, point of inflexion.

6.4. Explain criteria for maxima and minima values of a function.
6.5. Solve problems involving rate of change of variables.

7. Integration

7.1. Apply concept of integration in solving technological problems
7.2. Explain the concept of integration.
7.3. Write basic theorems of integration.
7.4. List some important rules of integration.
7.5. Derive fundamental formulas of integration.
7.6. Solve problems based on these formulas/rules.

8. Methods of Integration

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

9. Definite Integral

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

10. Plane Analytic Geometry and Straight Line

10.1. Understand the concept of plane analytic geometry.
10.2. Explain the rectangular coordinate system.
10.3. Locate points in different quadrants.
10.4. Derive distance formula, prove section formulas and Derive Slope formula.
10.5. Solve problem using the above formulas.

11. Equations of Straight Line

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

12. The Equations of Circle

12.1. Solve technological problems using equation of circle.
12.2. Define a circle.
12.3. Describe standard, central and general forms of the equation of a circle.
12.4. Convert general form to the central form of equation of a circle.

12.5. Deduce formulas for the radius and the coordinates of the center of a circle from the general form.
12.6. Derive equation of the circle passing through three given points.
12.7. Solve problems involving these equations.

Course Code: **CIT- 213**	**T**	**P**	**C**
Course Title: Object Oriented Programming	2	3	3

Another course on programming in object-oriented language and in visual environment. It intends to provide students with working skills and knowledge in writing programs using the GUI-oriented Visual Basic programming language. The course covers Visual Basic IDE, event-driven programming, GUI interface, control constructs, functions, graphics, objects and data programming. It comes with laboratory component to complement the theory.

Course Objectives

At the end of the course the students are expected to be able to

- Understand the concepts and methodology of object-oriented programming in GUI-environment.
- Formulate logically problems and their solutions
- Use Visual Basic programming language to solve problems
- Represent real-world information into computer data.
- Write Visual Basic program
- Use input devices with ease and confidence
- Appreciate the effectiveness of GUI interface.

COURSE OUTLINE

Contents	**Hours**
1. Introduction to Visual Basic	**2**
1.1. Visual programming	
1.2. Visual Basic Integrated Development Environment	
2. Visual Basic Programming	**4**
2.1. Event-driven Programs	
2.2. Controls and Properties	
2.3. Labels, Buttons and Textboxes	
3. Visual Basic Statement	**6**
3.1. Data Types	
3.2. Variables	
3.3. Expressions and Operators	
3.4. Conditional Statement	
3.5. Logical Operators	
3.6. Iteration	

4. Modular Programming **4**
- 4.1. Subroutines and Functions
- 4.2. Invocation
- 4.3. Passing of Parameter
- 4.4. Visual Basic Built-in Function

5. Debugging **1**
- 5.1. Visual Basic Debugger
- 5.2. Breakpoints
- 5.3. Stepping Through Program

6. GUI Interface **2**
- 6.1. Menus
- 6.2. Tool Bars
- 6.3. Dialog Boxes

7. Graphics Controls **1**
- 7.1. Image Control
- 7.2. Line and Shape Control

8. Database Programming **4**
- 8.1. Files
- 8.2. Tables
- 8.3. Data Control
- 8.4. Data Form

9. Objects **6**
- 9.1. ActiveX
- 9.2. OLE Processing
- 9.3. Modules and Class Modules
- 9.4. Object Members
- 9.5. Class Module Properties
- 9.6. Object Properties and Object Variables
- 9.7. Class Instance and Inheritance

10. Printing **1**
- 10.1. Print Introduction
- 10.2. Printer Object
- 10.3. Print Method

11. Application Distribution **1**
- 11.1. Compilation
- 11.2. Project Properties
- 11.3. Application Setup

Total Hours: 32

References

- **Mastering Visual Basic 6**, Evangelos Pertoutsos, Sybex Computer Books, Inc.
- **Visual Basic 6 Programmer's Guide**, Eric Stroo, Editor, Microsoft Press
- **Teach Yourself Visual Basic 6 in 24 Hours**, Greg Perry, Sams Publishing

CIT-213 – Object Oriented Programming

LEARNING OBJECTIVES

1. Introduction to Visual Basic

1.1. Describe visual programming
1.2. List different versions of Visual Basic for different users
1.3. Install Visual Basic software
1.4. Launch Visual Basic
1.5. Identify components of Visual Basic opening window
1.6. Navigate Visual Basic window

2. Visual Basic Programming

2.1. Describe event-driven program
2.2. Relate event-driver program with GUI
2.3. Identify controls and properties of objects
2.4. Manipulate values in control and properties of objects
2.5. Create labels, buttons and textboxes using Visual Basic

3. Visual Basic Statement

3.1. Enumerate data types used in Visual Basic
3.2. Describe each data type
3.3. Declare variables in Visual Basic program
3.4. Write simple program in Visual Basic with conditional statements
3.5. Write simple program in Visual Basic with iteration

4. Modular Programming

4.1. Define subroutine in Visual Basic
4.2. Describe functions in Visual Basic
4.3. Declare and invoke functions in Visual Basic program
4.4. Define ways of passing parameter in a function
4.5. Use built-in Visual Basic functions in programs

5. Debugging

5.1. Invoke and use Visual Basic debugger
5.2. Set breakpoints in Visual Basic program for debugging
5.3. Step through a program in debugger

6. GUI Interface

6.1. Create menus in program
6.2. Write Visual Basic programs with toolbar
6.3. Write Visual Basic program with dialog boxes

7. Graphics Controls

7.1. Write Visual Basic program with Image Control
7.2. Write Visual Basic program with line and shape Control

8. Database Programming

8.1. Describe files as used in Visual Basic database programming
8.2. Open, close and use files in Visual Basic program
8.3. Describe database tables
8.4. Create database tables in Visual Basic
8.5. Write Visual Basic program with data control objects
8.6. Write Visual Basic program with data form

9. Objects

9.1. Describe ActiveX objects of Visual Basic
9.2. Describe Object-Linking and Embedding
9.3. Define Visual Basic modules
9.4. Define Visual Basic class
9.5. Differentiate method and class
9.6. Identify object members
9.7. Describe object properties
9.8. Define and declare object variables in Visual Basic
9.9. Describe class instance and inheritance
9.10. Write Visual Basic program with object

10. Printing

10.1. Describe printer method in Visual Basic
10.2. Use print method of Visual Basic in program

11. Application Distribution

11.1. Compile Visual Basic program
11.2. Define properties of project (Visual Basic program)
11.3. Set up an application program in Visual Basic

CIT-213 – Object Oriented Programming

LIST OF PRACTICALS

1. Navigation of Visual Basic Integrated Development Environment
2. Control and Properties
3. Creation of Label, Button and Textboxes
4. Program Using Conditional Statement
5. Program Using Looping
6. Program Making Menus, Toolbars and Dialog Box
7. Program Making Graphics Objects
8. Individual Major Project: Moderately-sized program in Visual Basic

Course Code: **Comp 225**	**T**	**P**	**C**
Course Title: **Microprocessor Architecture**	3	6	5

The core course on computer hardware dealing with the main components of personal computers. It intends to provide students with working knowledge of how the central processing unit (CPU) of microcomputers, the Intel microprocessor, operates and its instruction set. It discusses organization of computer, study of Intel 8088/8086 family of microprocessor, its instruction set and programming, interfacing and support devices. It comes with laboratory component to reinforce the theoretical classroom discussion.

Course Objectives

At the end of the course the students are expected to be able to

- Understand the concepts and design, organization and operational principles of microprocessor especially, Intel 8088/86 microprocessor.
- Use the instruction set of Intel 8088/86 to write assembly language program.
- Create hardware interface for Intel 8088/86 microprocessor
- Explain system timing and bus multiplexing
- Write amply documented and readable assembly program
- Appreciate the logic and simplicity of the organization of microprocessors

COURSE OUTLINE

Contents	**Hours**
1. Fundamental Concepts	**5**
1.1. Address, Data and Control Buses	
1.2. Fundamental Control Bus	
1.3. Tristate Devices in Bus-based Systems	
1.4. Definition of Terms	
1.5. Microcomputer Block Diagram.	
1.6. Memory Devices	
1.7. I/O ports.	
1.8. Basic Operation of Computer	
1.9. Roles of Addressing and Control Signals	
2. Introduction to Intel 8088/86	**5**
2.1. Definition of Terms	
2.2. Instruction Decoder	
2.3. Accumulator, ALU, Condition Flags, Addressing Registers and Program counter	
2.4. Block Diagram of Intel 8088/86 Microprocessor	
2.5. Functional Pin Definitions for the 8088/86	

2.6. Power and Clocking Requirements of 8088/86
2.7. 8088/86 Data Bus Multiplexing and De-Multiplexing.
2.8. Production of Conventional Control Signals from the 8088/86 Control Signals

3. Introduction to Intel SDK-88/86 **5**

3.1. Main Sections of SDK-88/86 and Its Components
3.2. Block Diagram of SDK-88/86.
3.3. SDK-88/86 System Schematics
3.4. SDK-88/86 DC Power Supply Levels
3.5. Characteristics of SDK-88/86 Clock and Basic Control Bus Signals
3.6. Functions and Advantages of Intel 8088/86 Support Devices

4. Introduction to Assembly Programming **5**

4.1. Definition of Terms
4.2. Design of Algorithms
4.3. Representation of Data, Addresses and Printable Characters
4.4. Process of Hand Assembly.
4.5. Addresses and Data in Assembly Language Programming

5. Programming the Intel **28**

5.1. 8088/86 Programming Model
5.2. Instruction Groups in the 8088/86 Instruction Set
5.3. Data Transfer Group
5.4. Arithmetic Group and Logical Group
5.5. Branch Group
5.6. Stack and Machine Control
5.7. Addressing Modes of the 8088/86.
5.8. Main features of SDK-88/86 Keyboard Monitor
5.9. Subroutines
5.10. Basic Operation of 8088/86 Stack and Stack Pointer

6. Intel 8088/86 System Timing and Bus Multiplexing **8**

6.1. Definition of terms
6.2. 8088/86 Machine Cycles
6.3. Memory Read and Memory Write
6.4. I/O Read and I/O Write
6.5. Interrupt Acknowledge and Bus Idle
6.6. Production of Required Instruction Cycle
6.7. Timing Diagram for Common 8088/86 Instructions.
6.8. Purpose and implementation of the 8088/86 Wait, Halt and Hold states.
6.9. Interpretation of 8088/86 State Transition Diagram
6.10. Timing of the 8088/86 Multiplexed Bus Structure.

7. SDK-88/86 System Hardware **12**

7.1. Block Diagram of the SDK-88/86 Main Board
7.2. Operation of SDK-88/86 Main Board Sub-systems

7.3. Block Diagram of the SDK-88/86 Expansion Board
7.4. Operation of Expansion Board Sub-systems
7.5. Use of INTEL 8088/86 Support Devices to build a Minimum System.
7.6. SDK-88/86 Memory and I/O Maps.
7.7. Use of the Expansion Board Address Select Jumpers

8. Interfacing to Intel 8088/86 **20**

8.1. Isolated I/O and Memory Mapped I/O
8.2. Absolute Address and Linear Address Decoding
8.3. Unconditional and Polled I/O
8.4. Interrupt Driven I/O
8.5. Interrupt Service Routine
8.6. Interrupt Vector
8.7. Direct Memory Access
8.8. Device Request Flag and Service Request Flag
8.9. Strobed Ports
8.10. Design of Simple Input and/or Output Ports
8.11. 8088/86 Vectored Interrupt System
8.12. Use of Priority Interrupt Control Unit in 8088/86-based Systems
8.13. Fundamentals of DMA-driven I/O in 8088/86-based System

9. 8-Bit Support Devices **8**

9.1. 8088/86 Support device
9.2. General Purpose Support device
9.3. Programmable Support Device
9.4. Operation and Programming of Intel 8255 Programmable Peripheral Interface.
9.5. Operation and Programming of Intel 8088/86 Support Devices
9.6. Function of Intel 8-bit Support Devices
9.7. Interface Designing and Operation Demonstration
9.8. SDK-88/86 Environment

Total Hours: 96

References

- **The 80x86 Family, Design, Programming and Interfacing**, John Uffenbach
- **MCS-88/86 Users Manual**, Intel Corporation
- **SKD-88/86 Trainer**, User Manual
- **Microprocessor Architecture, Programming and Applications with the 8088/86/8080A**, Ramesh, S. Gaonkar, MacMillan
- **Intel Microprocessors: Hardware, Software, and Applications**, Roy W. Goody, McGraw Hill

CIT-225 – Microprocessor Architecture

LEARNING OBJECTIVES

1. Fundamental Concepts

1.1. Define and describe the purpose of
1.2. Address, data and control busses
1.3. Fundamental control bus
1.4. Describe the use of tristate devices in bus based systems
1.5. Define the following basi0.c terms: ALU, Microprocessor, Microcomputer, Storage, Input and output ports, Input and output devices, Software program, Hardware, Address decoding and microcontrollers
1.6. Sketch and explain a basic microcomputer block diagram.
1.7. Describe the basic purpose and types of memory devices.
1.8. Describe the basic purpose and types of I/O ports.
1.9. Describe the following basic principles of computer action: Instruction fetch and execution, Memory read cycle, Memory write cycle, I/O read cycle, I/O write cycle
1.10. Describe roles of addressing and control signals

2. Introduction to Intel 8088/86

2.1. Define the following terms: Register array, General purpose registers, Temporary registers, Internal data bus, Instruction register, Instruction decoder, Accumulator, ALU, Condition flags, Addressing registers, and Program counter
2.2. Draw, label and describe the individual elements in the block diagram of the INTEL 8088/86 microprocessor.
2.3. Give the functional pin definitions for the 8088/86.
2.4. Describe the power and clocking requirements of the 8088/86.
2.5. Explain the 8088/86 data bus multiplexing and show how it can be de-multiplexed to create (16-bit) address and (8 bit) data buses.
2.6. Explain how conventional control signals MEMR, MEMW, and I/OW can be produced from the 8088/86 IO/M/, RD/, and WR/ control signals.

3. Introduction to Intel SDK-88/86

3.1. Describe Main sections of the SDK-88/86 and components used in each CPU group, PROM I/O System, RAM I/O SYSTEM, Keyboard and display, Address Decoder, Bus Expansion Drivers, Expansion Memory System, Expansion I/O System, Power Supply and Teletype Interface
3.2. Explain the block diagram of the SDK-88/86.
3.3. Describe the power and clocking requirements of the SDK-88/86.
3.4. Using SDK-88/86 system schematics locate and identify the components used in each main section.
3.5. Measure the amplitude and noise of SDK-88/86 DC power supply levels.
3.6. Measure the amplitude and timing characteristics of the SDK-88/86 clock and basic control bus signals. Verify operation of the Bus Expansion System.

3.7. Describe the main functions and advantages of the following INTEL 8088/86 support devices:
3.8. 8155 Static RAM with I/O ports
3.9. 8755 EPROM with I/O ports
3.10. 8279 Programmable Keyboard/Display Interface.
3.11. Explain the Memory Map of the SDK-88/86 Main and Expansion Boards.

4. Introduction to Programming

4.1. Define: Problem definition, Algorithm, Flowcharting, Instruction Opcode, Operand, Mnemonics and labels, Machine language, Assembly language, High level language, Compiler, interpreter, assembler, Operating systems, monitors and ASCII Code
4.2. Design algorithms using flowcharts to solve simple programming problems.
4.3. Explain how integer data, addresses and printable characters are represented in microcomputer systems.
4.4. Explain the process of hand assembly using coding sheets.
4.5. Explain and use labels to represent addresses and data in Assembly Language programming

5. Programming Intel 8088/86

5.1. Explain the 8088/86 programming model and the role of the following: General Purpose Registers, Condition Flag Register, Accumulator, Program Counter and Stack Pointer
5.2. List the five instruction Groups in the 8088/86 Instruction Set: Data Transfer Group, Arithmetic Group, Logical Group, Branch Group and Stack and Machine Control
5.3. List and explain the addressing modes of the 8088/86.
5.4. Explain and use the main features of the SDK-88/86 keyboard monitor to enter run, and debug simple 8088/86 machine language programs.
5.5. Make use of subroutines in the SDK-88/86 monitor to perform basic keyboard, display, and delay functions.
5.6. Explain the 8088/86 stack and stack pointer and their basic operation during CALL, RETURN, PUSH and POP instruction execution.
5.7. Explain the usage of the reserved System RAM area by the SDK-88/86 Monitor.

6. Intel 8088/86 System Timing and Bus Multiplexing.

6.1. Define the following terms: T-State, Machine Cycle and Instruction Cycle, Bus Cycle
6.2. Explain the basic function of the following 8088/86 machine cycles: Opcode fetch, Memory Read, Memory Write, I/O Read, I/O Write, Interrupt Acknowledge, Bus Idle
6.3. Explain how the 8088/86 instruction Decoder/Machine Cycle Encoder produces suitable Machine Cycles in correct succession to produce a required Instruction Cycle.
6.4. Interpret and explain timing diagram for common 8088/86 Instructions.
6.5. Explain the purpose and implementation of the 8088/86 Wait, Halt and Hold states.
6.6. Interpret the 8088/86 State Transition Diagram.
6.7. Explain the timing of the 8088/86 Multiplexed Bus Structure and show how it can be de-multiplexed to allow interfacing non-8088/86 Memory and I/O Devices.

7. SDK-88/86 System Hardware.

7.1. Explain the Block Diagram of the SDK-88/86 Main Board.

7.2. Use SDK-88/86 Main Board schematics to explain the operation of the following SDK-88/86 Main Board sub-systems: System Address Decoder, EPROM/IO (8755), RAM/IO (8155), Keyboard/Display System (8279) and Expansion Bus and Drivers
7.3. Create and explain the Block Diagram of the SDK-88/86 Expansion Board.
7.4. Use SDK-88/86 Expansion Board schematics to explain the operation of the following Expansion Board sub-systems. (IF PRESENT ON TRAINER)
7.5. Expansion connectors J1, J2 and JX10
7.6. Memory and I/O Address Decoding
7.7. Memory System
7.8. I/O System
7.9. Explain how INTEL 8088/86 Support Devices can be used to build a Minimum System.
7.10. Use schematics to draw and explain complete SDK-88/86 Memory and I/O Maps.
7.11. Explain how the Expansion Board Address Select jumpers can be used to map Expansion Memory and I/O Ports to new addresses. (IF PRESENT)

8. Interfacing to Intel 8088/86

8.1. Explain of the following terms: Isolated I/O, Memory Mapped I/O, Absolute Address Decoding, Linear address Decoding, Unconditional I/O, Polled I/O, Interrupt Driven I/O, Interrupt Service Routine, Interrupt Vector, Direct Memory Access, Device Request Flag, Service Request Flag and Strobed Ports
8.2. Design Simple Input and/or Output ports using specified I/O Mapping and Address decoding techniques on the SDK-88/86.
8.3. Explain the 8088/86 Vectored Interrupt System, established interrupt priorities, and implementation of interrupts in the SDK-88/86.
8.4. Explain the usage of a Priority Interrupt Control Unit in 8088/86 based systems.
8.5. Explain the fundamentals of DMA driven I/O in an 8088/86 based system.

9. 8-Bit Support Devices

9.1. Explain the following terms: 8088/86 Support device, General Purpose Support device, Programmable Support Device
9.2. Describe the operation and programming of the INTEL 8255 Programmable Peripheral Interface.
9.3. Describe the operation and programming of the following INTEL 8088/86 support devices:
9.4. 8155 RAM with I/O Ports and Timer
9.5. 8755 PROM with I/O Ports
9.6. 8279 Programmable Keyboard/Display Interface
9.7. Explain the function of the following INTEL 8-bit Support Devices: 8259 Priority Interrupt Control Unit, 8253 Programmable Interval Timer, 8251 USART and 8237 DMA Controller
9.8. Design an Interface and demonstrate operation of selected support devices in the SDK-88/86 environment.

CIT-225 – Microprocessor Architecture

LIST OF PRACTICALS

1. Introduction of SDK-88/86 Bus System.
2. Introduction to SDK-88/86 Power Supply and Timing.
3. Introduction to SDK-88/86 Functional Elements.
4. Introduction to Flowcharting
5. Algorithm Design Using Flowcharts
6. Applications of ASCII Code.
7. The SDK-88/86 Keyboard Monitor Program.
8. Entry and Disassembly of Simple Programs.
9. Use of Delay Programs.
10. Use of Subroutine Concepts.
11. Programming of Arithmetic Instructions.
12. Program Subroutines II.
13. Programming of Logic statements.
14. Program Subroutines III.
15. Program BCD to Binary Conversion.
16. Programming of Multiplication and Division – optional Exercise.
17. Program Indirect Addressing I.
18. Program Indirect Addressing II – Optional Exercise.
19. Familiarize with the 8088/86 System Timing.
20. Introduce 8088/86 System Wait State Insertion.
21. Familiarize with the SDK-88/86 Memory Systems.
22. Introduce SDK-88/86 I/O System.
23. Interface Isolated Output Ports.
24. Interfacing of Memory Mapped Output Ports.
25. Interface Isolated Input Ports.
26. Interfacing of Memory Mapped Input Ports.
27. Interface Polled I/O (Programmable I/O)
28. Interfacing of 8088/86 Interrupt Driven I/O I.
29. Interfacing of 8088/86 Interrupt Driven I/O II.
30. Use 8255A Programmable Peripheral Interface.
31. Use 8155 Static RAM with I/O Ports and Timer.
32. Use 8755 EPROM with I/O Ports

Course Code: **CIT 233**	**T**	**P**	**C**
Course Title: **Data Communication and Networking**	2	3	3

Introductory course on data communication and computer networks. It aims to provide the students conceptual tools to understand the design and implementation of data communication as applied to computer networks. It discusses the layered model. It covers communication, media, WAN, LAN, Internetworking, protocols, network management and troubleshooting. This comes with practical component to complement classroom discussion.

Course Objectives

At the end of the course, the students are expected to be able to

- Understand basic concepts and principles of data communication as applied to computer networking
- Synthesize the different approaches of data communication in networking and assess their effectiveness in implementation
- Troubleshoot and diagnose network faults and correct them
- Assemble cabling system of a network
- Recognize the inherent problems in networking and appreciate the solutions of the problems

COURSE OUTLINE

Contents	**Hours**
1. Principles of Data Communication and Networking	**8**
1.1. Development of Communication and Data Communication	
1.2. Data Transmission	
1.2.1. Analog Transmission	
1.2.2. Digital Transmission	
1.2.3. Signal Impairment	
1.3. Transmission Media	
1.3.1. Types of Cables and Connectors	
1.3.2. Telephony and Wireless Communication	
1.4. Data Encoding	
1.5. Asynchronous and Synchronous Transmission	
2. Data Link Control	**4**
2.1. Flow Control: Sliding Window Flow Control	
2.2. Error Detection	

3. Multiplexing **2**
- 3.1. Frequency-Division Multiplexing
- 3.2. Time-Division Multiplexing

4. Wide Area Network (WAN) **10**
- 4.1. Switching Concepts
- 4.2. Circuit-Switching Networks
- 4.3. Routing in Circuit-Switched Networks
- 4.4. Packet Switching and Frame Relay
- 4.5. Asynchronous Transfer Mode (ATM)
- 4.6. ISDN

5. Local Area Network (LAN) **10**
- 5.1. LAN Architecture
- 5.2. Topologies
- 5.3. LAN Systems
  - 5.3.1. Ethernet and Fast Ethernet (CSMA/CD)
  - 5.3.2. Token Ring and FDDI

6. Connectivity Devices **6**
- 6.1. Modems
- 6.2. Hubs and Repeaters
- 6.3. Bridges, Routers and Gateways

7. Internetworking **10**
- 7.1. Principles of Internetworking
- 7.2. Protocols
  - 7.2.1. OSI Model
  - 7.2.2. TCP/IP Suite
- 7.3. Internet Protocol (IP)
- 7.4. Routing Protocol
- 7.5. Transport Protocols and Transport Services
- 7.6. Transmission Control Protocol (TCP)

8. Network Administration and Management **8**
- 8.1. Types of Servers
- 8.2. Managing Accounts
- 8.3. Performance Monitoring
- 8.4. Data Protection and Security

9. Network Troubleshooting **6**
- 9.1. Structured Cabling
- 9.2. Network Testing Tools
- 9.3. Fault Diagnosis: Troubleshooting Connectivity and Communication

Total Hours: 64

References

- **Networking Essentials**, Joe Casad and Dan Newland, Techmedia
- **Computer Networks, 2Ed**, Andrew S. Tanenbaum, Prentice Hall
- **Data and Computer Communications, 4Ed**., William Stallings, MacMillan
- **Local Area Networks**, 2Ed, Peter Hodos
- **An introduction to Local Area Networks**, Greg Nunemacher
- **Networking Explained**, Gallo
- **Networking Essentials**, **2Ed**, Microsoft Press

CIT 233– Data Communication and Networks

LIST OF PRACTICALS

1. Identifying various hardware components of a network
2. Studying network card
3. Splicing a coaxial cable
4. Terminating twisted pair cable
5. Terminating coaxial cable
6. Installing structured cabling system
7. Installing simple network
8. Installing concentrators or hubs
9. Installing Modem
10. Studying RS-232-C
11. Using Network Tools and Analyzers
12. Digital Voltmeters (DNM)
13. Time-Domain Reflectometers (TDRs)
14. Advanced Cable Testers
15. Using Oscilloscopes
16. Using Network Monitors
17. Troubleshooting Network Connectivity

CIT 233– Data Communications and Networking

LEARNING OBJECTIVES

1. Principles of Data Communication and Networking

1.1. Discuss the development of communication
1.2. State the principles of data communication
1.3. Describe methods of data transmission
1.4. Differentiate analog signal from digital signal
1.5. Explain causes of transmission error
1.6. List transmission media
1.7. Describe each transmission media
1.8. State the advantage and disadvantage of each transmission media
1.9. List and describe different systems of coding data
1.10. Describe asynchronous transmission
1.11. Describe synchronous transmission
1.12. Explain the advantage and disadvantage of asynchronous and synchronous transmission

2. Data Link Control

2.1. Define data flow control
2.2. Describe sliding window flow control
2.3. Illustrate sliding window control
2.4. Describe methods of error detection and correction

3. **Multiplexing**

3.1. Explain the need for multiplexing
3.2. Describe Frequency-division multiplexing
3.3. Describe Synchronous Time-division Multiplexing

4. Wide Area Network (WAN)

4.1. State the concepts of switching
4.2. Discuss the development of switching networks
4.3. Describe circuit-switching networks
4.4. Describe routing methods in circuit-switched networks
4.5. Describe packet switching
4.6. Explain the advantage of packet switching
4.7. Describe methods of frame relay
4.8. Explain the advantage of frame relay protocol
4.9. Describe the protocol of asynchronous transfer mode (ATM)
4.10. Explain principle of ATM
4.11. Explain basic concepts in ISDN

5. Local Area Network (LAN)

5.1. Describe LAN architecture

5.2. Identify different topologies of LAN
5.3. Describe different topologies of LAN
5.4. Illustrate different topologies
5.5. State the advantage and disadvantages of each topology
5.6. Describe different LAN systems like Ethernet
5.7. Explain the advantage and disadvantage of different LAN systems
5.8. Describe bridges

6. Connectivity Devices

6.1. Explain the need for connectivity devices
6.2. State the operational principle of Modems
6.3. Describe Modem
6.4. Describe hubs and repeaters
6.5. Describe bridges, routers and gateways
6.6. Illustrate the relationships of this devices in networking

7. Internetworking

7.1. Explain the principles in Internetworking
7.2. Explain the need for protocols in Internetworking
7.3. Describe each layer of OSI model of network
7.4. Differentiate connectionless and connection-oriented internetworking
7.5. Describe the Internet Protocol
7.6. Discuss the development of Internet Protocol
7.7. Describe routing protocols
7.8. Explain transport protocol
7.9. Describe Transmission Control Protocol (TCP)
7.10. Explain the advantage of TCP/IP from OSI

8. Network Administration and Management

8.1. Describe different types of servers
8.2. Create and manage user accounts
8.3. Use software to conduct performance monitoring of network
8.4. Explain the data protection and security
8.5. Describe means to protect data and secure its integrity in network system.

9. Network Troubleshooting

9.1. Describe structured cabling
9.2. Identify network testing tools
9.3. Use network testing tools to diagnose network fault
9.4. Perform network fault diagnoses
9.5. Troubleshoot network connectivity and communication faults

Course Code: **CIT-243**	**T**	**P**	**C**
Course Title: **Analogue Electronics**	2	3	3

A major course in Computer Information Technology dealing with the non-digital components of electronics. It intends to complement the student's foundation knowledge of digital electronics. It covers diodes, transistors, amplification, power electronics and troubleshooting of analogue electronic devices. This comes with a laboratory course.

Course Objectives

At the end of the course the students are expected to be able to

- Understand basic concepts, principles and application of analogue electronics
- Apply operational principles of transistors for amplification.
- Use knowledge of electronics to maintain electronic devices
- Relate analogue electronics to digital electronics
- Observe and measure accurately using electrical and electronics instruments
- Demonstrate motivation in applying knowledge and skills in analogue electronics in daily life

COURSE OUTLINE

Contents	**Hours**
1. Rectification	**4**
1.1. Half Wave	
1.2. The Transformer action	
1.3. Full Wave	
1.4. Bridge Rectification	
2. Special Diodes	**6**
2.1. The Zener Diode	
2.2. Zener Diode as a Regulator	
2.3. Light Emitting Diode	
2.4. Photo Diode	
2.5. Schottky Diode	
3. Transistor	**6**
3.1. Theory of BJT operation	
3.2. What are the characteristics of a Devices	
3.3. Common Base Characteristics	
3.4. Common Emitter Characteristics	
3.5. Common Collector Characteristics	

3.6. Common Base Bias Circuits
3.7. CE Bias Circuit
3.8. CC Bias Circuit
3.9. The transistor as a Switch

4. Oscilloscope **4**

4.1. Oscilloscope Basics
4.2. The CRT
4.3. The Graticule & Construction
4.4. Measurement with the Oscilloscope
4.5. Voltage measurement
4.6. Current measurement
4.7. Time and Frequency Measurement
4.8. Rise and Fall Time Measurement

5. Amplifiers **16**

5.1. Small Signal BJT Amplifier
5.2. AC Amplifier Fundamentals
5.3. Gain
5.4. Coupling Capacitors
5.5. Linearity and Distortion
5.6. Frequency Response
5.7. Practical Differential amplifiers
5.8. Introduction to Operational Amplifiers
5.9. Operational Amplifier Theory
5.10. The Ideal Operational Amplifier
5.11. The Inverting Amplifier
5.12. The Non-Inverting Amplifier
5.13. Feed Back Theory
5.14. Feed-back in Non Inverting Amplifier
5.15. Feed-back in Inverting Amplifiers
5.16. Frequency Response
5.17. Stability
5.18. Gain Bandwidth Product

6. Conversion **8**

6.1. What is digital?
6.2. Shades of Grey
6.3. Ramp Generator
6.4. Voltage Comparator
6.5. Digital to Analog Converter
6.6. Analog to Digital Converter
6.7. The ramp ADC
6.8. Dual Slope ADC
6.9. Staircase ADC
6.10. Successive Approximation ADC

6.11. Flash Converter

7. Power Electronics **8**

7.1. SCRs
7.2. Power Control Using SCRs
7.3. DIACs and TRIACs
7.4. Opto Electronic Devices
7.5. Photo conductive Cells
7.6. Photo transistor
7.7. Solar Cells
7.8. Opto Couplers
7.9. Liquid Crystal Displays
7.10. Unijunction Transistors

8. Trouble Shooting **12**

8.1. Troubleshooting concepts
8.2. An Open Device
8.3. A Shorted Device
8.4. Power Supply Troubleshooting
8.5. Zener Troubleshooting
8.6. Common Emitter Amplifier
8.7. How Troubleshooter think
8.8. Amplifier Troubleshooting

Total Hours: 64

References

- **Electronic Devices and Circuits**, R. Bogart
- **Electrical Instrumentation and Measurement**, R. Aston
- **Electronic Principles**, 3Ed, Malvino, McGraw-Hill
- **Power Electronics**, P.C.Sen

CIT-243 Analogue Electronics

LEARNING OBJECTIVES

1. Rectification

1.1. Explain Half Wave, Full Wave, Bridge Rectification. AC to DC. Rectifier Diodes
1.2. Describe Zener Diode, when it works best and as safety device
1.3. Describe transformer action: Turns ratio, step-up/ step-down action, voltage tapping

2. Special Diodes

2.1. Describe diode concept of regulation: Input/Load regulation
2.2. Explain diode as a regulator. e.g. Zener diode.
2.3. Explain a light emitting diode
2.4. Illustrate light emitting diode use
2.5. Explain a photo diode

3. Transistor

3.1. Describe bipolar transistor and its parts: emitter, base, and collector.
3.2. Explain significance of transistor curves
3.3. Differentiate NPN and PNP transistor
3.4. Explain amplification of common emitter transistor circuit
3.5. Describe characteristics of devices
  3.5.1. Common Base Characteristics
  3.5.2. Common Emitter Characteristics
  3.5.3. Common Collector Characteristics
  3.5.4. Common Base Bias Circuits
3.6. CE Bias Circuit
3.7. CC Bias Circuit
3.8. Describe its switching action

4. Oscilloscope

4.1. Use CRO
4.2. Manipulate control panel and buttons
4.3. Use as a sensitive voltmeter
4.4. Use as a frequency meter

5. Amplifiers

5.1. Explain working of an Amplifier. Explain biasing. Explain superposition of amplifiers. DC and AC amplifiers. Explain voltage swing.
5.2. Explain the DC and AC gain of a CE amplifier. Relate biasing to change in gain.
5.3. Explain the Terms: Distortion: Amplitude, Frequency and Phase
5.4. Explain Frequency Response of an Amplifier: High, Low Frequency Response
5.5. Explain Negative Feedback and Its Advantages
5.6. Explain the Basic AC amplifier
5.7. Explain Differential amplifier. Explain its use in Op. Amps.
5.8. Operational amplifier. Virtual Ground and Virtual Short.

5.9. Explain Positive Feedback and Negative Feedback

6. Conversion

6.1. Explain digital Cvcv

6.2. Explain working principle of Ramp Generator, Voltage Comparator, Digital to Analog Converter, Analog to Digital Converter, The ramp ADC, Dual Slope ADC, Staircase ADC, Successive Approximation ADC, and Flash Converter

7. Power Electronics

7.1. Define Power Electronics?

7.2. Explain Silicon Controlled Rectifiers (SCR). Give their main utility.

7.3. Describe the TRIAC

7.4. Explain how these devices produce triggering action

7.5. Explain working principal of DIAC and UJT

8. Troubleshooting

8.1. Explain basics of trouble shooting

8.2. Describe fundamental troubleshooting concepts

8.3. Identify an open device

8.4. Identify a shorted device

8.5. Perform power supply troubleshooting

8.6. Perform Zener Troubleshooting

8.7. Perform common emitter amplifier circuit troubleshooting

8.8. Demonstrate amplifier circuit troubleshooting

CIT-243– Analogue Electronics

LIST OF PRACTICALS

1. Analog Electronics (Using Discrete Electronics)
2. To Study the Characteristics of CE-Amplifier Using A Fixed Bias
3. To Study the BJT Common Emitter Amplifiers Using Voltage Divider Bias
4. To Study Common Collector Amplifier
5. To Study the Frequency Response of A Common Emitter Amplifier
6. To Study A "Phase Splitter" Circuit.
7. To Study the Frequency Response of CE-CB (Cascade) Amplifier.
8. Analog Integrated Circuit (IC) Electronics
9. Study of Inverting Amplifier using 741.
10. Study of Non-inverting Amplifier using 741.
11. Digital Electronics (Using Discrete Electronics)
12. To Study the Characteristics of Transistor As Switch.
13. To Study the Bistable Multivibrator
14. To Study the Bistable Multivibrator with Toggle
15. To Study the Monostable Multivibrator
16. To Study the Astable Multivibrator
17. To Study the Schmitt Trigger Circuit
18. Digital Integrated Circuit (IC) Electronics
19. To Implement the Monostable Circuit using 555 Timer IC
20. To implement the Astable Circuit using 555 Timer IC

Course Code: **CIT - 253**	**T**	**P**	**C**
Course Title: **Digital Electronics**	2	3	3

Foundation course of digital circuit dealing with basic devices that are building blocks of digital circuits. It intends to provide students with knowledge and skills to analyze digital circuits. It contains discussion on binary numbers, Boolean algebra, different digital IC families, flip-flop and latches, clock and triggers, registers, counters, and arithmetic circuits. This has laboratory component to strengthen the classroom theory.

Course Objectives

At the end of the course the students are expected to be able to

- Understand the mathematical and logical foundations of digital circuit operational principles.
- Relate binary mathematics and boolean logic with digital circuit constructs
- Understand the construction, operation and use of different digital circuits (IC's)
- Apply digital circuit principles in building clocked and trigger circuits
- Calibrate, manipulate and use measuring instruments accurately and with ease
- Appreciate the relationship between the concepts of binary numbers, Boolean algebra and digital circuits

COURSE OUTLINE

Contents	**Hours**
1. Positional Notation	**4**
1.1. Number system: Binary, Octal, Decimal and Hexadecimal Base	
1.2. Conversion of Numbers from One Base to Another	
2. Digital IC's and Families	**4**
2.1. Definitions: DIP, SIP, ZIP and QUIP, Pin Grid Array	
2.2. Techniques for Mounting Each Type of IC	
2.3. Digital Families: DTL, TTL, CMOS,ECL	
2.4. Characteristic Comparison of TTL, ECL, CMOS	
2.5. Operation of a TTL gate.	
2.6. TTL Family Parameters	
3. Boolean Algebra	**8**
3.1. Circuits, Boolean Equation and Truth Table	
3.2. Boolean Laws.	
3.3. De Morgan's Theorems	
3.4. Symbols of Digital Gates: AND, OR, XOR, NOT (inverter), NAND, XNOR and Buffer	
3.5. Boolean Expression, Boolean Equation and Truth table	

3.6. Function, Boolean Expression and Truth Table for Basic Gate
3.7. NOR gates Implementation of Basic Gates
3.8. NAND Gates Implementation of Basic Gates

4. Karnaugh Mapping **6**
4.1. Sum of Products
4.2. Karnaugh Map from Sum of Products.
4.3. Reduction of the Sum of Products

5. Clock and Trigger Circuits **5**
5.1. Definition of Terms
5.2. Operations of Clock and Trigger Circuits
5.3. Pulse Operation on Digital Circuits
5.4. Labeling on a Clock Waveform

6. Flip-Flops and Latches **8**
6.1. Definition of Terms
6.2. Clock Conventions in Digital Circuits.
6.3. Operation of Flip-Flops and Latches
6.4. Flip-flop Data Sheets.

7. Shift Registers **8**
7.1. Definitions of Terms
7.2. Operation of Register Circuits
7.3. Bi-directional Shift Register
7.4. Bi-directional Data Rotate Register
7.5. Shift-register Data Sheets.

8. Counter Circuits **8**
8.1. Definitions of Terms
8.2. Asynchronous Up/down Counter
8.3. Synchronous Binary Counter
8.4. Synchronous Up/Down Counter
8.5. Ring Counter and Johnson Counter
8.6. Features of Counters

9. Arithmetic Circuits **4**
9.1. Arithmetic Functions and Operations
9.2. Binary Representation: Negation, Fractional and Floating-Point
9.3. Operation of Circuits: Adder and Subtracter, Look-Ahead-Carry-Adder and Magnitude Comparator
9.4. Arithmetic Circuit Data Sheets.

10. Data Conversion/Transmission **6**
10.1. Definition of Terms
10.2. Even and Odd Parity

10.3. Encoder and Decoder
10.4. Multiplexer and Demultiplexer

11. Opto-Electronics **3**
11.1. Definition of Terms
11.2. Operations of Displays
11.3. Principle of Operation of Display Circuits
11.4. Features of Display Circuits
11.5. Indicator, Display and Decoder/driver Data Sheets

Total Hours: 64

References

- **Introduction to Number Systems**, Sperry Corporation
- **Digital Fundamentals 6Ed**, Floyd
- **LS/S/TTL Logic Databook**, National Semiconductor Corporation
- **Schottky TTL Databook**, Motorola Inc
- **Digital Fundamentals**, Webb

CIT 253 Digital Electronics

LEARNING OBJECTIVES

1. Positional Notation

1.1. Define the following terms: Binary, Octal, Decimal, Hexadecimal, Base
1.2. List the characters used as digits by each numbering system.
1.3. Count in each numbering system.
1.4. Convert numbers from one base to another: Binary to Decimal, Binary to Octal, Binary to Hexadecimal, Octal to Decimal, Octal to Hexadecimal and Hexadecimal to Decimal

2. Introduction to Digital IC's

2.1. Define following terms: DIP, SIP, ZIP, QUIP, Leadless chip carrier (JEDEC type A), Pin grid
2.2. Describe the different techniques used for mounting each type of IC.
2.3. Identify each of the following digital families: DTL, TTL,CMOS, ECL
2.4. Compare the following characteristics for TTL, ECL, CMOS, and GaAs: Density, Speed, Supply voltage(s) and Voltage swing
2.5. Explain the operation of a TTL gate.
2.6. Define the following parameters: Voltage margin, Noise margin, Noise immunity, Propagation delay, Source current, Sink current, Fan-in, Fan-out and Power dissipation
2.7. Identify the different TTL techniques:
- 2.7.1. 74xx standard
- 2.7.2. 74Hxx hi-speed
- 2.7.3. 74Lxx lo-power
- 2.7.4. 74Sxx Schottky
- 2.7.5. 74LSxx lo-power Schottky
- 2.7.6. 74Asxx advanced Schottky
- 2.7.7. 74ALSxx lo-power advanced Schottky
- 2.7.8. 74Fxx fast (Fairchild)
- 2.7.9. 74Cxx lo-power CMOS
- 2.7.10. 74HCxx hi-power CMOS
- 2.7.11. 54YYYxx military specifications

3. Boolean Algebra

3.1. Analyze circuits and write the Boolean equation and truth table for each table.
3.2. Apply Boolean laws to simplify each circuit.
3.3. Draw symbols for the gates: AND, OR, XOR, NOT (inverter), NAND, XNOR and BUFFER
3.4. Write the Boolean expression for each basic gate
3.5. Describe the function of each basic gate
3.6. Illustrate the truth table for each basic gate
3.7. Convert NOR circuits to NAND circuits and NAND to NOR using the Morgan's Theorems.
3.8. Use NOR gates to implement basic gates.
3.9. Use NAND gates to implement basic gates.

4. Karnaugh Mapping

4.1. Generate the sum of products from an equation and from a truth table for each circuit.
4.2. Draw a Karnaugh map from a sum products.
4.3. Using a Karnaugh map, reduce the sum of products to its simplest form.

5. Clock and Trigger Circuits

5.1. Define the following terms: Clock, Trigger, Pulse, Frequency and Pulse width
5.2. Describe the operation of the following: Circuits, Inverter clock, Ring oscillator, Crystal controlled inverter clock, NAND-gate clock and NOR-gate clock
5.3. Explain pulse operation on digital circuits.
5.4. Draw and label the following points on a clock waveform: Rise time, Fall time, Pulse width, Overshoot, Undershoot and Ringing

6. Flip-Flops and Latches

6.1. Define the following terms: Latch, Flip-flop, Racing, Set-up time, Hold time and Switch bounce
6.2. Describe the clock conventions used in digital circuits.
6.3. Describe the operation of the following circuits: S-R latch, Gated S-R latch, Toggle latch, Gated D latch, Edge-triggered flip-flops (S-R, D, J-K), Pulse triggered flip-flops (S-R, D, J-K), Data lock-out flip-flop, Switch debouncer and One shots
6.4. Interpret flip-flop data sheets as required.

7. Shift Registers

7.1. Define the following terms: Register, Storage capacity, Shift-register and Data rotate register
7.2. Describe the operation of the following circuits: Serial in/serial out shift register, Serial in/parallel out shift register, parallel in/parallel out shift register, parallel in/serial out shift register, Bi-directional shift register, Bi-directional data rotate register, and Interpret shift-register data sheets as required.

8. Counter Circuits

8.1. Define the following terms: Modulus, Asynchronous, Synchronous and Data rotate register
8.2. Describe the operation of the following circuits: Ripple counter, Asynchronous up/down counter, Synchronous binary counter, Synchronous up/down counter, Ring counter, and Johnson counter
8.3. Explain how the following features of counters are achieved: Loading, Decoding, Truncating, Recycling and Cascading

9. Arithmetic Circuits

9.1. Perform the following arithmetic functions: Binary addition, Binary subtraction by 1's complement, Binary subtraction by 2's complement, Binary multiplication and Binary division
9.2. Perform the following operation in binary: Negation, Fractional representation, and Floating-point representation

9.3. Describe the operation of the following circuits: Half-adder, Full-adder, Half-adder/ subtracter, Full-adder/subtracter, Serial-adder/subtracter, Parallel-adder/subtracter, Look-ahead-carry adder, Magnitude comparator
9.4. Interpret arithmetic circuit data sheets as required.

10. Data Conversion/Transmission

10.1. Define the following terms: Code, Gray code, BCD, ASCII, EBCDIC, Even/Odd parity
10.2. Describe the operation of the following circuits: Encoder, Priority encoder, Decoder, Multiplexer, Demultiplexer, Parity generator and Parity checker

11. Optoelectronics

11.1. Define the following terms: 7-segment display, Multi-digit display, Alphanumeric display and Dot-matrix display
11.2. Explain the difference between a common-anode and a common-cathode multi-segment display.
11.3. Explain how resistors are used to protect displays.
11.4. Describe the operations of the following displays: LED, LCD, ELD, Gas discharge display, Vacuum fluorescent display and Incandescent display
11.5. Describe the principle of operation of the following display circuits: 7-segment display decoder (LED), 7-segment display decoder (LCD)
11.6. Describe how the following features of display circuits are performed: Blanking, Leading 0's suppression, Trailing 0's suppression and Display multiplexing
11.7. Interpret indicator, display and decoder/driver data sheets as required

CIT - 253– Digital Electronics

LIST OF PRACTICALS

1. Interpret positional numbering systems.
2. Identify different IC packages.
3. Familiarization with Digital trainer
4. Determine truth tables for basic gates.
5. Design logic gates using discrete components.
6. Determine selected parameters of TTL devices.
7. Simplify and validate simplified circuits using Boolean algebra.
8. Verify de Morgan's theorems..
9. Use de Morgan's theorem to simplify a circuit and verify its operation.
10. Build XOR and XNOR circuits using basic gates.
11. Use Karnaugh maps to reduce complex gates into its simplest form.
12. Use Karnaugh maps to create a circuit.
13. Design and build clock circuit.
14. Use a variety of latches.
15. Build an edge-triggered flip-flop.
16. Detect the difference between edge-triggered, pulse-triggered and data lock-out flip-flops.
17. Design and build shift register circuits of any kind.
18. Design and build circuits for serial or parallel data transfers.
19. Design and build a ripple counter.
20. Build simple arithmetic circuits.
21. Build complex arithmetic circuits.
22. Use encoder and decoder circuits.
23. Use multiplexer and demultiplexer circuits.
24. Design and build a resistive ladder digital to analog converter.
25. Design and build an analog to digital converter.
26. Install seven segment displays into any circuit.
27. Use Schmitt trigger.
28. Use tristate devices.
29. Using an actual circuit, identify the individual IC's, and perform measurements on the circuit.
30. Use IC testers and troubleshoot individual IC's.
31. Use logic probes to troubleshoot a complex digital circuit.
32. Use an oscilloscope to troubleshoot a complex digital circuit.
33. Troubleshoot a complex digital circuit