GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Basics Mathematics
(Code: 3300001)

Diploma Programmes in which this course is offered	Semester in which offered
Automobile Engineering, Biomedical Engineering, Ceramic Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Electronics & Communication Engineering, Environment Engineering, Fabrication Technology, Information Technology, Instrumentation & Control Engineering, Mechanical Engineering, Mechatronics Engineering, Metallurgy Engineering, Mining Engineering, Plastic Engineering, Power Elctronics Engineering, Printing Technology, Textile Manufacturing Technology, Textile Processing Technology, Transportation Engineering	**First Semester**

1. RATIONALE

The subject is classified under Basic Sciences and students are intended to know about the basic concepts and principles of Mathematics as a tool to analyze the Engineering problems. Mathematics has the potential to understand the Core Technological studies.

2. LIST OF COMPETENCIES

The course content should be taught so as to understand and perform the Engineering concepts and computations. Aim to develop the different types of Mathematical skills leading to the achievement of the following competencies:

i. **Apply the concepts and principles of mathematics to solve simple engineering problems**

3. TEACHING AND EXAMINATION SCHEME

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

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 Logarithm	1.1 Solve simple problems using concepts of Logarithms	Concept ,Rules and related Examples
Unit– II Determinants and Matrices	2.1 Solve simultaneous equations using concepts of Determinants and Matrices	Idea of Determinant and Matrix, Addition/Subtraction, Product, Inverse up to 3X3 matrix, Solution of Simultaneous Equations(up to three variables)
Unit– III Trigonometry	3.1 Solve simple problems using concepts of Trigonometry	Units of Angles(degree and radian), Allied & Compound Angles, Multiple –Submultiples angles, Graph of Sine and Cosine, Periodic function, sum and factor formulae, Inverse trigonometric function
Unit– IV Vectors	4.1 Solve simple problems using concepts of Vectors	Basic concept of Vector and Scalar, addition & subtraction, Product of Vectors, Geometric meaning of Scalar and Vector Product. Angle between two vectors, Applications of Dot (scalar) and Cross (vector) Product, Work Done and Moment of Force.
Unit-V Menstruation	5.1 Calculate the surface area and volume of different shapes and bodies.	Area of Triangle, Square, Rectangle, Trapezium, Parallelogram, Rhombus and Circle Surface & Volume of Cuboids, Cone, Cylinder and Sphere.

5. SUGGESTED SPRCIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
1.	Logarithms	03	4	4	2	10
2.	Determinants and Matrices	08	6	8	4	18
3.	Trigonometry	08	8	6	4	18
4.	Vectors	06	5	5	4	14
5.	Mensuration	03	3	3	4	10
Total		**28**	**26**	**26**	**18**	**70**

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

6. SUGGESTED LIST OF EXERCISES (During tutorial hours)

The exercises 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.	Exercises/Tutorial
1	1	Logarithms-Simple Examples related Definition and Rules
2		Examples on various types and Graphs
3	2	Determinants, Simple Examples on Matrix Addition/Subtraction and Product
4		Co-factors, Adjoint and Inverse of Matrix
5	2	Solution of Simultaneous Equation using 3X3 Matrix and its Applications
6	3	Practice Examples: Allied & Compound Angles
7		Practice Examples: Periodic functions, Sum/Diff and factor formulae, Inverse Trigonometric function etc.
8		Simple Graphs of Sine and Cosine Functions(Explain Spherical Trigonometry, if possible, for Applications)
9	4	Practice Simple Examples Vectors
10		Example related to Dot and Cross Products and Applications
11	5	Examples on Area
12		Surface Area & Volume and its Applications

Note: The above Tutor sessions are for guideline only. The remaining Tutorial hours are for revision and practice.

7. SUGGESTED LIST OF STUENT 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.

1. Applications to solve identified Engineering problems and use of Internet.
2. Learn MathCAD to use Mathematical Tools and solve the problems of Calculus.
3. .Learn MATLAB and use 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
2	W R Neelkanth	Applied Mathematics-I	Sapna Publication
3	S P Deshpande	Polytechnic Mathematics	Pune Vidyarthi Gruh Prakashan
4	Rudra Pratap	Getting Started with MATLAB-7	OXFORD University Press

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. DPlot
3. MathCAD
4. MATLAB

You may use other Software like Mathematica and other Graph Plotting software. Use 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.
- **Smt R. L. Wadhwa**, Lecturer, Govt. Polytechnic, Ahmedabad
- **Shri H. C. Suthar**, Lecturer, BPTI, Bhavnagar
- **Shri P. N. Joshi**, Lecturer, Govt. Polytechnic, Rajkot
- **Shri P. T. Polara**, Lecturer, Om Institute of Engg. And Tech, Junagadh,
- **Smt Ami C. Shah**, Lecturer, BBIT, V. V. Nagar.

Coordinator and Faculty Member From NITTTR Bhopal

- **Dr. P. K. Purohit**, Associate Professor, Dept. of Science, NITTTR, Bhopal

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: English
(Code: 3300002)

Diploma Programmes in which this course is offered	Semester in which offered
Architectural Assistanship, Automobile Engineering, Biomedical Engineering, Ceramic Engineering, Chemical Engineering, Civil Engineering,Computer Aided Costume Design & Dress Making, Computer Engineering, Electrical Engineering, Electronics & Communication Engineering, Environment Engineering, Fabrication Technology, Information Technology, Instrumentation & Control Engineering, Mechanical Engineering, Mechatronics Engineering, Metallurgy Engineering, Mining Engineering, Plastic Engineering, Power Elctronics Engineering, Printing Technology, Textile Designing, Textile Manufacturing Technology, Textile Processing Technology, Transportation Engineering	**First Semester**

1. RATIONALE

English language has become a dire need to deal successfully in the globalized and competitive market and hence this curriculum aims at developing the functional and communicative abilities of the students in English. Proficiency in English is one of the basic needs of technical students. A technician has to communicate all the time with peers, superiors, subordinates and clients in his professional life. Hence this course is being offered.

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:

i. **Communicate verbally and in writing in English.**
ii. **Comprehend the given passages and summarize them.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Tutorial Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
3	2	0	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
	Writing Skills	**Speaking Skills**	
Unit – I Grammar	1.1 Apply correct verb in the given sentence	1b. Use grammatically correct sentence in day to day communication	**1.1 Tenses** - Present Tense (Simple, Continuous, Perfect, Perfect Continuous) - Past Tense (Simple, Continuous, Perfect) - Future Tense (Simple)
	1.2 Distinguish among various Determiners	1d. Distinguish among determiners and apply correctly in communicative usage.	**1.2 Determiners** - Articles (A, An, The) Some, Any, Much, Many, All, Both, Few, A few, The few, Little, A little, The little, Each, Every.
	1.3 Use appropriate modal auxiliaries in a given expression	1f. Choose appropriate modals in situations where different modes of expressions are used.	**1.3 Modal Auxiliaries** Can, Could, May, Might, Shall, Should, Will, Would, Must, Have to, Need, Ought to
	1.4 Choose the correct verb for the given subject	1h. Use the correct verb depending on the subject in a sentence.	**1.4 Subject- Verb Agreement**
	1.5 Distinguish between Active and Passive structures. Apply correct model auxiliary in the given sentence.	1j. Apply the correct voice in formal communication	**1.5 The Passive Voice** Simple Tenses, Perfect Tenses And Modal Auxiliary Verbs
	1.6 Use appropriate preposition in a sentence	1l. Usage of correct preposition as per time, place and direction.	**1.6 Prepositions**: Time, Place and Direction
	1.7 Identify different connectors and their usage.	1n. Join words or sentences using connectors and bring out the desired meaning.	**1.7 Connectors**: And, But, Or, Nor, Though, Although, If, Unless, Otherwise, Because, as, Therefore, So, Who, Whom, Whose, Which, Where, When, Why.

Unit	Major Learning Outcomes		Topics and Sub-topics
	Writing Skills	**Speaking Skills**	
Unit – II Comprehension Passages	2.1 Formulate sentences using new words. 2.2 Enrich vocabulary through reading. 2.3 Write short as well as long answers to questions. 2.4 Express ideas in English in written form effectively	2e.Discuss the content of the passage/story in the class. 2f. Ask appropriate questions as well to answer them. 2g. Follow oral instructions and interpret them to others. 2h. Present topics effectively and clearly. 2i.Use dictionary, thesaurus and other reference books. 2j.Describe an object or product. 2k. Use correct pronunciations and intonations. 2l. Give instructions orally	**2.1 Comprehension Passages** • Lincoln's Letter to His Son's Teacher (Abraham Lincoln) • What we must Learn from the West (Narayana Murthy) • Dabbawallas: Mumbai's Best Managed Business (Amberish K. Diwanji) • Internet (Jagdish Joshi) **2.2 Vocabulary Items:** -Matching items (word and its Meaning) - One word Substitution - Phrases and idioms - S ynonyms and Antonyms from given MCQs
Unit – III Short Stories		3a Express ideas and views on given topics. 3b. Speak briefly on a given topic fluently and clearly. 3c. Participate in formal and informal conversations 3d. Recapitulate orally the facts or ideas presented by the speaker	• My Lost Dollar by Stephen Leacock • The Snake in the Grass by R K Narayan • A Day's Wait by Earnest Hemingway
Unit – IV **Writing Skills**	4.1 Write letters and dialogues on given topics / situations.	4b.Face oral examinations and interviews	**4.1 Dialogue Writing** **4.2 Samples for Practice:** - Meeting ad Parting - Introducing and Influencing - Requests - Agreeing and Disagreeing - Inquiries and Information **4.3 Letter:** - Placing an order - Letter to Inquiry - Letter of Complaint - Letter of Adjustment - Letter seeking permission
Unit – V Speaking Skills		5a.Follow correct pronunciation, stress and intonation in everyday conversation.	**For 28 hours of practical periods**, digital language laboratory is recommended to be established in every polytechnic. But as polytechnics currently do not have digital language laboratories practical periods will be engaged encouraging the students to speak as per the text taught in the class.

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

Unit Title	Teaching Hours 42+28	Distribution of Theory Marks			
		R Level	U Level	A Level	Total
Unit – I Grammar	14	8	8	9	25
Unit – II Comprehension Passages	07	4	6	5	15
Unit – III Short Stories	07	4	5	5	14
Unit – IV Writing Skills	14	3	6	6	15
Unit – V Speaking Skills	28	1			01
Total	**70**	**20**	**25**	**25**	**70**

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

6. SUGGESTED LIST OF TUTORIAL EXERCISES

The tutorial exercises should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the above mentioned competencies.

S. No.	Unit No.	Experiment
1	I	**Conversation** 1. Introducing oneself 2. Introduction about family 3. Discussion about the weather 4. Seeking Permission to do something 5. Description about hobbies 6. Seeking Information at Railway Station/ Airport 7. Taking Appointments from superiors and industry personnel 8. Conversation with the Cashier- College/ bank 9. Discussing holiday plans 10. Asking about products in a shopping mall 11. Talking on the Telephonic 12. Wishing Birthday to a Friend 13. Talking about Favourite Sports
2	II	**Presentation Skills** General Presentations pertaining to Unit I, II, III

7. SUGGESTED LIST OF PROPOSED 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.

8. SUGGESTED LEARNING RESOURCES

A. Text Book

Sr. No.	Author/s	Title of Books	Publication
1	Juneja & Qureshi	**Active English**	Macmillan

B. List of Reference Books

Sr. No.	Author/s	Title of Books	Publication
1	Wren & Martin	High School English Grammar	S. Chand & Co. Ltd
2	M. Gnanamurali	English Grammar at Glance	S. Chand & Co. Ltd.
3	E. Suresh Kumar & Others	Effective English	Pearson
4	S. Chandrashekhar & Others	English Communication for Polytechnics	Orient BlackSwan
5	-	English Fluency Step 1 & 2	Macmillan
6	-	Active English Dictionary	Longman

C. List of Major Equipment/ Instrument

i. Digital English Language Laboratory
ii. Computers for language laboratory software
iii. Headphones with microphone
iv. Computer furniture

D. List of Software/Learning Websites

i. http://www.free-english-study.com/
ii. http://www.english-online.org.uk/course.htm
iii. http://www.english-online.org.uk/
iv. http://www.talkenglish.com/
v. http://www.learnenglish.de/

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Polytechnic Faculty Members

- **Prof. K. H. Talati**, Govt. Polytechnic, Gandhinagar (Convener)
- **Ms. Almas Juneja**, Gujarat Technological University, Ahmedabad.
- **Shri. D. M. Patel**, Govt. Polytechnic, Ahmedabad.
- **Dr. Sonal K. Mehta**, Govt. Girls Polytechnic, Ahmedabad.
- **Shri. Bhadresh J. Dave**, Govt. Polytechnic, Rajkot.
- **Dr. Peena Thanki**, Govt. Polytechnic, Jamnagar.
- **Dr. Chetan Trivedi**, Govt. Engineering College, Bhavnagar.
- **Dr. Raviraj Raval**, Govt. Polytechnic, Rajkot.
- **Shri Vaseem Qureshi**, Vishwakarma Govt. Engineering College, Chandkheda, Ahmedabad.

NITTTR Bhopal Faculty and Co-ordinator

- **Dr. Joshua Earnest,** , NITTTR, Bhopal
- **Prof.(Mrs.) Susan S. Mathew,** NITTTR, Bhopal

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Environment Conservation & Hazard Management
(Code: 3300003)

Diploma Programmes in which this course is offered	Semester in which offered
Biomedical Engineering, Ceramic Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Environment Engineering, Fabrication Technology, Information Technology, Instrumentation & Control Engineering, Mechanical Engineering, Mining Engineering, Textile Design, Transportation Engineering	**First Semester**
Architecture Assistantship, Automobile Engineering, Chemical Engineering, Electronics & Communication, Mechatronics Engineering, Metallurgy Engineering, Plastic Engineering, Power Electronics, Printing Technology, Textile Manufacturing, Textile Processing	**Second Semester**

1. RATIONALE

For a country to progress, sustainable development is one of the key factors. Environment conservation and hazard management is of much importance to every citizen of India. The country has suffered a lot due to various natural disasters. Considerable amount of energy is being wasted. Energy saved is energy produced. Environmental pollution is on the rise due to rampant industrial mismanagement and indiscipline. Renewable energy is one of the answers to the energy crisis and also to reduce environmental pollution. Therefore this course has been designed to develop a general awareness of these and related issues so that the every student will start acting as a responsible citizen to make the country and the world a better place to live in.

2. 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.

i. **Take care of issues related to environment conservation and disaster management while working as diploma engineer.**

3. TEACHING AND EXAMINATION SCHEME

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

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 Ecology and environment	1.1 Enhance knowledge about engineering aspects of Environment 1.2 Correlate the facts of ecology and environment A 1.3 assess the effect of pollution 1.4 List the causes of environmental pollution 1.5 State the major causes of air, water and noise pollution 1.6 Describe how industrial waste contaminates the land 1.7 Describe the effects of radiation on vegetables, animals	1.1 Importance of environment and scope 1.2 Engineering and environment issues 1.3 The natural system, Biotic and a-Biotic components and processes of natural system 1.4 Eco system, food chain and webs and other biological Systems, 1.5 Causes of environmental pollution 1.6 Pollution due to solid waste 1.7 water pollution, air pollution, the Noise as pollution, 1.8 Pollution of land due to industrial and chemical waste 1.9 Radiation and its effects on vegetables and animals
Unit– II Sustainable Development	2.1 Explain the concept of sustainable development 2.2 Justify the need for renewable energy 2.3 Describe the growth of renewable energy in India 2.4 Explain the concepts of waste management and methods of recyling	2.1 Concept of sustainable development, 2.2 Natural resources, a-biotic and biotic resources 2.3 Principles of conservation of energy and management 2.4 Need of Renewable energy 2.5 Growth of renewable energy in India and the world 2.6 Concept of waste management and recyling
Unit – III Wind Power	3.1 Describe the growth of wind power in India 3.2 State the differences between VAWTs and HAWTs 3.3 Explain the differences between drag and lift type wind turbines 3.4 Describe the working of large wind turbines 3.5 List the types of aerodynamic control of large wind turbines 3.6 Name the generators used in large wind turbines	3.1 Growth of wind power in India 3.2 Types of wind turbines – Vertical axis wind turbines (VAWT) and horizontal axis wind turbines (HAWT) 3.3 Types of HAWTs – drag and lift types 3.4 Working of large wind turbines 3.5 Aerodynamic control of large and small wind turbines 3.6 Types of electrical generators used in small and large wind turbines
Unit – IV Solar Power	4.1 Describe the salient features of solar thermal and PV systems 4.2 Describe a solar cooker and solar water heater 4.3 Describe the working of solar PV system 4.4 State the salient features of polycrystalline, monocrystalline and thin film PV systems	4.1 Features of solar thermal and PV systems 4.2 Types of solar cookers and solar water heaters 4.3 Solar PV systems and its components and their working 4.4 Types of solar PV cells 4.5 Solar PV and solar water heaters, rating and costing
Unit – V Biomass energy	5.1 State the different types of biomass energy sources 5.2 Describe about the energy content in biomass 5.3 Describe the working of simple biogas plant	5.1 Types of Biomass Energy Sources 5.2 Energy content in biomass of different types 5.3 Types of Biomass conversion processes 5.4 Biogas production

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – VI Seismic Engineering and disaster management	6.1 Explain the principles of seismic Engineering in design of structure 6.2 State the appropriate actions to be taken during disasters	6.1 Introduction of seismic engineering and its application civil engineering designs 6.2 Features of disasters such as Floods, Earthquakes, Fires, Epidemics, Gas/radioactive leaks etc. 6.3 Management and mitigation of above disasters

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 Marks
1.	Ecology and Environment	8	4	4	0	8
2.	Sustainable Development	10	4	5	1	10
3.	Wind Power	10	4	6	4	14
4.	Solar Power	10	4	6	4	14
5.	Biomass energy	8	4	4	2	10
6.	Seismic Engineering and disaster	10	6	6	2	14
	Total	**56**	**26**	**31**	**13**	**70**

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

6. SUGGESTED LIST OF EXPERIMENTS/PRACTICAL EXERCISES

Nil

7. SUGGESTED LIST OF STUDENT ACTIVITIES

i. Prepare paper on various sustainable development
ii. Make a report after gathering information the values of water, noise pollution and air pollution in your city/town and compare the values in other cities and towns in India with respect to environmentally acceptable levels
iii. Prepare a paper on air and water pollution in an industry/institute
iv. Undertake some small mini projects in any one of the renewable energies
v. Visit an energy park and submit project on various sources of energy
vi. Prepare powerpoint on clean and green technologies
vii. Prepare a list of do's and don'ts applicable during disasters
viii. Submit a report on garbage disposal system in your city/town.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S. No.	Title of Book	Author	Publication/Year
1	Renewable Energy Technologies	Solanki, Chetan Singh	PHI Learning, New Delhi, 2010
2	Ecology and Control of the Natural Environment	Izrael,Y.A.	Kluwer Academic Publisher
3	Environment Engineering and Disaster Management	Sharma, Sanjay K.	Luxmi Publications, New Delhi
4	Environmental Noise Pollution and Its Control	Chhatwal,G.R.; Katyal,T.; Katyal,	Anmol Publications, New Delhi
5	Wind Power Plants and Project Development	Earnest, Joshua & Wizelius, Tore	PHI Learning, New Delhi, 2011
6	Renewable Energy Sources and Emerging Technologies	Kothari, D.P. Singal, K.C., Ranjan, Rakesh	PHI Learning, New Delhi, 2009
7	Environmental Studies	Anandita Basak	Pearson
8	Environmental Science and Engineering	Alka Debi	University Press
9	Coping With Natural Hazards, Indian Context	K. S. Valadia	Orient Longman
10	Engineering and Environment	Edward S. Rubin	Mc Graw Hill Publ.

B. List of Major Equipment/ Instrument

i. Digital sound level meters (to check noise pollution)
ii. Digital air quality meter (to measure air pollution)
iii. Digital handheld anemometer (to measure wind speeds)
iv. Digital hand held pyranometer (to measure solar radiation levels)

C. List of Software/Learning Websites

i. http://www1.eere.energy.gov/wind/wind_animation.html
ii. http://www.nrel.gov/learning/re_solar.html
iii. http://www.nrel.gov/learning/re_biomass.html
iv. http://www.mnre.gov.in/schemes/grid-connected/solar-thermal-2/
v. http://www.mnre.gov.in/schemes/grid-connected/biomass-powercogen/

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. H.L.Purohit** , HOD, Civil Engg. Dept. L.E.College. Morbi
- **Shri. P.A.Pandya**, LCE, Civil Engg. Dept, G.P , Himatnagar

Co-ordinator and Faculty Members from NITTTR Bhopal

- **Dr. J.P.Tegar**, Professor Dept of Civil and Environmental Engg, NITTTR, Bhopal.
- **Dr. Joshua Earnest,** Professor and Head, Dept. of Electrical & Electronics Engg, NITTTR, Bhopal

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Engineering Chemistry(Group-2)
(Code: 3300006)

Diploma Programmes in which this course is offered	**Semester in which offered**
Biomedical Engineering, Electrical Engineering, Power Electronics Engineering	**First Semester**
Metallurgy Engineering	**Second Semester**

1. RATIONALE

Science is the foundation for all technician courses. The Basic aim of teaching science is to develop in the students the habit of scientific inquiry, ability to establish the cause and effect, relationship.
Chemistry forms the part of applied science. The study of basic concepts of chemistry like chemical bonding, corrosion, water treatment, and different engineering materials like polymers, paints ,lubricants, cement, Refractories etc. will help the students understanding engineering subjects where the emphasis is laid on the application of these concepts
Chemistry is concerned with the changes in structure and properties of matter. Many of the process which are involved to bring out this changes forms the basis of engineering activities. Teaching of chemistry should be aimed at developing the right type of aptitude in the students and the ability to predict the result under given condition
Thus good foundation in basic science will help the students in their self development, to cope up with continuous flow of innovations.

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 competency.

i. Apply the basic concepts and principals of Chemistry in various engineering applications.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			**Total Credits (L+T+P)**	**Examination Scheme**				
				Theory Marks		**Practical Marks**		**Total 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 **Chemical Bondings and Catalysis**	1.1. Describe the different types of chemical bonds 1.2. Explain various properties of material depending upon bond formation 1.3. Describe the molecular structure of solid, liquid and gases 1.4. Comprehend the crystal structure of metal and properties reflected by packing of atoms 1.5. Explain the various types of catalysis and catalyst industrial 1.6. List the industrial applications of catalyst.	Introduction 1.1 Theory Of Valence 1.2 Types of chemical bonds 1.2.1 Electrovalent bond,& its characteristics 1.2.2 Covalent bond & its characteristics 1.2.3 Co- ordinate bond & its characteristics 1.2.4 Hydrogen bond, its types and Significance 1.2.5 Metallic bond, Explanation of Metallic properties. 1.3 Intermolecular force of attraction 1.4 Molecular arrangement in solid, liquid and gases. 1.5 Structure of solids. 1.5.1 Metallic solids- Unit cell- bcc, fcc and hcp packing of metals –examples and properties reflected by the packing of atoms 1.6 Catalysis, 1.6.1 Types of catalysis 1.6.2 Theory of Catalysis 1.7 Types of Catalyst 1.7.1 Positive Catalyst 1.7.2 Negative Catalyst 1.7.3 Auto-catalyst 1.8 Catalytic Promoter and Catalytic inhibitor 1.9 Industrial Application of Catalyst
Unit– II **Concepts of Electro Chemistry**	2.1 Explain theory of ionization and factors affecting it. 2.2 Explain the importance of pH &and its industrial application 2.3 List the	2.1 Introduction 2.2 Arrhenius theory of ionization. 2.3 Degree of ionization 2.3.1 Factors affecting the degree of ionization 2.4 Definition of pH 2.4.1 pH of acid, base and neutral solution 2.4.2 pH calculations of acid, base and salt solution at different concentration 2.4.3 Importance of pH in various fields. 2.5 Definition of buffer solution. 2.5.1 Buffer Action & Types of buffer solution. 2.5.2 Application of buffer solutions. 2.6 Electrolytes and Non-electrolytes

Unit	Major Learning Outcomes	Topics and Sub-topics
	difference between electrolytes and non-electrolytes 2.4 Describe construction and working of electrochemical cell 2.5 State the term: electrode potential and standard condition for its measurement 2.6 State the application of electrolysis process for surface coating	2.6.1 Types of electrolytes 2.7 Construction and working of electrochemical cell 2.8 Standard conditions 2.9 Standard hydrogen electrodes 2.10 Nernst theory of single electrode potential & Nernst equation 2.11 Electrochemical series, galvanic series 2.12 Electrolysis, Faradays laws of electrolysis 2.13 Industrial application of Electrolysis 2.14 Conductance of solution (a) Conductivity (b)Specific Conductivity (c) Equivalent conductivity (d) Molar conductivity
Unit– III **Corrosion of metals & its prevention**	3.1 Describe the different types of corrosion 3.2 Comprehend the different factors affecting rate of corrosion 3.3 Explain the different protective measures to prevent the corrosion	3.1. Definition of corrosion 3.2 Types of corrosion 3.2.1 Dry corrosion: Oxidation corrosion mechanism corrosion-mechanism , Nature of oxide film 3.2.2 Wet corrosion-mechanism 3.2.3 Concentration cell corrosion 3.3 Pitting corrosion 3.4 Waterline corrosion 3.5 Crevice corrosion 3.6 Factors affecting the rate of corrosion,- Nature of film, Nature of Environment,PH of Solution, Area of cathode anode and, Temperature, Moisture, Purity of metal 3.7 . Methods of prevention of corrosion- Modification of environment , Modification of the properties of metal , Use of protective coatings. Anodic and cathodic protection, Modification in design and choice of material
Unit– IV **Fuels and Combustion**	4.1 Classify different fuels 4.2 Determinate calorific value 4.3State the significance of	4.1 Definition of fuels classification of fuels 4.2 Calorific value and its unit 4.2.1 Determination of calorific value by Bomb calorimeter 4.3 Solid Fuels: Coal 4.3.1 Classification of coal 4.3.2 proximate and ultimate analysis of fuels 4.4 Numerical based analysis of coal-Dulong formula 4.5 Liquid Fuels: Petroleum,

Unit	Major Learning Outcomes	Topics and Sub-topics
	octane and cetane number 4.4 Justify the need of alternative fuels such as power alcohol and Bio-diesel and hydrogen gas	4.5.1 Origin of petroleum& Composion of petroleum, 4.5.2 Refining of petroleum 4.5.3 Octane Number of petroleum,Cetane number of petroleum 4.5.4 Power alcohol, Bio-diesel. 4.6 Gaseous fuels: Composition, Properties and application of natural gas 4.6.1 .CNG,LPG and LNG-Properties and application 4.6.2 Hydrogen gas as fuel 4.7 Combustion-chemical reaction.
Unit– V **Lubricants**	5.1 Explain terms Lubrication and Lubricants 5.2 Describe the different types of lubricants 5.3 Describe the physical and chemical property of lubricants 5.4 Selection of proper lubricants for engineering use	5.1 Introduction and definition of lubricants and lubrication 5.2 function of lubricants 5.3 Types of lubrication 5.3.1 Fluid film lubrication. 5.3.2 Boundary lubrication 5.4 Classification of lubricants 5.4.1 Solid lubricants 5.4.2 Semi-solid lubricants 5.4.3 Liquid lubricants 5.4.4 Synthetic oils 5.5 Physical Properties of lubricants and their significance like 5.5.1 Viscosity and viscosity index 5.5.2 Flash point and fire point 5.5.3 Pour point and cloud point 5.5.4 oiliness 5.6 Chemical Properties of lubricants like 5.6.1 Saponification value 5.6.2 Neutralization number 5.6.3 Emulsification number 5.7 Selection of lubricants for 5.7.1 Gears 5.7.2 Cutting tools 5.7.3 Steam turbine.
Unit– VI **Polymers, Elastomers & Insulating Material**	6.1 Explain the process of polymerisation 6.2 Classify polymers based on different properties 6.3 Explain the	6.1 Introduction and Definition of Polymer and Monomer 6.2 Classification of Polymer on basis of Molecular structure as Linear, Branch and Cross-linked polymers 6.3 Classification on basis of monomers (homopolymer and copolymer) 6.4 Classification of Polymers on basis of Thermal behavior(Thermoplastics& Thermosetting) 6.5 Types polymerization Reaction 6.5.1 Addition Polymerization 6.5.2 Condensation Polymerization 6.6 Synthesis, properties and application of 6.6.1 Polyethylene 6.6.2 Polypropylene 6.6.3 Polyvinyl chloride

Unit	Major Learning Outcomes	Topics and Sub-topics
	properties and uses of Polymers, elastomers & adhesives. 6.4 Describe the process of vulcanization of rubber 6.5 Explain the properties and uses of different insulating materials	6.6.4Teflon 6.6.4 Polystyrene 6.6.5 Phenol formaldehyde 6.6.6 Acrylonitrile 6.6.7 Epoxy Resin 6.7 Elastomers 6.8 Natural rubber and its properties 6.9 Vulcanization of rubber 6.10 Synthetic rubber, Synthesis, properties and uses 6.10.1 Buna-S Rubber 6.10.2 Buna-N Rubber 6.10.3 Neoprene Rubber 6.11 Insulators: Definition 6.12 Classification and properties of insulating materials : 6.12.1 Natural insulating materials(wood,cotton,mica,paper etc.) 6.12.2 Insulating oils. 6.12.3 Insulating wool,resines 6.13 Synthetic insulating
Unit– VII **Electrochemical Energy Sources**	7.1 List of various types of Batteries 7.2 Describe the construction and working of various batteries 7.3 Explain the working of fuel cell	7.1 Batteries: An electrochemical source of energy 7.2 Types of Batteries :-Primary, Secondary and fuel batteries. 7.3 Dry cell- construction and working. 7.4 Lead acid storage cell- -construction and working. 7.5 Nickel/Cadmium battery –construction and Working. 7.6 Fuel cell- definition example H2/O2 fuel cell [green fuel cell] - solar cells

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.	Chemical Bondings and catalysis	06	3	2	3	08
2.	Concepts of Electro Chemistry	07	4	4	4	12
3.	Corrosion of metals & its prevention	05	3	2	3	08
4.	Fuels and Combustion	07	4	4	4	12
5.	Lubricants	05	2	3	3	08
6.	Polymers, Elastomers & Insulating Material	07	4	4	6	14
7.	Electrochemical Energy Sources	05	3	2	3	08
	Total	**42**	**23**	**21**	**26**	**70**

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

6. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list of exercises/practical/experiments for guidance.

S. No.	Unit No.	Practical Exercises/Experiment
1	1	Find out strength of given acidic solution using standard solution of Base.
2	3	Standardize $KMnO_4$ solution by preparing standard oxalic acid and to estimate ferrous ions.
3	3	Standardize $Na_2S_2O_3$ solution by preparing standard potassium dichromate and to estimate percentage of copper from brass.
4	6	Determine the viscosity of given lubricating oil by using Red-wood Viscometer
5	6	To Determine Flash of given lubricating oil.
6	2	To Determine PH-Values of given samples of Solution by using Universal Indicator and PH-meter
7	6	Determine molecular weight of a polymer using Ostwald viscometer
8	6	Prepare (any one) polystyrene, urea formaldehyde, phenol formaldehyde and its Characterization
9	6	Determine Acid Value of given lubricating Oil.
10	4	Determine percentage of moisture in given sample of coal by proximate analysis
11	6	Determine of saponification value of an lubricating oil
12	3	Study of corrosion of metals in medium of different pH
13	4	Determine ash content of a given sample of coal
14	6	Determine Fire point of given lubricating oil.
15	3	Study of Corrosion of Metals in the different Mediums.
	Note	**Minimum Ten Experiments/Practical Exercises should be performed by the students from the above given list. Or any other experiments related to above topics**

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- Teacher guided self learning activities.
- Course/topic based internet based assignments.
- Library survey regarding Engineering Material used in different industries.
- Industrial Visits of one or Two Industries.
- Quiz & Brain storming session related to Fuel properties & Utilization of fuel for different purposes.
- Sampling & Testing of water collected from different places.
- These could be individual or group-based.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

Sr.No.	Title of Books	Author	Publication
1	Engineering Chemistry	JAIN & JAIN	Dhanpat Rai and Sons
2	A Text Book of Polytechnic Chemistry	V.P. Mehta	Jain Brothers
3	A Text Book of Applied Chemistry	J. Rajaram	Tata McGraw Hill Co. New Delhi
4	Engineering Chemistry	S.S.Dara	S.Chand Publication

. B. List of Major Equipment/ Instrument

- pH- Meter
- Red wood Viscometer.
- Pensky Martin Apparatus / Abel's Apparatus.
- Cleveland open cup apparatus.
- Glass wares

C. List of Software/Learning Websites: ---

(a) www.chemistryteaching.com
(b) en.wikipedia.org/wiki/chemistry
(c) www.chm1.com
(d) www.em-ea.org
(e) www.ce.sc.edu
(f) www2.chemistry.msu.edu

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof.J.C.Patel,** I/C.Head, Science & Humanities Department, Dr.S.& S.S. Ghandhy College of Engineering Technology, Surat
- **Prof. Dr. P.R.Patel**, Head, Science & Humanities Department N.G.Patel Polytechnic, Isroli, Bardoli
- **Prof.S.A.Nimakwala**, I/C.Head, Science & Humanities Department,Shri.K.J. Polytechnic, Bharuch.
- **Prof.R.R.Patel,** I/C.Head, Science & Humanities Department,G.P. Himmatnagar

Co-ordinator and Faculty Members from NITTTR Bhopal

- **Dr. Anju Rawlley ,** Professor Applied Science Dept. NITTTR, Bhopal
- **Dr. C.K.Chug ,**Professor & Head Dept. of Electronic media , NITTTR, Bhopal

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Basic of Computer & Information Technology
(Code: 3300013)

Diploma Programmes in which this course is offered	Semester in which offered
Biomedical Engineering, Electrical Engineering, Electronics & Communication	**First Semester**

1. RATIONALE

This subject envisages making the student know the fundamentals of Computer Application. It will also helps the student to have hands on experience on different application software used for office automation like MS-Word, MS-Excel and MS-PowerPoint, day-to-day problem solving, in particular for creating business documents, data analysis and graphical representations.

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 competency:

i. **Use MS Office software for word-processing, data analysis and preparing presentations**

ii. **Create a webpage**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	
0	0	0	4	00	00	40	60	**100**

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

4. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **Basics of Computer System**	1.1 Describe computer hardware and software 1.2 Identify I/O devices 1.3 Describe functioning of CU ALU and memory unit 1.4 Differentiate various types of printers 1.5 Explain use of OS 1.6 Demonstrate various file handling operations	**Basics of Computer System** 1.1 Concept of Hardware and Software 1.2 Computer block diagram 1.3 Input Output unit 1.4 CPU, Control Unit, Arithmetic logic Unit (ALU), Memory Unit 1.5 Monitor, Printers: Dot matrix, Laser, Inkjet, Plotters, Scanner 1.6 System software and Application Software 1.7 Operating system concepts, purpose and functions 1.8 Operations of Windows OS. 1.9 Creating and naming of file and folders 1.10 Copying file, renaming and deleting of files and folders, 1.11 Searching files and folders, installation application, creating shortcut of application on the desktop 1.12 Overview of control Panel, Taskbar.
Unit– II **Using MS - Word 2007**	2.1 Use basics text formatting features 2.2 Manipulate text 2.3 Use page Setup features 2.4 Use spell and grammar utility 2.5 Work with graphics/ clipart 2.6 Create and manipulate table 2.7 Use auto shapes and its formatting with text	**Using MS - Word 2007** 2.1 Overview of Word processor 2.2 Basics of Font type, size, colour, 2.3 Effects like Bold, italic , underline, Subscript and superscript, 2.4 Case changing options, 2.5 Inserting, deleting, undo and redo, Copy and Moving (cutting) text within a document, 2.6 Formatting Paragraphs and Lists 2.7 Setting line spacing; single 2.8 Page settings and margins including header and footer 2.9 Spelling and Grammatical checks 2.10 Table and its options, Inserting rows or columns, merging and splitting cells, Arithmetic Calculations in a Table. 2.11 Working with pictures, Inserting Pictures from Files, 2.12 Using Drawings and WordArt; Lines and Shapes, Modifying Drawn Objects, Formatting Drawn Objects, options for Creating and Modifying a WordArt Object

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit– III **Using MS - Excel 2007**	3.1 Use basic formatting and data entry features 3.2 Use formula and functions 3.3 Work with graphics 3.4 Create and manipulate charts 3.5 Use header and footer options 3.6 Setup page layout and print worksheet	**Using MS - Excel 2007** 3.1 Introduction to Excel 2007, 3.2 Introduction to data, Cell address, Excel Data Types, Concept of hyperlink 3.3 Introduction to formatting, number, text and date formatting 3.4 Concept of worksheet and workbook 3.5 Understanding formulas, Operators in Excel 2007, Operators Precedence, Understanding Functions, Common Excel Functions such as sum, average, min, max, date, transpose, In, And, or, sqrt, power, upper, lower. 3.6 Types of graphics : Word art, auto shapes , Images 3.7 Introduction to charts, overview of different types of charts available with Excel 3.8 Concept of print area, margins, header, footer and other page setup options
Unit – IV **Using MS - PowerPoint 2007**	4.1 Create new presentation and apply basic formatting features 4.2 Use master slide 4.3 Create and manipulate table 4.4 Work with objects and clips 4.5 Work with video 4.6 Work with audio 4.7 Use special effects 4.8 Use navigation and hyper linking	**Using MS - PowerPoint 2007** 4.1 Outline of an effective presentations, 4.2 Starting a New Presentation Files, Saving work, 4.3 Creating new Slides, Working with textboxes. 4.4 Changing a slides Layout, Applying a theme, Changing Colours, fonts and effects, Creating and managing custom Colour & font theme, Changing the background 4.5 Managing slides master, Managing theme. 4.6 Changing the font, font size, font colour, text fill, 4.7 Adjusting character spacing and line spacing Formatting text boxes. 4.8 Word arts, styles, 4.9 Formatting bulleted lists and numbered list, 4.10 Finding and replacing text, Correcting your spelling 4.11 Creating a new and editing a table's structure, 4.12 Selecting, deleting, moving, copying, resizing and arranging objects, 4.13 Working with drawing tools, Applying shape or picture styles, Applying object borders, object fill, object effects. 4.14 Working with clip art collection and modifying clip art, 4.15 Embed a video, Link to a video, Size a video, Video playback options, 4.16 Configuring a sound playback, Assigning sound to an object, Adding a digital music sound track, Transition effects and timings,

Unit	Major Learning Outcomes	Topics and Sub-topics
		4.17 Creating hyperlinks**,** Using action buttons
UNIT-V **MS-OFFICE INDIC & TBIL**	5.1 Create application and other documents in Guajarati.	5.1 Introduction about MS Office Indic 5.2 Installation of ms-office indic 5.3 How to change language English to Gujarati 5.4 Introduction about the Gujarati keyboards 5.5 Introduction about the Gujarati IME. 5.6 Difference between Remington and 5.7 Transliteration K/B 5.8 How to operate the K/B. What is 5.9 Transliteration K/B? 5.10 How to type different Characters and Words 5.11 from transliteration K/B 5.12 How to use IME help? How to use spelling 5.13 grammars check in Gujarati? 5.14 What is Smart Tag? What is Thesaurus? 5.15 How to change the Menu from English to Gujarati? 5.16 Convert the ASCII font to Unicode from TBIL Converter
UNIT-VI **Introduction to Internet HTML**	6.1 Use internet access efficiently.	6.1 What is the Internet? 6.2 Web pages 6.3 Home page 6.4 Use of web sites 6.5 Access providers 6.6 Types of access 6.7 The browser 6.8 Universal resource locators 6.9 Browsing or surfing the web 6.10 A search engine 6.11 Internet phone **Applications of the Internet:** 6.12 E-mail 6.13 Voice mail 6.14 Newsgroup 6.15 Mailing list 6.16 Internet relay chat 6.17 Games 6.18 Video-conferencing 6.19 File transfer protocol
Unit – VII **Using HTML**	7.1 Comprehend the HTML page structure 7.2 Use basic formatting tags in HTML 7.3 Create and format tables	**Basic structure of HTML** 7.1 Structure of HTML Page 7.2 Inserting formatting tags for Text: bold, italic, underline, line break, special character, predefine headings, paragraph,

Unit	Major Learning Outcomes	Topics and Sub-topics
	7.4Insert and format images in HTML page 7.5 Create various types of hyper linking 7.6 Work with video and sound files	comments. 7.3 Font color, size, Alignment 7.4 Margin with body tag, background and text colour 7.5 Ordered and unordered lists **Tables, Images and Links in HTML** 7.6 Tables – basic structure, Using TD, TR, TH tags, use of basic elements in table : border, cellpadding, cellspacing, width, caption, align, bgcolor 7.7 Images in web page: inserting and formatting of images using SRC, border, Vspace, Hspace, align, ALT, height, width and background in HTML page 7.8 Types of links: Linking two or more web pages, linking within a web page, linking to external page, linking to a specific point in another web page, linking image file, mailto. **Working with Multimedia Objects** 7.9 Video and sound file. Add marquees of scrolling text. Inserting and controlling video and audio in HTML page

5. SUGGESTED SPECIFICATION FOR DISTRIBUTION OF HOURS AND MARKS (THEORY)

Not Applicable

6. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list of exercises/practical/experiments for guidance.

S. No.	Unit No.	Experiment
1	I	• Create and manage files and folder tree • Use accessories utilities of windows OS
2	II	• Entering and editing text in document file. • Apply formatting features on Text like Bold, Italics, Underline, font type, colour and size. Apply features like bullet, numbering • Create documents, insert images, format tables • Create and manipulate tables
3	III	• Entering and editing data in worksheet • Apply formula and functions in the sheet • Use graphics and auto shapes in Excel sheet • Create and manipulate EXCEL charts • Create Pay bills, Pay slips, Electricity bills using Excel

		• Print sheet using print area
4	IV	• Basic operations of Power point, Create PPT and inset and delete slides • Create Project presentations, Lecture presentations. • Use of Mater Slide in Presentation • Apply basic formatting features in presentation like font, font size, font colour, text fill, spacing and line spacing Formatting text boxes, word arts, styles bullet and numbering • Working with drawing tools, Applying shape or picture styles, Applying object borders, object fill, object effects. • Working with video, Link to video and sound files. • Creating hyperlinks, Using action buttons
5	V	• Installation and keyboard setting of Guajarati indic. • Create invitation letter in Guajarati using indic
6	VI	• Practice browsing of different sites using search engine • practice and understand different E-Mail services – Outlook, Yahoo mail, rediffmail etc • Practice Creating E-Mail accounts, Sending, Receiving & Storing of • mails.
7	VII	• Basic program of HTML • Program based on Inserting formatting tags for Text: bold, italic, underline, line break, special character, predefine headings, paragraph, comments. • Use Font color, size, background and Alignment • Create ordered and and unordered list • Create program on Tables – basic structure, Using TD, TR, TH tags, use of basic elements in table : border, cellpadding, cellspacing, width, caption, align, bgcolor • Working with Images in web page: inserting and formatting of images using SRC, border, Vspace, Hspace, align, ALT, height, width and background. • Program based on Linking two or more web pages, linking within a web page, linking to external page, linking to a specific point in another web page, linking image file, mailto. • Working with Video and sound file.

7. SUGGESTED LIST OF PROPOSED 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.

Learning Strategies

Learning Computer application in the class room takes place through activities like reading individually and in groups, discussion, debate, and quiz, seminars preparing notes, observation and program writing. Preparation for practical work also should take place in the class room. Preparation notes for laboratory work, design stepss and data are some of the things that have to be developed in the class room before the practical work in the laboratory. Among these, individual activities such as assignment and self-check questions given in the text book could be done at Home. But they have to be discussed in the class room. The students should also record such assignments in the note book. The teacher should give clear instructions as to what are the activities to be done at home and how they could be done. On the Job Training (OJT) and Field visit have to be conducted and the report should be prepared by the students. The teacher should give clear instruction to prepare reports.

Evaluation Activities for CE

The continuous evaluation may include the following activities;

1. Class Test
2. Assignment
3. Seminar/Symposium
4. Project
5. Collection/Records
6. Group discussion/Debate

For continuous evaluation of lab activity

S.NO	Content	Max. Marks
1	Lab Record	05
2	Answer one question from Computer Basics & Internet	10
3	Writing steps on any two (one each from Section – II, III)	15
4	Executing of two exercises	40
5	Result /Printout	10
6	Viva voice	20
Total		100

8. SUGGESTED LEARNING RESOURCES

A. List of Books

Sr. No.	Author	Title of Books	Publication
1	R Taxali	Computer Course	Tata McGraw Hills. New Delhi.
2	Xavier	World Wide Web design with HTML	Tata McGraw Hills. New Delhi.
3	CURTIN, FOLEY, SEN, MORIN	INFORMATION TECHNOLOGY	TMH
4	V. RAJARAMAN (3RD EDITION)	FUNDAMENTALS OF COMPUTERS	PHI
5	CISTEMS	INTERNET AN INTRODUCTION	TMH
6	SAGMAN	MICROSOFT OFFICE FOR WINDOWS('O' LEVEL DOEACC)	PEARSON EDUCATION ISBN 81-7808-341-8
7	C. XAVIER	WORLD WIDE WEB DESIGN WITH HTML	TMH
8	COURTER	MASTERING MS OFFICE - 2000 PROFESSIONAL	TECHMEDIA
9	DAVID D.BUCH	PAGEMAKER 6.5 /7	BPB PUBLICATION
10		PHOTOSHOP 6/ 7	BPB PUBLICATION

		COMPLETE	
11	SHROFF	INTRODUCTION TO INTERNET AND HTML SCRIPTING 3RD ED	
12	T R JAGADISH ET	A COMPUTER LABORATORY REFERRAL FOR DIPLOMA & ENGINEERING STUDENTS	AL UNIVERSITIES PRESS

B. List of Major Equipment/ Instrument

I. COMPUTER
II. PROJECTOR
III. EQUIPMENTS LIKE PRINTER,SCANNER,PLOTTER,MODEM

C. List of Software/Learning Websites

I. Microsoft Office Professional 2010
II. Norton Antivirus 2012
III. Window 7.0
IV. MS-OFFICE Indic

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Polytechnic Faculty Members

- **Prof. T.R.PARMAR**, Lecturer in E.C, G.P.PALNAPUR
- **Prof. G.V.PARMAR** ,Lecturer in E.C., A.V.P.T.I. RAJKOT

NITTTR Bhopal Co-ordinator and Faculty Member

- **Dr Sanjay Agrawal**, Prof. and Head Dept. Of Computer Engg. And Applications, NITTTR, Bhopal
- **Dr. M A Rizvi**, Associate Prof. Dept. Of Computer Engg. And Applications, NITTTR, Bhopal

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Fundamental of Mechanical Engineering (Code: 3300015)

Diploma Programmes in which this course is offered	Semester in which offered
Electrical Engineering, Plastic Engineering	**First Semester**
Ceramic Engineering, Metallurgy Engineering, Mining Engineering, Transportation Engineering	**Second Semester**

1. RATIONALE:

In the era of technology integration, it has become unavoidable to possess the basic knowledge of various engineering disciplines. The advancement in technology is the best on multi technology integration and hence in performance too. The motive of this subject is to enhance the knowledge & skill level in the inter disciplinary area to strengthen the present practices.

This course is specially designed with a view to impart basic knowledge of other conventional disciplines (other than own discipline).

This course mainly encompasses the major and general areas of mechanical engineering which are being used by common man to large industrial sectors. A technician has to know many times the implications and knowledge of other disciplines so as to conclude the solution of his/her own branch tasks.

2. LIST OF COMPETENCIES:

i. **To perform the simple tasks related to mechanical engineering so as to reduce the dependency on mechanical engineers and to achieve the reliability and quality of own branch's tasks**.

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total 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	Sub-topics
Unit –1 **INTRODUCTION**	1.1 Identify mechanical related basic components and their uses.	1.1 Introduction of mechanical engineering. 1.2 Use of mechanical engineering : a. In day to day life. b. Interdisciplinary use. 1.3 Items in general use- identification criteria, major types, specifications and uses : such as bolts, nuts, washers, bearings, bushes, belts, springs, levers, couplings, brakes, screws, rivets, keys, o' rings, oil seals, gears, pulleys, shafts, axles, etc. 1.4 Pipes and pipe fittings- Types , specifications and uses of pipes and pipe fittings. 1.5 Hand and power tools: a. Types, specifications and uses of spanners (such as fix, ring, box, pipe, allen, adjustable, etc.). b. Types, specifications and uses of hand tools (such as pliers, screw drivers, saws, hammers, chisels, cutters, planes, etc.). c. Types, specifications and uses of power tools(drill, chipper, etc.)
Unit –2 **POWER TRANSMISSION & SAFETY**	2.1 Identify the type of power transmissions being used. 2.2 Follow general safety norms.	2.1 Power transmission: a. Importance. b. Modes (belt drives, rope drives, chain drives and gear trains). c. Types of belts. d. Gear train-concept, transmission ratio. e. Applications. 2.2 Types and applications of couplings in power transmission. 2.3 Causes and remedies of general accidents in power transmission. 2.4 Safety norms to be followed for preventing accidents and damage in power transmission. 2.5 Safety norms to be followed in mechanical based industries / shop floors.
Unit – 3 **PROCESSES ON MATERIAL**	3.1 Understand common metal joining and machining methods.	3.1 Welding. a. Types. b. Working setup of arc and gas welding, accessories and consumables. c. Types of work carried out by welding. d. Precautions and safety during arc and gas welding.

Unit	Major Learning Outcomes	Sub-topics
		3.2 Brazing and Soldering. a. General set up. b. Applications. 3.3 Gas cutting. a. Working setup, accessories and consumables. b. Types of work carried out. c. Precautions and safety during gas cutting. 3.4 Foundry. a. Concept. b. Process of getting cast material. c. Applications. 3.5 Other metal forming and cutting operations- bending, shearing-concept and applications. 3.6 Basic machine tools. a. Working principle of hacksaw, lathe, drill and milling machines. b. Types of operations / jobs which can be performed on machine tools listed above.
UNIT –4 **STEAM GENERATION AND PRIME MOVERS**	4.1 Explain working of boilers and prime movers.	4.1 Steam. a. Generation process. b. Properties. 4.2 Boilers. a. Classification. b. Working. c. Accessories and mountings-types and applications. d. Applications. e. Regulations and safety requirements. f. Common troubles and remedies. 4.3 Prime movers. a. Meaning. b. Classification. c. Working. d. Steam turbine-working. e. Gas turbine-types and applications. f. Common troubles and remedies.
Unit –5 **INTERNAL COMBUSTION ENGINES**	5.1 Explain working of internal combustion engines.	5.1 Internal combustion engines. a. Meaning. b. Classification. 5.2 Working of petrol engine, diesel engine and gas engine. 5.3 Performance parameters. 5.4 Main parts and functions. 5.5 Applications. 5.6 Common troubles and remedies.

Unit	Major Learning Outcomes	Sub-topics
Unit– 6 **HYDRAULIC AND PNEUMATIC DEVICES**	6.1 Identify the applications of fluid concepts. 6.2 Use pumps and other hydraulic – pneumatic equipments and machineries.	6.1 Concept of theory of fluid flow. 6.2 General properties of fluids. 6.3 Pump. a. Working principle. b. Types. c. Working of centrifugal and reciprocating pumps. d. Performance parameters. e. Main parts of pumps and their functions. f. Common troubles and remedies. 6.4 Water turbines-working principle, types and applications. 6.5 Common troubles and remedies of water turbine. 6.6 Air compressor. a. Working principle. b. Types. c. Performance parameters. d. Applications. 6.7 Other hydraulic/pneumatic/ hydro-pneumatic equipments. a. Principle of working-hydraulic lift, hydraulic pump, hydraulic power pack, hydraulic jack. b. Applications of above.
Unit – 7 **MATERIAL HANDLING**	7.1 Select proper material handling equipment. 7.2 Identify common reasons for common troubles.	7.1 Need of material handling. 7.2 Types , principle of working and applications of material handling equipments. a. Hoisting equipments. b. Conveying equipments. c. Surface & overhead equipments. d. Earth moving machineries. e. Construction machineries. 7.3 Criteria for selection of material handling equipments. 7.4 Factors affecting selection of material handling equipments. 7.5 Selection of suitable material handling equipment for the given situation. 7.6 Common troubles and remedies.

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.	Introduction	4	5	0	2	07
2.	Power transmission & safety	8	7	7	0	14
3.	Processes on material	8	7	3	4	14
4.	Steam generation and prime movers	4	3	4	0	07
5.	Internal combustion engines	6	3	4	2	09
6	Hydraulic and pneumatic devices	6	3	3	3	09
7	Material handling	6	7	0	3	10
	Total	**42**	**35**	**21**	**14**	**70**

Legends:
R = Remembrance; U = Understanding; A = Application and above levels.

NOTES:

a: If mid sem test is part of continuous evaluation, unit numbers 1, 2 and 3 are to be considered.

b: Ask the questions from each topic as per marks weightage. Optional questions must be asked from the same topic. That is weightage of compulsory attendance part of questions will be equal to marks allotted to each topic.

6. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list of exercises/practical/experiments for guidance.

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Ex. No.	Unit No.	Practical Exercises/Experiment	Hours
1	1	Demonstrate use of various mechanical items, spanners, hand tools and power tools. Student will prepare the report which will include sketches of each item demonstrated with specifications and applications.	02
2	2	a: Demonstrate various power transmission methods. Also demonstrate items used in power transmission with material of construction and specifications of each item. Student will prepare the report on working principles, set up sketch, working parameters, specifications of items and safety norms followed. b: Student will calculate velocity ratios for belt drives and number of teeth for gear train based on given data.	04
3	3	Demonstrate working of welding transformers, welding process, gas welding process , gas cutting process, brazing and soldering process. Student will prepare the report on working principles, set up sketch, working parameters, consumables used with specifications and safety norms	02

		followed.	
4	3	Prepare simple weld joint job.	02
5	3	a: Demonstrate various machining methods on hacksaw, lathe, drill and milling machines. b: Also prepare simple turning job.	04
6	4	Study boiler, boiler mountings and boiler accessories.	02
7	5	Perform and study the effect of variation of load on fuel-consumption of an I.C. engines (On petrol engine). Also locate the faults in a given petrol engine and suggest remedial measures.	02
8	5	Perform and study the effect of variation of load on fuel-consumption of an I.C. engines (On diesel engine). Also locate the faults in a given diesel engine and suggest remedial measures.	02
9	6	Demonstrate a water-turbine.	02
10	6	Perform test on Air compressor.	02
11	6	Perform test on centrifugal pump. Also find fault and remedies for centrifugal pump.	02
12	7	Study various types of materials handling equipments.	02
		Total	28

NOTES:

1. It is compulsory to prepare log book of exercises. It is also required to get each excersise recorded in logbook, checked and duly dated signed by laboratory assistant/instructor and teacher.
2. Student activities are compulsory and are also required to be performed and noted in logbook.
3. For 20 marks practical ESE, students are to be assessed for competencies achieved.

7. STUDENT ACTIVITIES:

S. No.	Details of activity.
1	Student will visit the respective discipline industry / site (electrical, printing, as applicable) and will prepare the list of mechanical engineering related equipments/machineries used by that industry / site.
2	Student will observe the fuel supply system of any bike and will also observe the working of engine. Student will also identify the type and specification of engine used for bike.
3	Prepare the list of mechanical items surrounding to you.

8. SUGGESTED LEARNING RESOURCES:

A. List of Books.

S.No.	Title of Books	Author	Publication
1	Theory of Machines	R.S.Khurmi and J.K.Gupta	S.Chand
2	Heat engine	Shah & Pandya	Charotar Publishing House
3	Hydraulic machines	Jagdish lal	Metropolitan Book Company
4	Elements of Workshop	Hazara chaudhary	Asia Publishing House

S.No.	Title of Books	Author	Publication
	Technology (Vol. 1,2)		
5	Hydraulics	R.C.Patel	Acharya Book Depot
6	Pumps operation and maintenance	Tyler and Hicks	Tata McGraw-Hill
7	Material Handling equipments	M.Rundenko	Mir Publishers

B. List of Major Equipment/ Instrument.

a: Various mechanical items, spanners, hand tools and power tools..
b: Various power transmission devices.
c: Welding transformers, welding accessories and consumables.
d: Gas welding set up with all accessories and consumables.
e: Brazing and soldering setup with all accessories and consumables.
f: Gas cutting process set up with all accessories and consumables.
g: Workshop based machine tools-Hacksaw, Lathe, Drill and Milling.
h: Boiler/ Working model of boiler.
i: Petrol engine test rig.
j: Diesel engine test rig.
k: Air compressor test rig.
l: Water turbine / working model of water turbines.
m: Centrifugal pump test rig.
n: Models / working models of various material handling devices.

C. List of Software/Learning Websites: ---

a: http://www.youtube.com/watch?v=1cFu2bkZ7Vw&feature=related (ic engine)
b: http://www.youtube.com/watch?v=pCg1Ih_oVSA (pump)
c: http://www.youtube.com/watch?v=V3aPHmZ97yM&feature=related (pump)
d: http://www.youtube.com/watch?v=FENCiA-EfaA&feature=related (impeller)
e: http://www.youtube.com/watch?v=TBdUcGYo7XA (gas turbine)
f: http://www.youtube.com/watch?v=HzQPNpP55xQ (turbines)
g: http://www.youtube.com/watch?v=e_CcrgKLyzc (coal power plant)
h: http://www.youtube.com/watch?v=8GSUgwombdE&feature=related (boiler)
i: http://www.youtube.com/watch?v=A3ormYVZMXE (hy.lift)
j: http://www.youtube.com/watch?v=FP05rYRI9JU&feature=related (hy.pump)
k: http://homepages.cae.wisc.edu
l: http://www.youtube.com/watch?v=E6_jw841vKE&feature=related (air compressor)
m: http://www.youtube.com/watch?v=twM-GLUYQ-o&feature=related (belt drive)
n: http://www.youtube.com/watch?feature=endscreen&v=gjUwJ1CJVq4&NR=1 (belt drive)
o: http://www.youtube.com/watch?v=XunM7yUC06M&feature=related (gear drive)

p: http://www.youtube.com/watch?v=ftdgB93QOD8&feature=related (gear box)
q: http://en.wikipedia.org/wiki/Boiler

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Shri. M.K.Shukla**, Lecturer in Mechanical Engineering, Sir B.P.I., Bhavnagar.
- **Shri. A.M.Talsaniya**, Lecturer in Mechanical Engineering, Sir B.P.I., Bhavnagar.
- **Shri. R.B.Variya**, Lecturer in Mechanical Engineering, B and B institute of Technology, Vallabhvidyanagar.
- **Shri. N.C.Pandya**, Lecturer in Mechanical Engineering, Government Polytechnic, Himmatnagar

Co-ordinator and Faculty Member from NITTTR Bhopal

- **Dr. K.K. Jain**, Professor & Head, Dept. of Mechanical Engg, NITTTR, Bhopal
- **Dr. Joshua Earnest**, Professor & Head, Dept. of Electrical & Electronics Engg, NITTTR, Bhopal