

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Advance Mathematics (Group-1)
(Code: 3320002)

Diploma Programmes in which this course is offered	Semester in which offered
Biomedical Engineering, Chemical Engineering, Electrical Engineering, Computer Engineering, Electronics & Communication Engineering, Information Technology, Power Electronics	Second Semester

1. RATIONALE

The course is classified under Advance Mathematics and students are intended to understand the advance concepts and principles of Mathematics such as calculus, complex numbers and differential equations. This knowledge is required to understand and solve engineering problems.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of mathematical skills so that students are able to acquire following competencies:

- Use proper Mathematical tool to understand engineering principles and concepts.
- Apply concepts of calculus or suitable mathematical tool to solve given engineering problems.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	100
2	2	0	4	70	30	0	0	

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P -Practical; C – Credit; ESE -End Semester Examination; PA - Progressive Assessment.

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Complex Number	1a. Simplify Complex expressions 1b. Find Modulus and Amplitude of given expressions 1c. Use De Moivre's Theorem to simplify mathematical expressions and to find roots	Concept, Modules and Amplitude form, Root of Complex Number, De Moivre's Theorem. Apply concept of complex numbers in simple engineering problems.
Unit– II Function & Limit	2a .Solve the problems using functions 2b .Solve the problem of function using the concept of Limit	2.1 Function Concept and Examples 2.2 Limit Concept of Limit, Standard Formulae and related Examples.
Unit– III Differentiation & it's Applications	3a. Differentiate the various function 3b. Apply the differentiation to Velocity, Acceleration and Maxima & Minima	3.1 Differentiation: Definition, Rules of, Sum, Product, Quotient of Functions, Chain Rule, Derivative of Implicit functions and Parametric functions, Logarithmic Differentiation. Successive Differentiation up to second order 3.2 Application: Velocity, Acceleration, Maxima & Minima.(simple problems)
Unit– IV Integration & its application	4a. Integrate the various function 4b. Apply the Integration for finding Area and Volume	4.1 Integration: Concept, Integral of Standard Functions, Working Rules of Integration, Integration by Parts, Integration by Substitution Method, Definite Integral and its properties. 4.2 Application: Area and Volume.(simple problems)
Unit-V Differential Equations(First Order First Degree)	1a. Find the Order and Degree of a Differential Equation. 1b. Form a Differential Equation for simple Engineering problems 1c. Solve Differential Equations using Variable Separable, Homogeneous and Integrating Factor methods.	5.1 Definition, Order and Degree of Differential Equation 5.2 Formation of DE 5.3 Solution of DE of First Degree and First Order by Variable Separable, Homogeneous and Integrating Factor methods.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Complex Number	3	2	5	3	10
II	Function & Limit	4	3	5	4	12
III	Differentiation & its Application	8	4	8	6	18
IV	Integration & its Application	8	4	8	4	16
V	Differential Equations	5	2	8	4	14
Total		28	15	34	21	70

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The exercises should be properly designed and implemented with an attempt to develop different types of mathematical skills so that students are able to acquire above mentioned competencies.

S. No.	Unit No.	Practical Exercises
1	I	Complex Number, Practice Examples
2		Use software for further understanding of applications
3	II	Practice Examples of Function & Limit
4		Use of Various Method/Techniques
5	III	Differentiation and Related Examples
6		Solve problems related to various methods/techniques of differentiations
7		Identify the Engineering Applications from respective branches and solve the problems
8	IV	Integration & Related Examples.
9		Solve problems Related to Various Methods/Techniques of integration
10		Identify the Engineering Applications from respective branches and solve the problems
11	V	Identify the corresponding Engineering Applications for differential equations from respective branches and solve the problems.

Note: The above Tutor sessions are for guideline only. The remaining Tutorial hours are may be used by teachers appropriately for revision and practice.

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like: course/topic based seminars, internet based assignments, teacher guided self learning activities, course/library/internet/lab based Mini-Projects etc. These could be individual or group-based. Some of these activities may be as below:

1. Applications to solve identified Engineering problems and use of Internet.
2. Learn graphical softwares:EXCEL,DPLOT,GRAPH etc.
3. Learn MathCAD to use Mathematical Tools and solve the problems of Calculus.
4. Learn MATLAB and use it to solve the identified problems.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Author	Title of Books	Publication
1	Anthony croft and others	Engineering Mathematics (third edition)	Pearson Education,2012
2	Pandya N R	Advanced Mathematics for Polytechnic	Macmillan Publishers India Ltd.,2012
3	Deshpande S P	Polytechnic Mathematics	Pune Vidyarthi Gruh Prakashan,1984
4	Prakash D S	Polytechnic Mathematics	S Chand,1985

B. List of Major Equipment/ Instrument

1. Simple Calculator
2. Computer System with Printer, Internet
3. LCD Projector

C. List of Software/Learning Websites

1. Excel
2. D Plot
3. Graph
4. MathCAD
5. MATLAB

You may use other Software like Mathematical and other Graph

Plotting software. Use websites such as wikipedia.org, mathworld.wolfram.com Etc...

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE:**Faculty Members from Polytechnics**

- **Dr. N. R. Pandya**, HOD-General Dept., Govt. Polytechnic, Ahmedabad
- **Dr N A Dani**, Lecturer, Govt. Polytechnic, Junagadh.
- **Prof. (Smt) R L Wadhwa**, Lect Govt Polytechnic, Ahmedabad
- **Prof. H C Suthar**, BPTI, Bhavnagar
- **Prof. P N Joshi**, Govt Polytechnic, Rajkot

Coordinator and Faculty Member From NITTTR Bhopal

- **Dr. P. K. Purohit**, Associate Professor, Dept. of Science.
- **Dr. Deepak Singh**, Associate Professor, Dept. of Science.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Basic Physics (Group-2)
(Code: 3300005)

Diploma Programmes in which this course is offered	Semester in which offered
Electronics & Communication Engineering	First Semester
Biomedical Engineering, Computer Engineering, Electrical Engineering, Information Technology, Instrumentation & Control Engineering, Power Electronics Engineering, Printing Technology	Second Semester

1. RATIONALE

As Physics is the mother of all engineering disciplines, students must have some basic knowledge on physics to understand their core engineering subjects more comfortably. Accordingly, in reviewing the syllabus, emphasis has been given on the principles, laws, working formulae and basic ideas of physics to help them study the core subjects. Complicated derivations have been avoided because applications of the laws and principles of physics are more important for engineering students.

As Physics is considered as basic science, its principles, laws, hypothesis, concepts, ideas are playing important role in reinforcing the knowledge of technology. Deep thought is given while selecting topics in physics. They are different for various branches of engineering. This will provide sound background for self-development in future to cope up with new innovations. Topics are relevant to particular program and students will be motivated to learn and can enjoy the course of Physics as if it is one of the subjects of their own stream.

Engineering, being the science of measurement and design, has been offspring of Physics that plays the primary role in all professional disciplines of engineering. The different streams of Physics like Optics, Acoustics, Dynamics, Semiconductor Physics, Surface Physics, Nuclear physics, Energy Studies, Materials Science, etc provide Fundamental Facts, Principles, Laws, and Proper Sequence of Events to streamline Engineering knowledge.

Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

Laboratory experiments have been set up keeping consistency with the theory so that the students can understand the applications of the laws and principles of physics.

2. LIST OF COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies.....

- Select proper measuring instrument on the basis of range, least count & precision required for measurement.
- Analyze properties of material & their use for the selection of material mostly applicable for engineering users..
- Identify good & bad conductors of heat and proper temperature scale for temperature measurement
- Identify, analyze, discriminate and interpret logical sequence of field problems with the study of physics.
- Analyze variation of sound intensity with respect to distance.
- Follow the principles used in the physical properties, its measurement and selections.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
3	0	2	5	70	30	20	30	

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit; ESE - End Semester Examination; PA - Progressive Assessment.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I	*Explain Physical Quantities and their units. *Measure given dimensions by using appropriate instruments accurately. *Calculate error in the measurement *Solve numerical based on above outcomes	1.1 Need of measurement and unit in engineering and science, definition of unit , requirements of standard unit, systems of units-CGS,MKS and SI, fundamental and derived quantities and their units 1.2 Least count and range of instrument, least count of vernier caliper, micrometer screw gauge 1.3 Definition of accuracy, precision and error, estimation of errors - absolute error, relative error and percentage error, rules and identification of significant figures. (Numerical on above topics)
Unit– II	*State Coulomb’s law, Ohm’s law and Kirchhoff’s law *Explain Electric field, potential and potential difference	2.1 Concept of charge, Coulomb's inverse square law, Electric field, intensity, potential and potential difference. 2.2 Electric current, Ohm's law, laws of series and parallel combination of resistance 2.3 D.C. circuits, Kirchhoff’s law, heating effect & chemical

Unit	Major Learning Outcomes	Topics and Sub-topics
	<ul style="list-style-type: none"> *Define intensity, electric current, resistance *Apply laws of series and parallel combination to electrical circuits *Explain heating & chemical effect of current *Solve numerical based on above outcomes 	<p>effect of current</p> <p>(Numericals on above topics)</p>
Unit– III	<ul style="list-style-type: none"> *Define magnetic intensity and flux and state their units *Distinguish between dia, para and ferro magnetic materials *Explain electromagnetic induction and its uses *State lenz's law *State applications of AC 	<p>3.1 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units</p> <p>3.2 Dia, Para, Ferro magnetic materials</p> <p>3.3 Electromagnetic Induction, Lenz's law and its Applications, Alternating current and its waveform</p>
Unit– IV	<ul style="list-style-type: none"> *Define types of materials based on energy bands *Distinguish between intrinsic and extrinsic semiconductors *Explain p-n junction diode and its characteristics *State applications of diodes *state advantages of bridge rectifier over others * Explain types of transistors *Explain characteristics of transistors *Explain transistor operation in CE mode *State relation of current gain * Define nanotechnology and explain applications 	<p>4.1 Conductors, Insulators and Semiconductors, Energy bands, intrinsic and extrinsic semiconductors, Temperature dependence of conductivity, Superconductivity</p> <p>4.2 p-n junction diode and its characteristics, Rectifier circuits - Full wave, half wave and bridge rectifiers (no design)</p> <p>4.3 semiconductor transistor pnp and npn and their characteristics, transistor operation in CE mode, relation of current gain</p> <p>4.4 Introduction to nanotechnology</p>
Unit– V	<ul style="list-style-type: none"> *Explain wave and wave motion with example. *Distinguish between longitudinal and transverse waves *Explain propagation of sound in air. * State properties of light. *Define reflection, refraction polarization and diffraction *Explain physical significance of refractive index * Explain dispersion of light *State Properties of laser *Explain spontaneous and stimulated emission, population inversion and optical pumping *Explain construction and working of He-Ne laser *State applications of lasers. * Explain principle & working of optical fibres 	<p>Definition of wave motion, amplitude, period, frequency, and wavelength, relation between velocity, frequency and wavelength, longitudinal and transverse wave, principle of superposition of waves, definition of stationary wave, node and antinode, definition of resonance with examples, Formula for velocity of sound in air</p> <p>Properties Of Light, Electromagnetic spectrum, Reflection, refraction, snell's law, diffraction, polarization, interference of light, constructive and destructive interference (Only definitions),</p> <p>physical significance of refractive index, dispersion of light LASER, Properties of laser, spontaneous and stimulated emission, population inversion, optical pumping, construction and working of He-Ne laser, applications of lasers.</p> <p>Fibre Optics, Introduction, Total internal reflection, critical angle, acceptance angle, Structure of optical fibre, Numerical Aperture, Fiber optic materials, Types of optical fibres, Applications in communication systems.</p>

Unit	Major Learning Outcomes	Topics and Sub-topics
	* State applications of optical fibres in communication systems	

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
1.	SI Units & Measurements	05	03	02	05	10
2.	Static & Current Electricity	10	05	05	08	18
3.	Electromagnetism & AC Current	08	04	05	03	12
4.	Semiconductors & Nano-technology	10	06	06	05	17
5.	Sound, Laser & Optical Fiber	09	04	06	03	13
	Total	42	22	24	24	70

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

6. SUGGESTED LIST OF EXPERIMENTS

The experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency -

S. No.	Unit No.	Experiment
1	1	To Measure linear dimensions by vernier caliper and calculate volume
2	1	To Measure linear dimensions by Micrometer screw
3	2	To calculate resistance using Ohm's law
4	2	To verify law of Resistance in series and parallel
5	2	To find unknown resistance through whetstone bridge
6	3	To determine A.C. frequency with the help of sonometer
7	1,2	To determine errors in electrical measurements
8	5	To determine the divergence of He-Ne laser beam.
9	3	To Measure A.C. Power using resistive load
10	3	Measurement of Energy
11	4	To study p-n junction in forward bias
12	4	To calculate SA/V ratio of simple objects to understand nanotechnology

- Hours distribution for Physics Experiments :

Minimum 8 experiments should be performed from the above list

Sr. No.	Description	Hours
1	An introduction to Physics laboratory and its experiments (for the set of first four experiments)	02
2	Set of first four experiments	08
3	An introduction to experiments (for the set of next four experiments)	02
4	Set of next four experiments	08
5	Mini project	06
6	Viva and Submission	02
	Total	28

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

Laboratory based mini projects :

- To calculate acoustics of given class room
- To measure diameter and calculate resistance of given set of conductors

Teacher guided self learning activities :

- To prepare a chart of applications of nanotechnology in engineering field
- To prepare models to explain different concepts

Course/topic based seminars :

- Seminar by student on any relevant topic

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Author	Title of Books	Publication
1	Sears And Zemansky	University Physics	Pearson Publication
2	Paul G Hewitt	Conceptual Physics	Pearson Publication
3	Halliday & Resnick	Physics	Wiley India
4	G Vijayakumari	Engineering Physics, 4e	Vikas-Gtu Students' Series
5	Arvind Kumar & Shrish Barve	How And Why In Basic Mechanics	Universities Press
6	Ncert	Physics Part 1 And 2	Ncert

S.No.	Author	Title of Books	Publication
7	Giancoli	Physics For Scientists And Engineers	
8	H C Verma	Concepts Of Physics	
9	Gomber & Gogia	Fundamentals Of Physics	Pradeep Publications, Jalandhar

B. List of Major Equipment/ Instrument

1. Digital Vernier Calipers And Micrometer Screw Guage
2. Whetstone's Bridge
3. He – Ne Laser Instrument
4. Digital Energy Meter
5. Resistance Box
6. Battery Eliminator
7. Digital Millimeters

C. List of Software/Learning Websites

1. www.physicsclassroom.com
2. www.physics.org
3. www.fearofphysics.com
4. www.sciencejoywagon.com/physicszone
5. www.science.howstuffworks.com

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

1. Dr. S. B. Chhag, Lecturer in Physics, Science Deptt, Govt. Polytechnic, Rajkot
2. Ku. B. K. Faldu, Lecturer in Physics, Science Deptt, Govt. Polytechnic, Ahmedabad
3. Shri D. V. Mehta, Lecturer in Physics, Science Deptt, RCTI, Ahmedabad
4. Shri S. B. Singhanian, Lecturer in Physics, Science Deptt, Govt. Polytechnic, Ahmedabad
5. Dr. U. N. Trivedi, Lecturer in Physics, Science Deptt, RCTI, Ahmedabad

Coordinator and Faculty Member From NITTTR Bhopal

1. Dr. P. K. Purohit, NITTTR, Bhopal

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Basic Electronics
(Code: 3320701)

Diploma Programmes in which this course is offered	Semester in which offered
Computer Engineering, Information Technology	Second Semester

1. RATIONALE

Electronics is an integral part of computers; hence students of computer engineering and information technology need to know the fundamental of electronics. This course has been designed to provide the needful inputs to handle simple electronic components and circuits. Students after studying this course will be able to understand the basics of analog electronics, various electronics components and develop skills to use simple electronic instruments needed for computer-based working environment.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competency:

- Apply the basic electronic skills as required in the field of computers and information technology.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PA	ESE	PA	
3	0	2	5	70	30	20	30	150

Legends: L-Lecture; T – Tutorial/Teacher Guided Student Activity; P - Practical; C – Credit;; ESE - End Semester Examination; PA - Progressive Assessment.

Note: It is the responsibility of the institute heads that marks for PA of theory & ESE and PA of practical for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Electronic Components and Signals	1a. State the difference between active and passive electronic components 1b. Differentiate between voltage and current source. 1c. Explain the signal parameters	1.1 Active and passive components. 1.2 Voltage and Current Source. 1.3 Symbols of various Semiconductor components. 1.4 Definitions of: amplitude, Frequency, Phase, Wavelength 1.5 Definitions of: Signal, waveform, spectrum, Time and frequency domain representation 1.6 Test Signals: unit step, unit impulse, and unit ramp 1.7 Types of Signals: sinusoidal, triangular and saw tooth, square
Unit– II Diodes and Applications	2a. Describe the working and applications of P-N junction diode. 2b. Describe the working and applications of Zener diode.	2.1 P-N junction diode 2.2 Bridge Rectifier 2.3 'T' and 'π' Filter circuits 2.4 Zener diode, Zener diode as voltage regulator
Unit– III Transistors	3a. Differentiate between PNP and NPN transistor and their applications 3b. Distinguish between FET, MOS and CMOS and their applications	3.1 PNP and NPN transistor (working principle) 3.2 Transistor as switch 3.3 FET, working of PMOS and NMOS 3.4 Working of CMOS Logic Family
Unit– IV Oscillators	4a. Describe the working principle of oscillators	4.1 Types of feedback(Positive and Negative) 4.2 Principle of oscillation. 4.3 Oscillators: Hartley and Colpitts
Unit-V Cables, Connectors and Measuring Instruments	5a. Differentiate the different types of cables. 5b. Distinguish the different types of connectors 5c. Use different measuring instruments	5.1 Analog and Digital display. 5.2 Cables: coaxial cable, twisted pair cable and fiber optic cable 5.3 Connectors: coaxial cable connectors, RJ-45, RS-232, HDMI connectors 5.4 Multimeters: Analog and digital multimeter 5.5 CRO: front panel controls and application

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Electronic Components and Signals	07	05	04	05	14
II	Diodes and Applications	10	04	04	10	18
III	Transistors	09	01	04	09	14
IV	Oscillators	07	04	04	02	10
V	Cable, Connectors and Measuring Instruments	09	02	02	10	14
	Total	42	16	18	36	70

Legends:

R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the above mentioned expected competency.

S. No.	Unit No.	Practical Exercise	Approx Hours Required
1	All	Perform Basic operations on MultiSIM/ Electronic Workbench	04
2	I, V	Measure voltage and current of a given circuit using analog and digital multimeters.	02
3	II	Test performance of P-N junction diode.	02
4	V	Operate all controls of CRO front panel.	02
5	I,V	Measure voltage and frequency of any given signal using oscilloscope.	02
6	II	Test performance of bridge rectifier.	02
7	I	Measure parameters of various signals	02
8	III	Test performance of transistor as a switch	02
9	IV	Test the performance of the T-filter	02
10	IV	Test the performance of the π -filter	02
11	V	Test various cables for different applications	04
12	V	Identify various connectors & Draw their diagram	02
		Total	28

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed individual or group-based student activities like:

- Course/topic based seminars,
- Teacher guided self learning activities,
- Course /library/internet/lab based mini-projects etc.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Title of Books	Author	Publication
1	Principle of Electronics	V.K.Mehta	S.Chand & Co., latest edition
2	Electronics Principles	Albert Paul Malvino	McGraw Hill, latest edition
3	Electronics Devices and Circuit Theory	Robert L. Boylestad	Pearson, latest edition
4	Electronic Instrumentation	H.S.Kalsi	McGraw Hill, latest edition
5	Cables and Connectors	John Kadick	AVO International, latest edition

B. List of Major Equipment/ Cables and Connectors

- i. Analog multimeter, digital multimeter
- ii. CRO
- iii. Function generator
- iv. Different Types of Cables, Connectors

C. List of Software/Learning Websites

- i. Electronic workbench
- ii. MultiSIM

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE.

Faculty Members from Polytechnics

- **Prof. M.P.Parmar**, Incharge Head and Senior Lecturer, Information Technology Department, Government Polytechnic, Ahmedabad
- **Prof. Nandu Fatak**, Lecturer, Information Technology Dept. Government Polytechnic, Ahmedabad

Coordinator & Faculty Members From NITTTR, Bhopal

- **Prof. (Mrs.) Susan S. Mathew**, Associate Professor, Dept. of Electrical and Electronics Engg.
- **Dr.(Mrs.) Anjali Potnis**, Assistant Professor, Dept. of Electrical and Electronics Engg.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Advanced Computer Programming
(Code: 3320702)

Diploma Programmes in which this course is offered	Semester in which offered
Computer Engineering, Information Technology	Second Semester

1. RATIONALE

Students in the previous semester have learned procedure for developing programs to solve simple problems using basic features of very popular language i.e. structured programming language 'C'. This course deals with some advanced features of the 'C' language. The programming skills thus acquired can be used for developing programs with advance level programming features which in turn will be helping in developing practical applications for the scientific, research and business purposes.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- i. Develop structured, modular and memory efficient programs in 'C' using arrays, functions, pointers and data files.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L-Lecture; T – Tutorial/Teacher Guided Student Activity; P - Practical; C – Credit;; ESE - End Semester Examination; PA - Progressive Assessment.

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Arrays	1a. Develop, debug and execute programs which use reading, writing and manipulating single dimensional and multidimensional arrays.	1.1 Declaring and initializing One-Dimensional Array and array Operations i. Insertion ii. Searching iii. Merging iv. Sorting v. Deletion 1.2 Introduction of String as array of characters Declaration and Initialization of String 1.3 Two-Dimensional Array and its Operations i. Insertion, Deletion ii. Matrix addition operation 1.4 Multi-Dimensional Arrays 1.5 scanf() and printf() Functions 1.6 Drawbacks of Linear Arrays
Unit– II Pointers	2a. Develop, debug and execute programs to perform memory access using Pointers	2.1 Introduction and Features of Pointers 2.2 Declaration of Pointer 2.3 Void Pointers 2.4 Array of Pointers 2.5 Pointers to Pointers
Unit– III Functions	3a. Develop, debug and execute modular programs by writing and using Functions	3.1 Basics of Functions 3.2 Built-in and user defined Functions 3.3 Using String, Math and other built-in functions 3.4 Advantages of using Functions 3.5 Working of a Function 3.6 Declaring, Defining and calling user defined Functions- 3.7 The return Statement 3.8 Call by Value and call by Reference 3.9 Function as an Argument 3.10 Recursion 3.11 Advantages and Disadvantages of Recursion
Unit– IV Preprocessor Directives	4a. Appreciate use of various header files 4b. Define, test and implement constant and Macro	4.1 Introduction 4.2 #define and #undef Directives 4.3 #include, #line Directive 4.4 Predefined macros in ANSI C 4.5 Standard I/O Predefined Streams in stdio.h 4.6 Predefined macros in ctype.h
Unit– V Structure and	5a. Implement different data types under a	5.1 Introduction and Features of Structures 5.2 Declaration and Initialization of Structures

Unit	Major Learning Outcomes	Topics and Sub-topics
Union	single structure 5b. Utilize memory effectively using Union	5.3 Array of Structures 5.4 Pointers to Structure 5.5 typedef 5.6 Enumerated Data Type 5.7 Union 5.8 Union of Structures
Unit- VI Files	6a. Develop, debug and execute programs to read and write data from secondary storage devices	6.1 Introduction 6.2 File Operations i. Opening a File ii. Reading a File iii. Closing a File 6.3 Text Modes 6.4 Binary Modes 6.5 File Functions i. fprintf() ii. fscanf() iii. getc() iv. putc() v. fgetc() vi. fputc() vii. fseek() viii. feof() 6.6 Command Line Arguments

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks (Duration – 48 Hours)			
			R Level	U Level	A Level	Total
1.	Arrays	8	4	5	6	15
2.	Pointers	8	4	5	5	14
3.	Functions	8	4	5	6	15
4.	Preprocessor Directives	4	1	2	2	5
5.	Structure and Union	6	2	3	4	9
6.	Files	8	3	4	5	12
	Total	42	18	24	28	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF PRACTICAL/EXERCISES

Write, test, debug and execute following programs to develop different types of skills leading to the achievement of desired competency as mentioned. Out of the following enough practical/Exercise should be selected from each unit to give total workload of 56 hours to students.

S. No.	Unit No.	Practical/ Exercises	Approx Hrs. Required
1	I	Write, test, debug and execute minimum five programs with array operations like insertion, searching, merging, sorting and deletion.	06
2	I	Write, test, debug and execute minimum five programs using two Dimensional and Multi-Dimensional arrays.	06
3	II	Write, test, debug and execute four programs using Pointers.	06
4	II	Write, test, debug and execute programs using array of Pointers and pointers of pointers.	06
5	III	Write, test, debug and execute programs using String functions strlen(), strcpy, strcmp(), strlen(),strupr(), strchr(), strcat() and common math and other functions like sqrt(), pow(), ceil(), round(), sin(), cos(), tan(), div(), abs() etc .	06
6	III	Write, test, debug and execute programs using functions and passing function arguments.	06
7	III	Write, test, debug and execute programs using recursive functions.	04
8	IV	Write, test, debug and execute programs for implementing Preprocessor Directives such as constants and Macros	02
9	V	Write, test, debug and execute programs with various features of Structures	04
10	V	Write, test, debug and execute programs using Union and Union of structures	06
11	VI	Write, test, debug and execute programs using elementary read/write file operations.	06
12	VI	Write, test, debug and execute programs using fprintf(), fscanf(), getc(), putc(), fgetc(), fputc(), fseek(), feof() functions.	12
Total			70

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

- 7.1 Students will prepare file for the above mentioned Practical
- 7.2 Prepare presentation and deliver seminar on various topics covered like String functions, Pointers, Arrays, File Functions, Structures and Unions,
- 7.3 Students are expected to develop minimum one program of particular topic as an example to exhibit real life application.

8. SUGGESTED LEARNING RESOURCES**A. List of Books**

Sr.No.	Author	Title of Books	Publication
1	Kamthane,A.N.	Programming in 'C'	Pearson,2012
2	Balaguruswami,E.	Programming in ANSI C	TMH,2012
3	Kanetkar, Yashavant	Let us 'C'	BPB publications,2010

B. List of Major Equipment/ Software

- 1 Computer System with latest configuration
- 2 'C' Compiler

C. List of Software/Learning Websites

- 1 'C' Programming Language: <http://www.w3schools.in/c-programming-language/intro/>
- 2 Learn C Online: <http://www.learnonline.com/>
- 3 'C' Frequently Asked Questions: <http://www.c-faq.com>
- 4 'C' Programming: <http://www.cprogramming.com>
- 5 Sams Teach Yourself C in 24 Hours: <http://aelinik.free.fr/c/>

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

1. **Dr. P.P.Kotak** Head Computer Engg. Dept, AVPTI, Rajkot
2. **Prof. K. N. Raval** Head Computer Engg. Dep, RCTI, Ahmedabad
3. **Prof. R. M Shaikh** Head Computer Engg. Dept, KD Polytechnic, Patan.
4. **Prof. S. D. Shah** Lect. Computer Engg. Dept, RCTI, Ahmedabad

Co-ordinator and Faculty Members from NITTTR Bhopal

1. **Dr. K. J. Mathai**, Associate Professor Dept. of Computer Engineering and Applications
2. **Dr. R. K. Kapoor**, Associate Professor Dept. of Computer Engineering and Applications

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Fundamental of Information Technology
(Course Code: 3321601)

Diploma Programmes in which this course is offered	Semester in which offered
Information Technology	Second Semester

1. RATIONALE

Information Technology has developed over the years into a key driver of science and economy. Almost every aspect of our personal and our professional lives is affected by information technology. IT industry became a major part of economy and it has a profound influence on almost all other industries. India is moving towards economies which are knowledge-based with Information Technology playing a crucial role.

Hence, central theme of offering this course is to educate new IT technicians to identify need of IT Infrastructure setup and use resources, structures and applications.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competencies:

- i. **Configure Computing device and peripherals on network.**
- ii. **Use Internet for its application**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	50
0	2	2	4	00	00	20	30	

Legends: L-Lecture; T – Tutorial/Teacher Guided Student Activity; P - Practical; C – Credit;; ESE - End Semester Examination; PA - Progressive Assessment.

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Basics of Information Technology	<p>1a. Differentiate Data, Information and Knowledge.</p> <p>1b. Explain Ethical and social issues in IT infrastructure.</p>	<p>1.1 Information Technology: Understanding the need of Information, Data, Knowledge, Difference between Data, Information and Knowledge.</p> <p>1.2 Benefits of IT infrastructure, Ethical issues : Plagiarism, Use of License Software, copyright infringement, Intellectual property Rights, its impact on IT.</p> <p>1.3 IT Infrastructure Components: Computer Hardware, Operating System, Software, Network components.</p>
Unit– II Anatomy of Computer System	<p>2a. Explain functionality of computer hardware.</p> <p>2b. Classify different types of components and peripherals.</p>	<p>2.1 Anatomy of computers: Motherboard, CPU, SMPS, Expansion slots, Drives, Storage devices</p> <p>2.2 Input devices: Keyboard, Mouse, Pen, Touch Screen, Scanners.</p> <p>2.3 Output devices: Monitors, LCD, LED, Printers, tablets.</p> <p>2.4 Memory: RAM, ROM, Cache, Auxiliary Memory, HDD, CD, DVD, Blue ray and USB drives.</p>
Unit– III Types of Software	<p>3a. Differentiate among different types of software</p> <p>3b. Use Basic setting features of windows Operating systems.</p>	<p>3.1 Types of software: Overview of System software and application software, Operating system, Utility software, drivers, compilers and interpreters.</p> <p>3.2 Operating system: Windows :Desktop, Control Panel, Driver installation, create users, rename computer, manipulate taskbar, power management, screensaver, Install new peripheral.</p>
Unit–IV Basics of Computer Networking	<p>4a. Identify different types of computer networks.</p> <p>4b Identify different network devices</p> <p>4c Explain working of different networking devices.</p>	<p>4.1 Network advantages like resource sharing, file sharing, common Storage.</p> <p>4.2 LAN, MAN, WAN, Internet, lay out of STAR, BUS, MESH and RING topology.</p> <p>4.3 Networking infrastructure: Repeater, Bridge, Hub, Switch, Router, Firewall, Gateway, NIC, Cables, MODEM.</p>
Unit-V Basics of Internet, Its Applications & Security	<p>5a. Explain different types of Internet connectivity.</p> <p>5b. Use Search engines.</p> <p>5c. Use Internet for mail, news, chatting and social networking .</p> <p>5d. Identify and avoid different threats to IT infrastructure.</p> <p>5e. Identify different remedies to mitigate</p>	<p>5.1 Internet basics: Dial up Connection, DSL, Leased line connectivity, Wi-Fi Connection, Browsers: IE, Firefox, Chrome.</p> <p>5.2 Protocols : http, https, www, IP, setting up Internet connection on DSL, setting up Internet on local network.</p> <p>5.3 DNS:types with examples</p> <p>5.4 Search engines : Google, yahoo, bing: search images, maps, news, search content using Different criteria.</p> <p>5.5 Applications of Internet : www, mail, news, Chat, social networking.</p> <p>5.6 Threats to IT infrastructure : Physical, Access level : password breaks, hacking,</p>

Unit	Major Learning Outcomes	Topics and Sub-topics
	threats to IT infrastructure.	web based threats like weak passwords, social engineering, pirated software, unethical websites, Malicious programs, infrequent updates, protecting and mitigating threats : Use of Anti Virus software, scanning computer regularly, updating anti Virus.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

-----Not Applicable-----

6. SUGGESTED LIST OF PRACTICAL/EXERCISES

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency . Out of the following enough practical/Exercise should be selected from each unit to give total workload of 56 hours to students.

S. No.	Unit No.	Practical/ Exercises	Approx Hrs. Required
1	I	1.1 Search and download share ware or freeware Plagiarism detection software.	04
2	II	2.1 Disassemble and Identify Motherboard, CPU, SMPS, Expansion slots, Drives, storage devices.	10
3	III	3.1 Install new application software using control panel. 3.2 Shrink the hard disk partition for more partitions 3.3 Create users with full control, limited control. 3.4 Set screen savers and energy management in Windows. 3.5 Set window resolution 3.6 Install a peripheral/printer/scanner driver on your computer system.	10
4	IV	4.1 Draw a neat Layout of network setup of your laboratory. 4.2 Setup a computer with proper IP and subnet for a local Network. 4.3 Find an IP address, Network mask, Computer Name in local Network. Rename the computer name with your own name.	12
5	V	5.1 Setup a connection with proper IP, subnet, and gateway Address to use Internet on local network. 5.2 Search Google for Information technology basic courseware ppt's and .pdf files. Use Google translate to translate content from one Language to another. 5.3 Use Google maps and find out location of your institute. 5.4 Apply updates to anti-virus software and download new Definitions. 5.5 Create a group mail, add class mates to group mail and send them 'Welcome e-mail'. 5.6 Apply passwords of your computer system. 5.7 Install Anti-Virus software in your computer; Scan all the Drives using quick and full options. Setup the software for continuous updates.	30
Total			66

7. SUGGESTED LIST OF STUDENT ACTIVITIES

7.1 Teachers guided self learning activities; Course/library/internet/lab based mini projects.

7.2 Students activities like: course/ topic based seminars; Internet based assignments, a presentation on Ethical use of IT infrastructure and social networks based on the accumulated knowledge.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

Sr. No.	Author	Title of Books	Publication
1	Dennis P. Curtin, Kim Foley	Information Technology	Tata Mcgraw Hill
2	Turban, Rainer	Introduction to Information Technology.	Wiley

B. List of Major Practical/ Software

1. Computers with licensed OS/Open source system software, licensed application software, Latest Anti-Virus software.
2. Sufficient Internet Bandwidth according to number of users.
3. Simulators/Kits for Network activity demonstration.

C. List of Software/Learning Websites

- 1 Weleys computing Resources
- 2 <http://bcs.wiley.com/hebcs/Books?action=index&itemId=0471347809&itemTypeId=BKS&bcsId=1918>

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnic

- **Prof. P.K.FARUKI**, Lecturer, Information Technology Department, Government Polytechnic, Ahmedabad
- **Prof. Nandu Fatak**, Lecturer, Information Technology Dept. Government Polytechnic Ahmedabad

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- **Dr. M. A. Rizwi**, Associate Professor Dept. of Computer Engineering and Applications