Programme : Diploma in CE/EE/ET/ MT/CM/IT
Programme Code : 01/02/03/05/06/07/15/16/17
Name of Course : English
Course Code : HU 161

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests each of 60 minutes.**	**03 Hrs.**	--	--	--
Marks	**20**	**80**	--	--	**25**

Course Rationale:

This is been noticed that diploma pass outs lack in grammatically correct written and oral communication in English. In order to develop this ability in students English is introduced as a subject.

Course Objectives:

After studying this course, the student will be able to

- Comprehend the given passage.
- Answer correctly the questions on seen and unseen passages.
- Increase the vocabulary.
- Apply rules of grammar for correct writing.
- Speak correct English.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Unit One: Self**			
	1.1	Face	**06**	**15**
	1.2	Four Words that changed a life- Bob Green		
	1.3	The Night Train at Deoli- Ruskin Bond		
2.	**Unit Two: Family**			
	2.1	Circus- Ranjita Nayak	**06**	**15**
	2.2	My Mother-in-Law- Sonia Ghandi		
	2.3	The Postman's Knock		
3.	**Unit Three: City**			
	3.1	The Growing City- Keshav	**06**	**15**
	3.2	BEST is Best- Shashi Purohit		
	3.3	Khoobsurat- Darshan Desai		
4.	**Unit Four: Grammar**			
	4.1	Verbs	**06**	**15**
	4.2	Tenses Do as directed (active / passive, Direct / indirect, Affirmative / negative / assertive, question tag, Remove too, use of article, conjunctions, interjections, punctuation)		
5.	**Unit Five: Paragraph/Essay Writing**			
	5.1	5.1 How to write a paragraph	**04**	**10**
	5.2	5.2 Essay Writing		
6.	**Unit Six: Phonetics**			
	6.1	Consonants	**04**	**10**
	6.2	Vowels		
	6.3	Diphthongs		
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Building of Vocabulary - 2 assignments 25 new words for each assignment with sentence	**04**
2.	Conversational Skills - Role play Student will perform the role on any 6 situations. Dialogue writing for the given situations.	**08**
3.	Grammar - 2 assignments	**04**
4.	Write paragraphs on given topics. 2 assignments	**06**
5.	Errors in English 2 assignments Find out the errors and rewrite the sentences given by the teacher.	**04**
6.	Essay writing 2 assignments. Write 2 essays on topic given by the teacher	**04**
7.	Phonetics. 2 assignments. Phonetic transcription of words.	**02**
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Self	Class room Teaching
2	Family	Class room Teaching
3	City	Class room Teaching
4	Grammar	Class room Teaching
5	Paragraph/Essay Writing	Class room Teaching
6	Phonetics	Class room Teaching

Text Books:

Sr. No	Author	Title	Publication
1.	Yuvakbharati	A Course Book in English.	---

Reference Books:

Sr. No	Author	Title	Publication
1.	J.D.O. Connors	Better English Pronunciation	Londoiv. Cambridge University Press ELBS
2.	Geofreylefc R and Jansvartvik	A Communicative Grammar of English	Essex Longman Group Ltd.: ELBS
3.	Randolf Sidney Grhn ba I M	University Grammar of English	Essex Longman Group Ltd.: ELBS

Learning Resources:

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Self	--	15	--	15
2.	Family	--	15	--	15
3.	City	--	15	--	15
4.	Grammar	--	--	15	15
5.	Paragraph/Essay Writing	--	05	05	10
6.	Phonetics	--	--	10	10
	Total	--	**50**	**30**	**80**

(Prof. M.A.Surdikar)
Prepared By

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(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in CE/EE/ET/ MT/CM/IT
Programme Code : 01/02/03/05/06/07/15/16/17
Name of Course : Communication Skills
Course Code : HU162

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two Class Tests each of 60 Minutes + One Oral Compulsory	**03 Hrs.**	--	--	--
Marks	**20**	**80**	--	--	**25**

Course Rationale:

Classified under human sciences this subject is intended to introduce students with the process of communication so that they can identify conditions favourable to effective communication. They will also be taught basic and applied language skills viz. listening, speaking, reading and writing – all useful for the study of a technical course and communication. Specifically, writing and oral presentation skills are two top ranking capabilities needed for professional careers and must be developed systematically.

Course Objectives:

After studying this course, the student will be able to

- Understand and use the basic concepts of communication and principles of effective communication in an organized set up and social context.
- Give a positive feedback in various situations to use appropriate body language & to avoid barriers for effective communication.
- Write the various types of letters, reports and office drafting with the appropriate format.
- Communicate with the Industry Professionals.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Basic Concepts And Principles Of Communication**			
	1.1	**The Communication Event** The communication event : Definition The elements of communication: the sender, receiver, message, channel, feedback and context.	**12**	**24**
	1.2	**The communication Process** The Communication process: definition Stages in the process: defining the context, knowing the audience, designing the message, encoding, selecting proper channels, transmitting, receiving, decoding and giving feedback.		
	1.3	**Principles of Effective communication** Effective Communication: definition Communication Barriers and how to overcome them at each stage of communication process. Developing effective message: thinking about purpose, knowing the audience, structuring the message, selecting proper channels, minimizing barriers and facilitating feedback.		

2.	**Organizational Communication**			
	2.1	What is an organization? Goal, structure, hierarchy. Patterns of communication: Upward, Downward, Horizontal and Grapevine	**04**	**12**
3.	**Non-verbal Communication**			
	3.1	Non Verbal Codes: Kinesics (eye- contact, gestures, Postures, body movements and facial expressions) Proxemics (using space), Haptics (touch), Vocalics (aspects of speech like tone, emphasis, volume, pauses etc.) Physical Appearance, Chronemics (manipulating time), Silence .	**06**	**12**
4.	**Business Correspondence and Office Drafting**			
	4.1	Business Correspondence: Letter of Enquiry, Order letter, Complaint Letter and Adjustment letter.	**10**	**32**
	4.2	Report Writing: Feasibility report/ Survey Report, Accident Report and Progress Report.		
	4.3	Office Drafting: Circular, Notice and Memo.		
	4.4	Job Application with Resume.		
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Self Introduction	02
2.	Elocution	04
3.	Extempore	04
4.	Mock Interview	04
5.	Debate	02
6.	Variety Applications/Reports.	02
7.	Writing Paragraphs on Technical Subjects	02

8.	Business letters	02
9.	Individual/Group Presentation on identified Topics	02
10.	Group Discussion	02
11.	Role Play	06
	Total	**32**

Text Books:

Sr. No	Author	Title	Publication
1.	MSBTE	Communication Skills	MSBTE

Reference Books:

Sr. No	Author	Title	Publication
1.	Joyeeta Bhatacharya	Communicaion Skills	Macmillan Co.
2.	Sarah Freeman	Written Communication in English	Orient Longman Ltd.
3.	Krishna Mohan and Meera Banerji	Developing Communication Skills	Macmillan India Ltd.

Learning Resources: Nil

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Basic Concepts and Principles of Communication	08	08	08	24
2.	Organizational Communication	04	04	04	12
3.	Non Verbal Communication	--	--	12	12
4.	Business Correspondence and Office Drafting	--	--	32	32
	Total	**12**	**12**	**56**	**80**

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Programme : Diploma in CE/EE/ET/ ME/MT/CM/IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Applied Mathematics – I
Course Code : SC 161

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical/Tutorial	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three Class Tests each of 60 Minutes	**03 Hrs.**	--	--	--
Marks	**20**	**80**	--	--	--

Course Rationale:

The students of Diploma in Engineering and technology must acquire some essential competencies in Mathematics.

Course Objectives:

- The students will be able to think logically and systematically. They will learn the importance of accuracy and develop attitude of problem solving with diligence and perseverance**.**

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Algebra**			
	1.1	**Determinants**: Determinants of second and third orders, solution of simultaneous equations in two and three unknowns (Cramer's method), Properties of determinants of order 3 and examples.	**04**	**06**
	1.2	**Partial fractions**: Rational fractions, resolving given rational fraction into partial fraction (Type : Denominator containing non-repeated, repeated linear factors and quadratic factor non repeated)	**04**	**06**
	1.3	**Matrix Algebra** - Definition of a matrix, types of matrices, Equal Matrices, Addition, subtraction, multiplication of matrices. Scalar multiple of a matrix. Transpose of a matrix, Singular and Non singular Matrix. Adjoint of a square matrix. Inverse of a matrix. Solution of simultaneous linear equations in 3 unknowns	**04**	**06**
	1.4	**Binomial Theorem** Definition of factorial notation, definition of permutation and combinations with formula, Binomial theorem for positive index, General term, Binomial theorem for negative index, Approximate value (only formula)	**04**	**06**
2.	**Trigonometry**			
	2.1	Trigonometric ratios and fundamental identities.	**04**	**08**
	2.2	Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), sub multiple angle.	**06**	**08**
	2.3	Sum and product formulae.	**06**	**08**
	2.4	Inverse Circular functions. (Definition and simple problems)	**04**	**08**
3.	**Coordinate Geometry**			
	3.1	**Point and Distances** Distance formula, Section formula, midpoint, centroid of triangle. Area of triangle and condition of co linearity	**03**	**08**

	3.2	**Straight Line** Slope and intercept of straight line. Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. Angle between two straight lines condition of parallel and perpendicular lines. Intersection of two lines. Length of perpendicular from a point on the line and perpendicular distance between parallel lines	**05**	**08**
	3.3	**Circle** Equation of circle in standard form, centre – radius form, diameter form, two – intercept form. General equation of circle, its centre and radius.	**04**	**08**
		Total	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	**Name of Practical/Experiment/Assignment**	**Hrs**
	Problems on following topics	
1.	Determinants	**02**
2.	Partial fractions	**01**
3.	Matrix Algebra	**02**
4.	Binomial Theorem	**02**
5.	Trigonometric ratios and fundamental identities	**01**
6.	Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), sub multiple angle.	**02**
7.	Sum and product formulae.	**01**
8.	Inverse Circular functions. (Definition and simple problems)	**01**
9.	Point and Distances	**01**
10	Straight Line	**02**
11.	Circle	**01**
	Total	**16**

Text Books:

Sr. No	Author	Title	Publication
1.	Shri.G.V.Kumbhojkar	Engineering Mathematics	Phadke Publication,Kolhapur
2.	Shri.Patel & Rawat	Engineering Mathematics	Nirali Prakashan

Reference Books:

Sr. No	Author	Title	Publication
1.	Shri S.P. Deshpande	Mathematics for Polytechnic Students	Pune Vidyarthi Griha
2.	Shri S.L. Loney	Plane Trigonometry	Macmillan and London
3.	Shri H.K. Dass	Mathematics for Engineers (Vol-I)	S.Chand and Comp.
4.	Shri Shantinarayan	Engg. Maths Vol-I and Vol-II	S. Chand and Comp.

Learning Resources: Chalk, Board etc

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Algebra	06	10	08	24
2.	Trigonometry	08	16	08	32
3.	Co-ordinate Geometry	06	10	08	24
	Total	**14**	**36**	**24**	**80**

(Prof. R.A.Pawar)
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Programme : Diploma in CE/EE/ET/ ME/MT/CM/IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Applied Mathematics – II
Course Code : SC162

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three Class Tests each of 60 Minutes	**03**	--	--	--
Marks	**20**	**80**	--	--	--

Course Rationale:

This subject intends to teach students basic facts, concepts, principles and procedure of Mathematics as a tool to analyze Engineering problems and as such it lays down foundation for the understanding of engineering science and core technology subjects.

Course Objectives:

After studying this course, the student will be able to

- Under stand basic facts of Mathematics about the field of analysis of any Engineering problem.
- Know the standard ways in which the problem can be approached.
- Apply basic concepts to engineering problems.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Functions and Limits**			
	1.1	Functions: Concept of functions, Types of functions; (only definitions)	**02**	**04**
	1.2	Limits: Concept of limits and limits of functions. (algebric, trigonometric, Logarithmic and exponential.)	**08**	**12**
2.	**Derivatives**			
	2.1	Definition of the derivative, derivatives of standard Functions.	**03**	**04**
	2.2	Differentiation of sum, difference, product and quotient of two or more functions	**03**	**04**
	2.3	Differentiation of composite, inverse, implicit functions.	**04**	**06**
	2.4	Differentiation of parametric exponential and logarithmic Functions.	**04**	**06**
	2.5	Successive differentiation.	**02**	**04**
3.	**Applications of Derivatives**			
	3.1	Geometrical meaning of derivative (Equations of tangents and Normals)	**04**	**08**
	3.2	Maxima and minima of functions.	**02**	**04**
4.	**Integration**			
	4.1	Definitions, standard formulae, integration of algebraic sum of two or more functions, integration by substitutions and by trigonometric , transformations, integration of √ax2+ bx+c, 1⁄ √ax2+ bx+c, integration by parts, integration by partial fractions.	**12**	**20**
5.	**Definite Integrals**			
	5.1	Definition and properties of definite integrals Example based on these properties	**06**	**12**
		Total	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
	Problems on following topics	
1.	Functions	01
2.	Limits	02
3.	Derivatives	04
4.	Applications of Derivatives	01
5.	Integration	06
6.	Definite Integrals	02
	Total	**16**

Text Books:

Sr. No	Author	Title	Publication
1.	S.P. Deshpande	Mathematic for polytechnic students I and II	Pune Vidyarthi Griha Prakashan
2.	G.V.Kumbhojkar	Applied Mathematics	Phadke Prakashan,Kolhapur
3.	Patel & Rawal	Applied Mathematics	Nirali Prakashan

Reference Books:

Sr. No	Author	Title	Publication
1.	Vishwanath	Engineering Mathematics Vol.I	Satya Prakashan, New Delhi
3.	H.K. Dass	Mathematics for Engineering Vol-I	S.Chand and Company
4.	Shantinarayan	Engineering Mathematics vol-I and II	S.Chand and Company

Learning Resources: Chalk, Board etc

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Function and Limits	04	06	06	16
2.	Derivatives	08	16	00	24
3.	Applications of derivatives	00	00	08	08
4.	Integration	06	10	04	20
5.	Definite Integrals	04	04	04	12
	Total	**22**	**36**	**22**	**80**

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Programme : Diploma in ET/ CM/ IT
Programme Code : 03/ 06/ 07/17
Name of Course : Applied Physics
Course Code : SC163

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three Class Tests each of 60 Minutes	**03**	**03**	--	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

The development of various engineering topics is primarily based on the fundamental principles. The different principles of physics have a wide range of applications in all the braches of engineering. A reasonably good level of knowledge of physics, therefore, forms sound base for engineering students. Physics can be considered as a basic tool in the hands of an engineer through which he can purse his studies and research work in technical field. The foundation level of the subject acquired by the student is kept in mind for selection of the topics. To create interest in the students more stress is given on the applications, in engineering field.

Course Objectives:

- To appreciate the role of fundamentals of Physics in different branches of Engineering.
- To think in scientific manner and apply the knowledge gained in different situations.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**General Physics**			
	1.1	**Units and Measurement** : Need of measurement, Unit of Physical Quantity, Requirements of standard unit, systems of unit, classification of physical quantities into fundamental and derived. Examples of conversion of unit.	**04**	**04**
	1.2	**Errors:** Instrumental, systematic and random error. Definition, Explanation, Examples.		
2.	**Sound**			
	2.1	Wave motion, Transverse and longitudinal waves ree and Forced vibrations, Resonance –explanation and example. Revision on reflection of sound, explanation of echo and reverberation of sound, absorption, reflection and transmission of sound, reverberation time (Sabine's formula), Acoustics ,factors affecting acoustical planning of building requirements of good acoustics, unit of audibility, decibel, simple problems.	**04**	**06**
3.	**Heat**			
	3.1	**Temperature measurements**: Thermometers-Mercury, Bimetallic, Pyrometer, Thermocouple, Platinum resistance and Thermister thermometers-**their principle and working**	**03**	**06**
4.	**Light**			
	4.1	Introduction to reflection and refraction of light, Snell's law, physical significance of refractive index, Total internal refraction of light, critical angle, simple problems.	**08**	**12**
	4.2	**Fiber optics** : Propagation of light through optical fiber, numerical aperture, types of optical fibers, methods of production, applications and comparison with electrical cable		
	4.3	**LASER :** Definition, spontaneous and stimulated emission, population inversion, He-Ne laser, construction and working, applications of LASER.		

	4.4	**Electro magnetic spectrum:** spectrum**,** origin of spectrum, electromagnetic spectral range, type of spectra, line, band and continuous spectra and their significance, applications of spectra.		
5.	**Electrostatics**			
	5.1	**Electric charge,** Coulomb's law of charges, unit charge, field, intensity of electric field, electric lines of forces (properties) electric flux, flux density.	**07**	**12**
	5.2	**Electric potential:** explanation, definition**,** potential due to a point charge, potential due to a charged sphere, absolute electric potential, expression for potential difference between two points. Simple problems.		
	5.3	**Electric condenser:** Concept, capacity of condenser, unit, Principle of condenser, series law and parallel law of condenser, simple problems. Applications of condensers.		
6.	**Current Electricity**			
	6.1	**Concept of resistance**, Specific resistance, Whetstone's network, meter bridge, balancing condition of meter bridge, measurement of unknown resistance using meter bridge. Problems.	**08**	**12**
	6.2	**Potential**, Potential drop along the length of wire, principle of potentiometer, potential gradient, E.M.F. unit, comparison of E.M.F using potentiometer.		
	6.3	**Electric work**, electric power, energy, units and calculations of electric bill.		
7.	**Thermo electricity**			
	7.1	Thermo couple, materials for thermocouples, Seeback effect, Peltier effect, variation of thermo e.m.f. with temperature, Thermo electric series, Law of intermediate temp. Uses of thermocouple.	**01**	**02**

8.	**Electromagnetism**			
	8.1	Magnetic effect of electric current, Ampere's rule, Intensity of magnetic field, magnetic Induction, relation between B and H, Biot and SavertLaw (Laplace's Law), Fleming's left hand rule, Force Experienced by current carrying straight conductor placed in magnetic field. Principle of galvanometer. Problems.	**04**	**08**
9.	**Magnetism**			
	9.1	Domain theory of magnetism, Intensity of magnetic field. Magnetic lines of forces (properties). Type of magnetic materials, para, dia and ferromagnetic substances – their properties and applications.	**02**	**04**
10.	**Modern Physics**			
	10.1	**Semiconductor**s- intrinsic, extrinsic, doping, p and n type semiconductors, electrical conduction through p and p semiconductors **Band theory** of solids, semiconductor, metal and insulator, temperature effect on the conductivity of semiconductors.	**07**	**14**
	10.2	**X- ray's;** production, properties and industrial applications.		
	10.3	**Ultrasonic** and infrasonic waves, properties and industrial applications..		
	10.4	**Nondestructive testing** methods - M.P.T., L.P.T (advantages and disadvantages), X rays, radiographic, ultrasonic		
	10.5	Introduction to Nanotechnology, methods and applications.		
	10.6	Introduction to superconductivity - properties and uses.		
		Total	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Use of vernier calliper to measure the dimensions of different objects.	02
2.	To understand the concept of error in instrument and to measure the dimensions of different objects using micrometer screw gauge.	02
3.	To understand the concept of resonance and to determine the velocity of sound using resonance tube method.	02
4.	Measurement of unknown temperature using thermocouple.	02
5.	Measurement of unknown temperature using platinum resistance thermometer.	04
6.	To determine the refractive index using spectrometer.	02
7.	To determine the specific resistance using Ohm's law.	02
8.	To understand the concept of Whetstone's network and to determine the specific resistance using the meter bridge.	02
9.	To study the principle of potentiometer.	02
10.	To verify Ampere's rule using Orested experiment and find the variation of intensity of magnetic field with current and distance.	02
11.	To determine the forbidden gap in semiconductors.	02
12.	To verify series/parallel law of condensers.	04
13.	Measurements using light	04
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	General Physics	Class room Teaching, Demonstration, Models
2.	Sound	Class room Teaching, Demonstration, Models, Expert Lectures, Visits
3.	Heat	Class room Teaching, Demonstration, Models
4.	Light	Class room Teaching, Demonstration, Models, Expert Lectures, Visits
5.	Electrostatic	Class room Teaching, Demonstration, Models
6.	Current Electricity	Class room Teaching, Demonstration, Models, Expert Lectures, Visits

7	Thermoelectricity	Class room Teaching, Demonstration, Models, Expert Lectures, Visits
8	Electromagnetism	Class room Teaching, Demonstration, Models, Expert Lectures, Visits
9	Magnetism	Class room Teaching, Demonstration, Models, Expert Lectures, Visits
10	Modern Physics	Class room Teaching, Demonstration, Models,

Text Books:

Sr. No	Author	Title	Publication
1.	R.K. Gaur and S. L. Gupta	Engineering Physics	Dhanpal Rai and Sons Publications
2.	Manikpure, Prakash Deshpande and Dagwar	Basic Applied Physics.	S. Chand and Co. New Delhi.

Reference Books:

Sr. No	Author	Title	Publication
1.	Modern Physics	Text book in Physics for diploma Engg. Student.	Sony Publications Pvt. Ltd.
2.	Applid Physics	Schum's Series.	
3.	Kshirsagar, Avdhanalu-	Engineering Physics	

Learning Resources:

Chart , Black Board, Television, Internet, Educational CD's 6. Models, Experimentation, Diagram Demonstration Chalk, Board etc

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	General Physics	2(3)	1(2)	1(1)	4(6)
2	Sound	3(4)	2(3)	1(2)	6(9)
3	Heat	3(4)	2(3)	1(2)	6(9)
4	Light	6(9)	4(6)	2(3)	12(18)
5	Electrostatic	6(9)	4(6)	2(3)	12(18)
6	Current Electricity	6(9)	4(6)	2(3)	12(18)
7	Thermoelectricity	1(2)	---	1(1)	2(3)
8	Electromagnetism	3(5)	3(5)	2(2)	8(12)
9	Magnetism	2(3)	1(2)	1(1)	4(6)
10	Modern Physics	5(8)	5(8)	4(5)	14(21)
	Total	**37**	**26**	**17**	**80**

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Programme : Diploma in ET/CM/IT
Programme Code : 03 / 06 /07 /17
Name of Course : Applied Chemistry
Course Code : SC165

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 Min. duration	**03**	**03**	---	---
Marks	**20**	**80**	**50**	---	---

Course Rationale:

Material Science is the science that investigates the composition and structure of matter, the changes that matter undergoes, the amount and kind of energy necessary for these changes, and the law that govern the changes.

Applications of Material Science and Chemical Principles have resulted into the Development of new materials used in modern medicines and automobiles, synthetic fibers polymers, alloys, new energy sources and many other important products and processes.

Hence, Material Science is an important and expanding branch in scientific engineering and economic field of our society.

Thus the principles of Material Science have a wide application in all the branches of engineering and technologies.

In this syllabus, the coverage of various topics will orient the students to appreciate the principles Material Science in the fields of engineering and Technology. The topic microstructure includes the basic structure of matter, which governs the Mechanical,Electrical and Magnetic properties of the matter. Steels, alloys, plastic resins and Elastometers are included in the syllabus considering their present extensive use in automobiles, chemicals and heavy engineering industries.

Course Objectives:

- Develop interest in the fundamental structure of matter, which governs the properties of matter.
- Apply principles of chemistry, to Engineering situations.
- Understand applications of basic concepts in chemistry.
- Appreciate effect of chemical changes.
- Understand various Chemical Technology processes.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1.	**Introduction to Material Science**			
	1.1	**Atomic Structure and Chemical bonding –** Fundamental particles, Electronic configuration, Atomic Orbital, Main and sub energy levels, Quantum Numbers and their significance, formation of molecules, electrovalent and ionic Bonds, Covalent Bonds, Nuclear stability, mass defect Nuclear fusion, fission.	**04**	**10**
	1.2	**Introduction to crystal structu**re- Unit cell, , seven systems, closed packed structures, hexagonal closed packed structure, cubic close packed structure, body-centered cubic structure and explanation of metallic properties based on these structure. Inter Atomic Distances and Ionic Radii Correlation between Crystal structure and properties.		

2.	**Electrochemistry**			
	2.1	**Introduction** Definition of electrolyte ,metallic and electrolytic conduction degree of ionization ,factors affecting degree of ionization, conductivity of electrolytes Mechanism of electrolysis Activity series Electrolysis of H_2SO_4, KCl with platinum electrodes. NaCl fused and NaCl (aq) $CuSO_4$ solution with Pt electrodes and Cu electrodes.	**06**	**15**
	2.2	**Faraday's law of electrolysis.** Statements, Numerical examples based on Faraday's laws of electrolysis.		
	2.3	**Some electrochemical cells and cell reaction such as** i) Voltaic cells, chemical cell, concentration cell, reversible and irreversible cells. ii) Daniel cell with porous vessel and salt bridge. Concept of electrode potential, standard electrode potential (E^O), significance of oxidation –reduction potential, type of electrodes, active electrodes. EMF series and its application, constructions, working and reaction of lead accumulators, Nickel Cadmium cell. Applications of Electrolysis Electroplating and Electrrefining.		
3.	**Corrosion**			
	3.1	Definition Types of corrosion Atmospheric Corrosion, Factors affecting atmospheric corrosion, Corrosion by oxidation Mechanism of Oxidation corrosion Types of oxide films formed	**06**	**15**

	3.2	Electrochemical Corrosion, its mechanism, electrochemical series, Galvanic corrosion, concentration cell corrosion- Metal ion concentration, oxidation concentration. Factors affecting Electro-chemical corrosion Protection of metal from corrosion- i) Purification of metal and alloy formation. ii) Cathodic Protection. iii) Inorganic coating. iv) Metallic coating- Anodic and Cathodic coating, Electroplating, Hot dipping galvanizing and tinning, Cementation- Sherardizing, Metal cladding, Spraying		
4.	**Polymer**			
	4.1	**Plastic** i) Introduction ii) Definition of polymerization iii)	**04**	**10**
	4.2	Types of polymerization – Addition and Condensation iv) Structure of polymer v) Types of plastic – Thermosoft and thermoset, vi) Their structure and properties vii) Study of polymers such as cellulose, acetate, PVC, polythene, polystyrene Nylon, Teflon(Thermosoft) Bakelite, silicon (Thermoset plastic) Compounding of plastic, Properties and related applications in industries.		
	4.3	**B- Elastometers-** Natural Rubber drawback of natural rubber, polymerization and. Vulcanization of rubber, properties (tack rebound, elasticity, abrasion resistance) and application of rubber.		
5.	**Metal and Alloy**			
	5.1	Definition of metal, mineral, ore , properties and applications of different metals (Fe, Cu ,Al ,Cr ,Ni,Sn,Pb,Zn,Co,W,Ag)	**05**	**10**

	5.2	Definition of alloy ,formation of alloy, purposes of making alloy, classification (ferrous and nonferrous alloy) composition, properties and uses of heat resisting steel, magnetic steel ,shock resistance steel, stainless steel ,high speed steel spring steel, tool steel, and bronze brass monel metal babbit metal duralumin.		
6.	**Engineering Materials**			
	6.1	Definition, properties ,application of Composite material	**04**	**10**
	6.2	Insulating materials		
	6.3	Ceramics and Asbestos, Paint ,Adhesives,		
7.	**Environmental Effects (Awareness Level)**			
	7.1	Definition, types of pollution, air, water, soil, sound, nuclear pollution. (Causes, control method, effect), E-waste (origin effect control) deforestation, ozone depletion, green house effect, preventative environmental management activities.	**03**	**10**
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Drawing of Electronic configuration of items from Z = 1 to Z = 20 Drawing of Molecular structures of electrovalent and covalent compounds and + ve and –ve ions	02
2	Qualitative Analysis of salts of metals such as Hg, Pb, Cu, Sn, Fe, Al, Cr, Ni, Zn, Mn, Ca, Ba, Mg, NH_4, K, Na (Any two)	04
3	Draw the crystal structure of cu and graphite.	04
4	To find the electrochemical equivalent of copper by electrolysis and to verify Faraday's 1^{st} law of Electrolysis.	04
5	Determine conductivity of different electrolytes by using conductometer.	04

6	Study of Mechanism of electrochemical Corrosion due to evolution of H_2 And absorption of O_2	04
7	Formation of phenol formaldehyde resin.	02
8	To estimate percentage of pure iron in iron alloy or impure iron by redox titration method.	02
9	Preparation of chart of composition, properties, uses of metal and alloys.	04
10	To determine co content in emission from petrol vehicle	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction to material science	Models of Hydrogen atom, Electrovalent and covalent molecules and crystal structure.
2.	Electrochemistry	Different Galvanic cells, and the working of dry cells and storage batteries, group discussion on laboratory experiment, based on this theory
3.	Corrosion	Comparison of the rate of corrosion in different environments such as water, moisture, acid, alkali, industrial area.
4.	Polymers	Collection the required data, from nearly polymer industry, to study the manufacturing conditions, and advantages of using polymer industry, to study the manufacturing conditions and advantages of using polymer over metallic material.
5.	Metal and alloy	Samples of different materials, chart
6.	Engg. Materials	Introduction to Engineering Materials – demonstration of material, samples and group discussion
7.	Environmental effects	Measure the level of pollutant and control method by using data group discussion

Text Books:

Sr. No	Author	Title	Publication
1.	S.N.Narkhede	Chemistry of Engineering Materials	Nirali Publication
2.	V. P. Mehta	Polytechnic Chemistry	Jain Brothers, New Delhi.
3.	P.C. Jain and Monica Jain	Applied Chemistry	Dhanpat Rai and sons, New Del hi

Reference Books:

Sr. No	Author	Title	Publication
1.	M.M. Uppal	Engineering Chemistry	Khanna Publisher, Delhi.
2.	J.C. Kurlacose J. Jairam	Chemistry in Engineering and Technology volume I and II.	Tata McGraw hill.
3.	Linus Pauling	The nature of Chemical Bond and the structure of Molecules and crystals	Oxford and IBH Publishing Co.
4.	C.M. Shrivastav C. Shrinivasam	Science of Engineering Materials.	Wiley Eastern Ltd.
5.	Lawrence H Van Vlack	Elements of Material science and Engineering (6^{th} Edition)	Wesley Publishing Co.
6.	Z bigniew D Jastrebski	The nature and properties of engineering material third edition.	John Eiley and Sons.
7.	T.T.T.I. Chandigarah	Civil Engineering Materials	Tata McGraw hill
8.	P.N. Balguni and p.Shah	Fiber Reinforced Cement composites	Tata McGraw hill

Learning Resources: Chalk, Board, Books, Video cassette no 51,55,56,60,61,63 of GPP Library

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction to Material Science	05	02	03	10
2.	Electrochemistry	05	04	06	15
3.	Corrosion	07	04	04	15
4.	Polymers	04	04	02	10
5.	Metal and alloy	04	04	02	10
6.	Engg. Materials.	04	02	04	10
7.	Environmental effects	06	02	02	10
	Total	**35**	**22**	**23**	**80**

(Prof. Smt.K.V.Mankar)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in CE/EE/ET/ MT/CM/IT
Programme Code : 01/02/03/05/06/07/15/16/17
Name of Course : Basics of Computer Systems
Course Code : CM261

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	---	---	2 hrs	---	2 hrs
Marks	---	---	50	---	25

Course Rationale:

In this world of high speed computing, it is essential for diploma in computer engineering students to know about device of computers, its operation and graphical base applications and latest technologies in the market. This course is designed for basic perspective for first year diploma students.

Course Objectives:

- Use computer system effectively.
- Describe and use different application software's.
- Use the basic functions of an operating system.
- Use five essential utility programs.
- Compare major OS like Linux and MS-Windows
- Understand working of input output devices.

- Understand working of secondary storage devices.
- Set the parameter required for effective use of hardware combined with and application software's
- Understand connectivity, internet multimedia and web.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1	**Input and Output**			
	1.1	**What Is Input?**	**04**	---
	1.2	**Keyboard Entry**		
		Keyboards		
	1.3	**Pointing Devices**		
		Mouse, Joystick, Touch Screen, Light Pen, Stylus		
	1.4	**Scanning Devices**		
		Optical Scanners, Bar Code Readers, Character and Mark Recognition Devices		
	1.5	**Image Capturing Devices**		
		Digital Camera, Digital Video Camera		
	1.6	**Audio-Input Devices**		
		Voice		
	1.7	**Webcams and Instant Messaging**		
	1.8	**What Is Output?**		
	1.9	**Monitors**		
		Cathode-Ray Tube, Panel Monitor, Monitors		
	1.10	**Printers**		
		Features, Ink-Jet Printer, Laser Printer, Thermal Printer, Other Printers		
	1.11	**Audio-Output Devices**		
	1.12	**Combination Input and Output Devices**		
		Fax Machines, Multifunction Devices, Internet Telephone, Terminals		

	SECONDARY STORAGE			
	1.13	**Storage**		
	1.14	**Floppy Disks**		
		Traditional Floppy Disk, High Capacity Floppy Disks		
	1.15	**Hard Disks**		
		Internal Hard Disk, Hard-Disk Cartridges Hard-Disk Packs, Performance Enhancements		
	1.16	**Optical Disks**		
		Compact Disc, Digital Versatile Disc		
	1.17	**Other Types of Secondary Storage**		
		Solid-State Storage		
	1.18	**Making IT Work for You:**		
	1.19	**Music from the Internet**		
		Internet Hard Drives, Magnetic Tape		
	1.20	**Mass Storage Devices**		
	1.21	**A Look to the Future: Blu-Ray Technology and**		
	1.22	**Plastic Memory Expected to Replace DVD**		
2	**The System Unit**			
	2.1	**Electronic Data and Instructions**	**02**	**---**
		Binary Coding Schemes		
	2.2	**System Board**		
	2.3	**Microprocessor**		
		Microprocessor Chips ,Specialty Processors		
	2.4	**Memory**		
		RAM, ROM, CMOS		
	2.5	**System Clock**		
	2.6	**Expansion Slots and Cards**		
	2.7	**Making IT Work for You:**		
	2.8	**TV Tuner Cards and**		
	2.9	**Video Clips**		
	2.10	**Bus Lines**		
		Expansion Buses		

	2.11	**Ports**		
		Standard Ports, Cables		
	2.12	**Power Supply**		
3.	**System Software**			
	3.1	**System Software**		
	3.2	**Operating Systems**		
		Functions, Features, Categories, Windows Mac OS, UNIX and Linux		
	3.3	**Utilities**	**04**	---
		Windows Utilities, Utility Suites		
	3.4	**Device Drivers**		
	3.5	**Making IT Work for You: Virus Protection and Internet Security**		
	3.6	**A Look to the Future: IBM Builds an Aware**		
4.	**Basic Application Software**			
	4.1	**Application Software**		
		Common Features, Web-based Applications		
	4..2	**Making IT Work for You: Speech**		
	4.3	**Recognition**		
	4.4	**Word Processors**		
		Features, Case		
	4.5	**Spreadsheets**		
		Features, Case		
	4.6	**Database Management Systems**	**20**	---
		Features, Case		
	4.7	**Presentation Graphics**		
		Features, Case		
	4.8	**Integrated Packages**		
		Case		
	4.9	**Software Suites**		
	4.10	**Sharing Data between Applications**		
		Copy and Paste, Object Linking and Embedding		
	4.11	**A Look to the Future: Web-based Application**		
	4.12	**Software Updates Ease Maintenance**		

5.	**Information Technology**			
	5.1	Internet, and You (Only Introduction)	**04**	---
	5.2	Information Systems		
	5.3	People		
	5.4	Making IT Work for You:		
	5.5	Information Technology Topics		
	5.6	Software		
		System Software, Application Software		
	5.7	Hardware		
		Types of Computers, Microcomputer Hardware		
	5.8	Data		
	5.9	Connectivity, the Wireless Revolution, and the Internet		
	5.9	A Look to the Future: Using and Understanding		
	5.10	Information Technology Means Being Computer Competent		
6.	**The Internet, the Web, and Electronic Commerce**			
	6.1	**The Internet and the Web Access**	**04**	---
		Providers, Browsers		
	6.2	**Communication**		
		E-Mail, Instant Messaging, Discussion Groups		
	6.3	**Making IT Work for You:**		
	6.4	**Blocking Spam**		
	6.5	**Search Tools**		
		Search Engines, Meta search Engines, Specialized Search Engines		
	6.6	**Electronic Commerce**		
		Web Storefronts, Web Auctions, Security		
	6.7	**Web Utilities**		
		Telnet, FTP, Plug-ins, Filters		
	6.8	**A Look to the Future:Internet2 Is a High-Performance Network**		

7.	**Specialized Application Software (only Introduction)**			
	7.1	**Specialized Applications**	**02**	---
	7.2	**Graphics**		
		Desktop Publishing, Image Editors, Illustration Programs, Image Galleries, Graphics Suites		
	7.3	**Audio and Video Multimedia**		
		Links and Buttons, Developing Multimedia Presentations, Making IT Work for You: Digital Video Editing, Multimedia Authoring Programs		
	7.4	**Web Authoring**		
		Web Site Design, Web Authoring Programs		
	7.5	**Emerging Applications**		
		Virtual Reality, Knowledge-based (Expert) Systems, Robotics		
	7.6	**A Look to the Future: The Future of Artificial**		
8.	**Communications and Networks (Only Introduction)**			
	8.1	**Communications**	**06**	---
		Connectivity, The Wireless Revolution, Communication Systems		
	8.2	**Communication Channels**		
		Physical Connections, Wireless Connections		
	8.3	**Connection Devices**		
		Modems , Connection Service		
	8.4	**Data Transmission**		
		Bandwidth, Protocols		
	8.5	**Networks**		
		Terms		
	8.6	**Network Types**		
		Local Area Networks, Home Networks, Metropolitan Area Networks, Wide Area Networks		
	8.7	**Network Architecture**		
		Configurations		

	8.8	**Making IT Work for You: Home Networking Strategies**		
	8.9	**Organizational Internets: Intranets and Extranets**		
		Intranets, Extranets, Firewalls		
	8.10	**A Look to the Future: Toyota and Sony Create Wireless Robotic Car**		
9.	**Cyber Law & Cyber Security**			
	9.1	Introduction to Cyber Security, Security issues related to Information, Internet Security, Data Security and Information Security. Cyber Law associated with violation of security.	**02**	**---**
		Total	**48**	---

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	**Demonstrate types of Computers**.	**02**
	Demonstrate use of various I/O Devices. (**Maximum Devices Available in the LAB as per theory should be demonstrated**)	
	Functioning of Cathode Ray Tube, TFT/Flat Monitors and other monitors	
	Introduction of interface of other output devices like Fax Machines, Internet phones, Digital Camera etc.	
	Functioning of various types of Audio-Output Devices.	
2.	**Functions and working of Secondary Storage devices**	**04**
	Types of Secondary Storage devices.	
	Installation, configuration and setting of Hard Disks.	
	BIOS Settings for Primary and secondary Memory.	
	Installation and working of CD-ROM/DVD-ROM/ DVD-Combo/ DVD-Writer (Internal and External).	
	Future of Secondary Storage Devices.	
3.	**Practice of basic commands in command window:** Ex: dir, md, copy, cd, move, rmdir, rd etc.	**04**

4.	**Operating System**	**04**
	Various operations on Window based operating system.	
	Windows Operations: Minimising, Maximising, Resizing.	
	Using Windows Help.	
	Creating, copying, moving files and folders.	
	Creating shortcuts.	
	Creating and Removing/Deleting User Accounts.	
	Setting window views.	
	Using Add /Remove Programs Utility.	
	Using Add Hardware Utility	
	Adding Fonts.	
	Viewing Computer Configuration.	
	Desktop settings: Display properties, time and date setting, Screen Saver , Appearance	
5.	**Application software**	**07**
	Word Processors	
	Hands on Word Processors.(Ex: MS WORD, OpenOffice.org)	
	Various options and its use in creating/ updating/ printing/ Adding Image/mail merge etc. (Perform at least 5 assignments Covering all menu items). Spreadsheets:	
	Assignments based on use of Spreadsheets &Various menu items and its use in worksheets to solve problems. (Perform at least 5 assignments using any spreadsheet software) Presentation Graphics:	
	Preparation of Various slides (Perform at least 5 assignments covering Presentation Graphics like objects grouping, Customising Slide transition, Embedding Links)	
6	**Database Management System**	**07**
	Creation of tables using DBMS tools like MS Access. (Teachers should frame their own assignments for above tools which covers maximum features provided by respective softwares).	

7.	**Introduction to Internet and WWW**	
	Conduct minimum 2 assignments on Internet and Web, like creating mail accounts, using web based applications, browsing internet sites to fetch relevant information, etc.	**02**
	Introduction to e-Commerce and related web sites. Example Railway Reservations, Air Ticket Reservations etc..	**02**
	Total	**32**

Text Books:

Sr. No	Author	Title	Publication
1.	Timothy J. O. Leary	Computing Essentials	TMH
2.	Vikas Gupta	Comdex Computer Course Kit	Dreamtech

Reference Books:

Sr. No	Author	Title	Publication
1.	Computer Fundamentals	BPB	P.K. Sinha
2.	Information Technology for Management	Tata McGraw Hill	Henry C. Lucas, Jr.

Learning Resources: Books, Models

(Prof. Smt. M. H. Thakare)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in CM/IT
Programme Code : 06/07
Name of Course : Programming in C
Course Code : CM 263

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 Minutes**	**03 hrs.**	**---**	**---**	**---**
Marks	**20**	**80**	**50**	**---**	**25**

Course Rationale:

In this era of high speed computing, it is necessary to program computers with the help of structured & dynamic languages like 'C' to study programming is useful in solving problems/tasks related to various domains. Now days almost every setup in software engineering domain chooses 'C' as a basic tool to develop software.

Course Objectives:

After studying this course, the student will be able to

- Write a programs using 'C' language
- Implement data types & structures related to problems.
- Solve the problems/tasks in structured way.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1	**Overview of 'C'**			
	1.1	Introduction: development of 'C',	**02**	**04**
	1.2	Importance of 'C',		
	1.3	Basic structure of 'C' programs, programming style, sample 'C' programs, execution of 'C' program		
2	**Data Types & Character Set**			
	2.1	Character set, C tokens, keywords & identifiers, constants, variables. Data types, declaration of variables, assigning values to variables, defining symbolic constants.	**04**	**06**
3	**Operators & Expressions**			
	3.1	Operators: Arithmetic, relational, logical, increment & decrement, conditional, bit-wise special.	**06**	**10**
	3.2	Expressions: Arithmetic expressions, evaluation of expressions, procedure of arithmetic operators, type conversions in expressions, operator precedence & associatively, mathematical functions.		
	3.3	Managing input & output operators: Introduction, reading a character, writing a character, formatted input, formatted output.		
4	**Decision Making**			
	4.1	Branching & looping introduction, decision making with if statement, simple if statement, the if-else statement, The else if ladder, The switch statement, The?: operator, the go to statement, looping , introduction , the while statement , jumps in the loop, break statement.	**06**	**08**
5	**Arrays**			
	5.1	Introduction, one- dimensional arrays, two-dimensional arrays, multidimensional arrays, Initialization of arrays.	**10**	**12**

6.	**Strings**			
	6.1	Introduction, declaring & initializing string variables, reading string, writing strings, arithmetic operations on string , putting strings together , comparison of two strings, string handling functions, table of strings	**06**	**06**
7.	**User defined functions**			
	7.1	Need of user defined function, the types of C functions, return values & their types, calling a function.	**10**	**12**
	7.2	Category of functions: No argument- No return value, Argument-No return value, No argument-return value & No argument- return value.		
	7.3	Handling non-integer functions, nesting of functions, recursion, and unction with arrays.		
8.	**Structures & Unions**			
	8.1	Structure definition, giving values to members, structure initialization and comparison structure variables.	**10**	**12**
	8.2	Arrays of structures, arrays within the structure, structure and functions, Unions, size of structures, bit fields & bit operations.		
9.	**Introduction to Pointers**			
	9.1	Pointer Concept,& and * operators, Declaration of Pointers, Initialisation of pointers, Pointer Expressions, Application of pointers, Array of Pointers, Pointer to array, function, structure, Function returning pointer and passing addresses to functions.	**10**	**10**
		Total	**64**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Demonstration of Turbo-C Compiler, Creating a program Compiling & linking executing programs.	**02**
2.	Write 'C' programs based on declaring variables & assigning values to variables. (Minimum 3)	**02**
3.	Write programs based on expressions and operators. Programs using scanf(), printf(), getch(), putch**().(Minimum 4)**	**02**
4.	Programs using following control statements: If statement, Switch statements,?: operator, go to statements Programs using following loop controls,while loop do.. while loop for loop**(Minimum 5)**	**06**
5.	Write programs based on arrays**. (Minimum 4)**	**04**
6.	Write programs using strings operations such as comparison, concatenation, copying etc. **(Minimum 3)**	**04**
7.	Examples on User defined functions, demonstration of return data types. Write programs demonstrating four categories of functions. Programs based on recursion & nesting of functions. **(Minimum 5)**	**04**
8.	Write programs based on structure definition and initialization. Write programs based on structure within structure. Write programs based on bitwise operations. **(Minimum 3)**	**04**
9.	Write programs based on Pointers and pointer applications. **(Minimum 3)**	**04**
	Total	**32**

Note :

- Minimum 30 Programs as specified in practical coverage section should be executed.
- Actual program statements on practical topics should be framed by the respective teachers.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Overview of 'C'	Demonstration of 'C' Compiler, Create simple program
2	Data types & character set	Write 'C' programs based on declaring variables & assigning values to variables.
3	Operators & Expressions	Explanation of operators, expressions & managing i/p & o/p operators.
4	Decision Making	Theoretical explanation + writing program using different control statements.
5	Arrays	Theoretical explanation & implementation of arrays.
6	Strings	Theoretical explanation & implementation of strings.
7	User defined functions	Explanation & implementation of examples on user defined functions,
8	Structures and Unions	Theoretical explanation & implementation of structures & Unions.
9	Pointers	Explanation & implementation of examples on Pointers

Text Books:

Sr. No	Author	Title	Publication
1.	E. Balagurusamy	Programming in ANSI 'C'	Tata- McGraw Hill pub.(Second Edition)

Reference Books:

Sr. No	Author	Title	Publication
1.	Yeshwant Kanetkar	Let us 'C'	BPB Publication
2.	Madhusudhan Mothe	C for Beginners	SPD Publication

Learning Resources: Black Board, Transparencies, Overhead projector, LCD, White Board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Overview of 'C'	01	01	02	04
2	Data types & character set	02	01	03	06
3.	Operators & Expressions	03	03	04	10
4.	Decision Making	02	04	02	08
5.	Arrays	03	04	05	12
6.	Strings	02	02	02	06
7.	User defined functions	04	04	04	12
8.	Structures and Unions	05	04	03	12
9.	Pointers	03	02	05	10
Total		**25**	**25**	**30**	**80**

(Prof. J.R.Hange)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in ET/CM/IT
Programme Code : 03 /06 /07/17
Name of Course : Electrical Technology
Course Code : EE 262

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 Min. duration	03 Hrs	---	---	---
Marks	**20**	**80**	---	**25**	**25**

Course Rationale:

Now a day's various electronic circuits are used for different electrical equipments. Hence it is necessary to study the electrical principles and working characteristics of some of the electrical machines.

Course Objectives:

After studying this course, the student will be able to

- Understand the basic and fundamental principle of Electrical engineering circuit.
- To state the basic principles of electromagnetism, electrostatics and electromagnetic induction.
- Apply these principles to different electrical machines.
- Understand the principle and construction of various electrical machines and transformers
- To explore to electrical safety.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Electrical Circuits**			
	1.1	Introduction to electrical power supply system, A.C. supply –single phase and three phase, DC supply.	**03**	**04**
	1.2	Resistance, Effect of temperature on resistance (pure metals, insulators, alloys), temperature coefficient of resistance.		
	1.3	Resistances in series, voltage division formula.		
	1.4	Resistances in parallel, current division formula. Simple numericals.		
2.	**Electromagnetism & Magnetic Circuits**			
	2.1	Magnetic field due to electric current, right hand grip rule, magnetic field of a solenoid.	**04**	**08**
	2.2	Production mechanical force on current carrying conductor placed in magnetic field. Fleming's Left hand rule		
	2.3	Introduction to magnetic circuit, M.M.F., absolute and relative permeability, reluctance, state the relation between M.M.F. and reluctance.		
	2.4	Comparison of magnetic & electrical circuits.		
	2.5	Simple series magnetic circuits, concept of useful flux, leakage flux, total flux & fringing.		
	2.6	Magnetization curves.		
	2.7	Concept of hysteresis, hysteresis loop & loss.		
	2.8	Practical importance of hysteresis loop		
3.	**Electromagnetic Induction**			
	3.1	Basic concept.	**04**	**08**
	3.2	Faradays law of Electromagnetic induction in brief		
	3.3	Nature of induced e. m. f. i.e. statically and dynamically.		
	3.4	Fleming's Right hand rule & Lenz's law.		
	3.5	Magnitude of dynamically induced e. m. f. (No Derivation)		

	3.6	Magnitude of self & Mutual induced e. m. f. (No derivation)		
	3.7	Self & mutual inductance.		
	3.8	Factors affecting inductance of a coil		
	3.9	Coefficient of coupling.		
	3.10	Dot convention. Simple numericals.		
4.	**Electrostatics**			
	4.1	Brief review of electric field, field density, permittivity, relative permittivity, charge & their relation.	**04**	**08**
	4.2	Capacitor & Capacitance.		
	4.3	Capacitors in series & parallel.		
	4.4	Capacitance of parallel plate capacitor with single dielectric and composite dielectric medium (No derivation).		
	4.5	Charging and discharging of capacitor to give idea of RC time constant (no deviation)		
	4.6	Types of capacitors- Identification & color coding. Simple numerical.		
5.	**AC Fundamentals & Series Circuits**			
	5.1	Generation of alternating voltage and current i.e. principles and descriptions of elementary alternators.	**10**	**16**
	5.2	Graphical representations of sinusoidal e.m.f and current.		
	5.3	General Equation of Alternating quantity.		
	5.4	Definitions of instantaneous value, cycle, period, frequency, amplitude.		
	5.5	Peak value, average value, r.m.s. value of an alternating sinusoidal voltage and current, Define peak factor and form factor..		
	5.6	Concept of phase and phase difference. Meaning of lagging and leading sine wave		
	5.7	Representation of an alternating quantity by phasor.		

	5.8	Waveforms and Phase diagram for a		
		Purely resistive AC circuit		
		Purely inductive AC circuit.		
		Purely capacitive AC circuit. (Voltage, Current, power, p.f. relations and phasor diagrams, no deviation).		
	5.9	Inductive reactance,		
	5.10	Capacitive reactance.		
	5.11	RL Series circuit: phasor diagram, Impedance, Impedance triangle, power factor. (only formulae , no derivations)		
	5.12	Definitions of apparent power, true power and reactive power.		
	5.13	R. C. circuit: phasor diagram, Impedance, Impedance triangle, power factor. (only formulae , no derivations)		
	5.14	R-L-C series circuit: phasor diagram, Impedance, Impedance triangle, power factor. (only formulae , no derivations)		
	5.15	Numerical on Series Circuits.		
6.	**Three Phase Circuits**			
	6.1	Introduction.	**03**	**06**
	6.2	Generation of 3-phase voltage and its waveform.		
	6.3	Phase sequence, star & delta connection.		
	6.4	Concept of balanced load.		
	6.5	Concept of balanced supply system.		
	6.6	Voltage, current, power relations in star & delta connected system & numerical (no derivation ,but simple numericals)		
	6.7	Advantages of poly phase circuits over 1-phase.		
7.	**Single-Phase Transformers**			
	7.1	Introduction.	**04**	**06**
	7.2	Principle of operation & construction of transformer.		
	7.3	Types of transformers on the basis of voltage, power & construction.		

	7.4	E.M.F. equation (No derivation).		
	7.5	Voltage, current ratio of a transformer.		
	7.6	Losses in transformer, efficiency & regulation of transformer. imple numericals.		
8.	**Electrical Motors**			
	A)	**D.C. Motors**		
	8.1	Construction and Working principle of d .c. motor		
	8.2	Types of motors.		
	8.3	Characteristics & applications of d. c. motors.		
	8.4	Reversal of direction of rotation of motor.		
	8.5	Speed control of d. c. motor.		
	8.6	Necessity of a starter.		
	B)	**Induction Motor**		
	8.1	Construction and working principle of three phase Induction Motor.		
	8.2	Synchronous speed, slip, frequency of rotor current.		
	8.3	Factors determining the torque.		
	8.4	Torque –slip characteristic & starting of three phase I.M.,	**12**	**16**
	8.5	Principle of working, specifications and applications of Relay and Contactor.		
	8.6	D.O.L & star- delta starters.		
	8.7	Change the direction of rotation.		
	8.8	Single Phase Induction Motors- working principle, types and applications.		
	C)	**Special Motors**		
	8.1	Steeper motor, definition types and applications.		
	8.2	Servo motors, Definition, A.C. Servo motors, D.C. Servo motors applications.		
		d) Factors to be considered while selecting motor for particular application.		

9.	**Electrical Safety**			
	9.1	I.E. rules for safety of person & equipment followed when working with electrical installation.	**04**	**08**
	9.2	Electrical shock, Procedure for rescuing a person who has received an electrical shock.		
	9.3	Operational precautions necessary to avoid electrical shock.		
	9.4	Introduction to circuit protective devices: Earthing, H.R.C. fuses, D.P. switch, MCB, safety tools, use of ELCB & Isolators.		
		Total	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	**Name of Practical/Experiment/Assignment**	**Hrs**
1.	To determine temperature rise of resistance of metal.	**02**
2.	Demonstration on production of mechanical force on current carrying conductor in magnetic field & verify Fleming's Left hand rule.	**02**
3.	To plot the B-H curve of a magnetic material.	**02**
4.	Verification of Faraday's Law of Electro Magnetic Induction & verify Fleming's Right hand rule.	**02**
5.	To plot the charging & discharging curve of a capacitor.	**02**
6.	To observe waveforms of A.C. Voltage and current on CRO, determine amplitude & phase and understand concept of lagging & leading.	**02**
7.	To determine the resistance & inductance of a choke coil.	**02**
8.	To measure voltage across each parameters of R-L-C series circuit and draw vector diagram. Also find impedance of circuit.	**02**
9.	To verify the relation between line & phase values of current and voltage in a balanced star & delta connected circuit.	**04**
10.	To determine voltage & current ratio of single-phase transformer.	**02**
11.	To determine efficiency and voltage regulation of single phase transformer by direct loading method.	**02**
12.	Speed control and reversal of rotation of D.C. shunt motor.	**02**

13.	Reversal of rotation of Three phase Induction Motor.	**02**
14.	Demonstration & use relay & contactor with simple circuit.	**04**
15.	Demonstration of use & tripping of MCB against overload & short circuit.	**04**
16	Demonstration of use & tripping of ELCB against leakage current	**04**
	Total	**40**

Note : Any 12 practical's are to be conducted & at least 1 from each chapter.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	D.C. Circuits & basic terms	Lecture, problem solving, practical
2	Electromagnetism & magnetic circuits	Lecture, Q/A technique.
3.	Electromagnetic induction	Lecture, problem solving
4.	Electrostatics	Lecture, problem solving
5.	AC Fundamentals & Circuits.	Lecture, problem solving, practical, Q/A technique.
6.	Three phase circuits	Lecture, problem solving, practical
7.	Single-phase transformers.	Lecture, problem solving, practical
8	D.C. Machines	Lecture, problem solving, practical
9	Induction motors.	Lecture, problem solving

Text Books:

Sr. No	Author	Title	Publication

Reference Books:

Sr. No	Author	Title	Publication
1.	B.L Theraja	Electrical Technology Vol. I & II	S. Chand & Co.
2.	Edvard Hughes	Electrical Technology	Pearson Education.
3.	H.Cotton	Electrical Technology	CBC, Delhi
4.	B. H. Deshmukh	Electrical Technology	Nirali Prakshan
5.	V. N. Mittle	Basic Electrical Engineering	Tata McGraw Hill
6.	Prof. Kulkarni	Introduction to Industrial Safety	

Learning Resources:

Model, White Board, Transparencies, Overhead projector.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Electrical Circuits	02	00	02	04
2	Electromagnetism & magnetic circuits	04	02	02	08
3.	Electromagnetic induction	02	02	04	08
4.	Electrostatics	02	02	04	08
5.	AC Fundamentals & Series Circuits.	04	02	10	16
6.	Three phase circuits	02	02	02	06
7.	Single-phase transformers.	02	02	02	06
8	Electrical Motors	04	06	06	16
9	Electrical Safety	04	04	00	08
Total		**26**	**22**	**32**	**80**

(Prof. K.M. Kakade)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in ME / MT / CM / IT
Programme Code : 04/ 05 /06 /07/18
Name of Course : Elements of Electronics Engineering
Course Code : ET 262

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3 hrs.	3 hrs.	--	--
Marks	**20**	**80**	**--**	--	**25**

Course Rationale:

This course will be useful in understanding of construction, working and applications of semiconductor devices and circuits.

Course Objectives:

After studying this course, the student will be able to

- Explain construction, working, characteristics and applications of semiconductor devices and circuits.
- Build and test the circuits

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Semiconductor devices**			
	Concept& principles of electronics devices		**15**	**20**
	1.1	**Rectifying diode :** Review of P - type and N - type semiconductor ,PN junction, Barrier voltage , depletion region ,Junction Capacitance **Forward biased & reversed biased junction** Diode symbol , forward & reversed Characteristics of PN junction diode **Specifications :** Forward voltage drop , Reverse saturation current, maximum forward current , power dissipation ,Package view of diodes of different power ratings (to be shown during practical hours)		
	1.2	**Zener diode :** construction ,Symbol ,characteristics (forward & reversed) Avalanche & zener breakdown **Specifications :** Zener voltage , power dissipation , break over current,dynamic resistance & maximum reverse current (to be shown during practical hours)		
	1.3	**Rectifier :** Half wave and Full wave Rectifier, circuit diagram, working, comparison, merits and demerits. Filters, necessity, types, comparison, merits, demerits.		
	1.4	**Transistor :** construction, symbol, operating principle, characteristics, applications, rating and specifications, configurations, comparison between CB, CE, CC.		
	1.5	**UJT :** Construction, symbol, operating principle, characteristics, applications, rating and specifications.		

	1.6	**FET:** Construction, symbol, operating principle, characteristics, applications, rating and specifications, configurations, comparison.		
	1.7	**SCR :** Symbol, their construction, working, characteristics, applications		
2.	**Oscillator**			
	2.1	Block diagram, Barkhausan Criteria for sustained oscillations, classification: LC and RC. Oscillations in LC tank circuit; Hartley; Colpitts. RC Wein Bridge and Phase shift, Oscillator. Crystal Oscillator.	**07**	**12**
3.	**Digital Fundamentals**			
	3.1	Number systems: Decimal, Binary, Hexadecimal, Octal.	**07**	**12**
	3.2	Basic logic gates: AND, OR, NOT, NAND, NOR,EXOR symbols, IC numbers and Truth Table.		
	3.3	Logic families : TTL, CMOS		
	3.4	Boolean Algebra: Fundamentals of Boolean algebra, Basic laws, De Morgan`s theorem,		
4.	**Linear ICs,**			
	4.1	OP AMP. IC 741, symbol, pin diagram, ideal and typical characteristics, Applications such as Inverting , Non Inverting amplifier, Difference amplifier, adder substractor , Integrator, differentiator.	**07**	**12**
	4.2	Timer IC 555: Block diagram, operating modes viz. Astable, Monostable.		
5.	**Instrumentation**			
	5.1	CRO: Cathode Ray Tube, Oscilloscope Block diagram, operation, oscilloscope specifications, Applications.	**05**	**12**
	5.2	Function generator, Block diagram, operation, specifications, applications		

6.	**Transducer**			
	6.1	Definition, classification: Active, Passive, Primary, Secondary, Mechanical, Electronic, Analog, Digital, Selection criteria, Resistive, Capacitive, Inductive, Transducers(LVDT), Photoelectric, Piezoelectric Transducers, proximity switch, Construction, Operation, One example of each, Applications,	**07**	**12**
Total			**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Plot V-I characteristics of P-N junction diode.	02
2.	Study of Half wave and Full wave rectifier with and without filter.	02
3.	Plot the i/p and o/p characteristics in CE configurations.	02
4.	Plot the characteristics of FET.	02
5.	Plot the characteristics of UJT.	02
6.	Plot the characteristics of SCR.	02
7.	Study of Hartley and Colpitts oscillator.	02
8.	Study of RC phase shift and Wein Bridge.	02
9.	Study of logic gates and verifications of logic gates.	02
10.	Verification of De Morgan`s theorem.	02
11.	Study of Inverting and Non Inverting Amplifier.	02
12.	Study of Adder, Substractor.	02
13.	Study of Integrator and Differentiator.	02
14.	Study of astable multivibrator using 555.	02
15.	Study of C.R.O.	01
16.	Study of Function generator.	01
17.	Study of Transducers.	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Semiconductor devices.	Classroom teaching and laboratory work.
2.	Digital fundamentals.	Classroom teaching and laboratory work.
3.	Linear IC`s.	Classroom teaching and laboratory work.
4.	Oscillator.	Classroom teaching and laboratory work.
5.	Instrumentation.	Classroom teaching and laboratory work.
6.	Transducer.	Classroom teaching and laboratory work.

Text Books:

Sr. No	Author	Title	Publication
1	Albert Malvino.	Basic Electronics.	TMH.
2	Katre.	Basic Electronics.	Tech-Max.
3	B.L.Theraja.	Basic Electronics.	S.Chand.
4	Ramakant Gaikwad	Linear Integrated Circuits	PHI
5	R P Jain	Modern Digital Electronics	TMH
6	A K Sawheny	Instrumentation	DHANPAT RAI & SONS

Reference Books:

Sr. No	Author	Title	Publication
1	Mottershed	Electronics Devices and Circuits.	PHI
2	Milmann Halkies	Electronics Devices and Circuits.	TMH

Learning Resources: Reference Books, Data Manual

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Semiconductor Devices	10	06	04	20
2.	Oscillators	04	06	02	12
3.	Digital Fundamentals	06	04	02	12
4.	Linear I C ‘s	06	04	02	12
5.	Instrumentation	06	04	02	12
6.	Transducers	06	04	02	12
Total		**38**	**28**	**14**	**80**

(Prof. R.M.Adhav)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in EE / ET / CM / IT
Programme Code : 02 / 03 / 06 / 07/16/17
Name of Course : Graphics Skills & Auto CAD
Course Code : ME261

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	---	---	---	---	---
Marks	---	---	**50**	---	**50**

Course Rationale:

Engineering drawing is the graphical language. It is used by engineers, designers, planners, supervisors and also the workers to express their thoughts, ideas and concepts. The expression by drawing is very accurate, precise and brief. At a glance one can understand detailed description of any part to be manufactured or a dam to be built or an electric circuit to be used. For all technicians through understanding of principles of engineering drawing (Graphic Skills) is essential.

Now engineering drawing has been greatly enhanced by the advent of the computer and computer graphics. The time saved by the computer in solving complex problems and modifying designs makes it possible to plan and to construct more sophisticated engineering, machines and structures than in the past.

Course Objectives:

After studying this course, the student will be able to

- Draw various engineering curves.
- Incorporate Indian Standards in drawings.
- Sketch various orthographic and isometric views.
- Draw all different views from given components vis-à-vis.
- Draw free hand sketches.

- Have hands on experience on AutoCAD.
- Under stand use of AutoCAD in 2D drawing
- Convert 2D drawing into AutoCAD drawing

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION-I				
1.	**Introduction of Drawing Instruments, Lines, Letters etc.**		**02**	**--**
	1.1	Use of different drawing equipments.		
	1.2	Types of letters.		
	1.3	Conventions of lines.		
	1.4	Scales.		
2.	**Curve and Tangential Exercises**		**04**	**--**
	2.1	Geometrical constructions and tangential exercises.		
	2.2	To draw an ellipse by concentric circle method.		
	2.3	To draw a parabola by : i) Directrix focus method.		
	2.4	To draw a hyperbola by : i) Directrix focus method.		
3.	**Orthographic Projections**		**10**	**--**
	3.1	Introduction to orthographic projections first and third angle method of projection. Conversion of simple pictorial view, Dimensioning technique.		
4.	**Sectional Orthographic Projections**		**06**	**--**
	4.1	Introduction, converting the given pictorial view into sectional views.		
5.	**Isometric Views**		**08**	**--**
	5.1	Isometric scale and isometric views of simple objects.		
	5.2	Isometric views of rectangular, cylindrical objects, slots on sloping surface.		
6.	**Free Hand Sketches**		**02**	**--**
	6.1	Fasteners, temporary threaded fasteners, locking arrangement, Foundation Bolts.		

SECTION-II				
7.	**AutoCAD Fundamentals**			
	7.1	Introduction to AutoCAD, Importance of Computer aided Drafting, AutoCAD's Graphical user interface, standard tool bar and menus, pull down menus ,screen menu tool bars displaying and hiding , drawing area , command prompt area , status line, text screen , UCSICON coordinator systems: Cartesian and polar Coordinate system.	--	--
8.	**Setting Up AutoCAD Environment**			
	8.1	Concept of setting up drawing, -determination of paper size, drawing scale, angles. Lines, colours, Methods of settings: Setting from scratch- default values, Using wizards to Automate settings, Using available Templates.	--	--
9.	**Drawing in AutoCAD**			
	9.1	AutoCAD command entry methods using command prompt, screen menu, pull down menu, Tool bar coordinate point entry method – using Absolute & relative coordinates Basic Geometric commands: Point, line, arc, circle, rectangle, ellipse, polygon, polyline, doughnut, sketch Redraw, regen and regen auto commands.	--	--
10.	**Drawing Accurately and Speedily**			
	10.1	Accuracy using grid, snaps, ortho and coordinate display Accuracy using object snap options- center, endpoint, insertion, intersection, midpoint, nearest, perpendicular, quadrant. Erase, break, trim, extend, stretch, move, rotate, chamfer, fillet. Copy, array, offset Display control commands such as zoom with its options. Pan and its options.	--	--

11.	**Layers and Line Types**			
	11.1	Concept of Layer, creating layer, organizing layers, controlling layers using ON/OFF, LOCK/UNLOCK, FREEZE/THAW commands Working with existing line types, assigning colour and a line type to a layer, line type scale factor, setting of the line type for the new objects, modifying line types and scale factor for existing object	**--**	**--**
12.	**Creating Blocks**			
	12.1	Concept of block, local and global block, creating block, inserting block, exploding block and redefining block.	**--**	**--**
13.	**Drawing and Plotting**			
	13.1	Text handling: single line text, text styles, Mtext. Section lines/hatching lines. Dimensioning: Fundamentals, dimension variables, styles, methods such as linear dimensioning: horizontal, vertical aligned, rotated, base line, continue, angular dimensioning, diameter and radius dimensioning, leader, tolerancing and plotting the drawing.	**--**	**--**
		TOTAL	**32**	**--**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
	SECTION - I	
5 sheets on topics covered in the syllabus.		
1.	Line letters and numbers. (Sheet No. 1)	**02**
2.	Engineering curves and tangential exercises. (Sheet No. 2)	**04**
3.	Orthographic projection. (Sheet No. 3)	**10**
4.	Sectional views(Sheet No. 3)	**06**
5.	One sheet Isometric projection(Sheet No. 4)	**08**
6.	Free hand sketches. (Sheet No. 5)	**02**
	Total	**32**
	SECTION - II	
7 Assignments on covered syllabus		
7.	Assignments on AutoCAD fundamentals	**04**
8.	Assignments on Setting up AutoCAD environment	**03**
9.	Assignments on Drawing in AutoCAD	**06**
10.	Assignments on Drawing accurately and speedily	**06**
11.	Assignments on Layers and Line types	**06**
12.	Assignments on Creating Blocks	**03**
13.	Assignments on Drawing and Plotting	**04**
		32

Note: 1) Th-2 & PR-2 for Graphic Skills, Th-0 & PR-2 for Auto CAD
2) Term work evaluation on Graphic skill & Practical evaluation on AutoCAD.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
	SECTION -I	
1.	Curves and tangential exercises	Demonstrations and classroom teaching.
2.	Orthographic projection	Use of models and classroom teaching.
3.	Sectional views	Use of models, transparencies and classroom teaching.
4.	Missing views	Classroom teaching, self study and assignments.
5.	Isometric views	Classroom teaching and use of models.
6.	Free hand sketches	Self study, assignments.
	SECTION -II	
7.	AutoCAD fundamentals	Classroom teaching and Computer Lab. teaching
8.	Setting up AutoCAD environment	
9.	Drawing in AutoCAD	
10.	Drawing accurately and speedily	
11.	Layers and Line types	
12.	Creating Blocks	
13.	Drawing and Plotting	

Text Books:

Sr. No	Author	Title	Publication
1.	N.D. Bhatt	Elementary Engg. Drawing (Including plan and solid geometry)	Charotar Publication, Anand.
2.	Mali, Choudhary	Engineering Drawing	Vrinda Prakashan, Jalgaon
3.	K. Venugopal	Engineering Drawing and Graphics + AutoCAD	New Age International Publishers.

Reference Books:

Sr. No	Author	Title	Publication
1.	N.D. Bhatt	Geometrical and Machine Drawing	Charotar Publication, Anand.
2.	--	I.S. 696 Latest version	B.I.S.
3.	Curriculum Development Centre, TTTI, Bhopal	A Workbook in Engineering Drawing	Somaiyya Publication Pvt. Ltd., Mumbai
4.	--	SP 46 – 1988	B.I.S.
5.	G.R. Nagpal	Machine Drawing	--

Learning Resources: Video cassettes No. 122, 123 of G.P.P. Library

(Prof.M. R. Mundhe)	(Prof. S. B. Kulkarni)	(Prof.D.A.Katare)
Prepared By	**Secretary, PBOS**	**Chairman, PBOS**

Programme : Diploma in CM / IT
Programme Code : 06 / 07
Name of Course : Workshop Practice (CM/ IT)
Course Code : WS 263

Teaching Scheme:

	Hours /Week	Total Hours
Theory	--	--
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	--	--	--	--	--
Marks	--	--	--	--	**50**

Course Rationale:

To make the students conversant with use of various workshop tools used in smithy, carpentry, fitting shops and PC components and devices

Course Objectives:

After studying this course, the student will be able to

- Interpret the assigned job drawing.
- Identify various tools used in different shops of Work shop.
- Select appropriate tool set to perform a specific job.
- Acquire skills to use various tools.
- Take care and maintain the tools.
- Open and connect various PC components.
- Connect external devices.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
1.	**Sketch of smithy/forging Hand tools**, Equipments, with construction and Application.	04	05
2.	**Sketch of carpentry hand tools**, Equipment with construction and application	14	10
3.	**Sketch of fitting and filling hand tools**, equipment with construction and application	14	10
4.	**Computer workshop :** Demonstrating Opening and closing PC PC components Cleaning keyboard Handling printers : Printer ON – OFF, Setting printers, Paper feeding, ejecting. Removing and mounting ribbon / cartridge. Removable medias : Hard disk : Attaching and jumper setting Floppy disk : Inserting, removing and attaching drives. CDROM : Inserting, removing and attaching drives Back Panel demonstration Monitor, Scanner, Speakers connection. Processor, Fan and RAM chips mounting. Cards: LAN cards, display cards, Modem card, connecting to external modem. Motherboard fitting and connections, power supply and front panel connection.	04 02 04 04 04 02 02 02 04 04	25
	Total	**64**	**50**

Note : Journal writing and submission on above given topics.

List of Practicals/Experiments/Assignments:

Sr. No.	Name of practical/Experiment/Assignment	Hrs
1.	Demo of job involving minimum three operations. e.g. Upsetting, Drawing Down, Bending, Setting down.	04
2.	One useful carpentry job involving carpentry joints and wood turning	14
3.	One useful fitting job involving Marking, Filing, Sawing, Drilling, Tapping	14
4.	Demonstrating Opening and closing PC PC components Cleaning keyboard Handling printers : Printer ON – OFF, Setting printers, Paper feeding, ejecting. Removing and mounting ribbon / cartridge. Removable medias : Hard disk : Attaching and jumper setting Floppy disk : Inserting, removing and attaching drives. CDROM : Inserting, removing and attaching drives Back Panel demonstration Monitor, Scanner, Speakers connection. Processor, Fan and RAM chips mounting. Cards : LAN cards, display cards, Modem card, connecting to external modem. Motherboard fitting and connections, power supply and front panel connection.	04 02 04 04 04 02 02 02 04 04
	Total	**64**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Smithy and forging	Explanation, Demonstration, exhibition of Models/samples pieces.
2.	Carpentry	
3.	Fitting and filling	
4.	Computer W / S	Explanation and Demonstration

Text Books:

Sr. No	Author	Title	Publication
1.	Mali and Ghan	Elements of electrical and mechanical technology(Mechanical technology portion)	Nirali and Pragati Prakashan
2.	Deshmukh Mandke	Elements of electrical and mechanical technology(Mechanical technology portion)	Nirali Prakashan
3.	Choudhari M.A.	Elements of electrical and mechanical technology(Mechanical technology portion)	Sandeep Prakashan, Pune
4.	M. David Stone & Alfred Poor	Troubleshooting your PC	PHI

Reference Books:

Sr. No	Author	Title	Publication
1.	S. K. Hajara Choudhari A. K. Hajara houdhari	Elements of workshop technology – Vol. I	Media promoters and Publishers Pvt. Ltd., Mumbai-7
2.	V. Kapoor	Workshop practice Manual	Dhanpat Rai and sons, New Delhi – 32
3.	B. S. Raghuwanshi	A course in workshop technology Vol-I	Dhanpat Rai and sons, New Delhi – 32.
4.	Govindrajalu	IBM PC clones	BPB Publication

Learning Resources:

Demonstration kit, charts, models/sample pieces and books. Video cassette.

Specification Table:

Sr. No	Topic	Cognitive	Psychomotor			Total
		Knowledge	Imitation	Manipulation	Perfection	
1.	Smithy and forging	5	--	--	--	5
2.	Carpentry	3	2	3	2	10
3.	Fitting and filling	3	2	3	2	10
4.	Computer Workshop	8	5	8	4	25
Total		**19**	**09**	**14**	**08**	**50**

(Prof. Hamid Zaheer)
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Programme : Diploma in CE/EE/ ET/ ME/MT/ CM/ IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Community Development
Course Code : AU362

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 min Duration**	**3 Hrs**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

The course has been introduced to make young Engineers especially aware of the present status of Villages &to motivate them to make improvement in villages when they start their Engineering carrier.

Course Objectives:

After studying this course, the student will be able to

- Able to understand present situation in villages and realize the gravity of the village development.
- Able to make survey of villages, collect the data, analyze it and identify the area of development.
- Able to identify the available natural resources and how they can be utilized for betterment of villages.
- Able to collect the useful information for starting probable new industries in villages.

- Able to guide villagers in building low cost durable houses taking in to considerations weather conditions of that area.
- Able to guide villagers for development good habits regarding health and hygiene.
- Motivated to bring about all round development of villages.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Introduction**			
	1.1	Present status of rural and urban community.	**02**	**04**
	1.2	Necessity of community development.		
	1.3	Identifying needs of community, Ways to develop community.		
2.	**Human Power Development**			
	2.1	Present scenario of Human power in India,	**04**	**08**
	2.2	Socioeconomic survey to ascertain requirement of human requirements.		
	2.3	Methodology for training the human power		
	2.4	Wage employment and self employment,		
	2.5	Support from financial institutions for self employment.		
3.	**Appropriate Technology and Technology Transfer**			
	3.1	Technological development of India, Additional needs of community due to technology development,	**04**	**12**
	3.2	Classification of rural industries,		
	3.3	Areas of appropriate technology,		
	3.4	Use of locally available materials,		
	3.5	Methods of transfer of technology, Project reports preparation.		
4.	**Industrialization**			
	4.1	Present status of rural traditional industries,	**04**	**12**

	4.2	Renewal of old industries in villages- Manufacturing new commodities such as plastic utensils, nylon ropes, ceramics Repairing – agricultural implements, tractors, automobiles, electrical or diesel pump sets, domestic appliances Food processing – Papad, jam, jelly, pickles, preservation, spices, syrups, ketchups Utilization of waste product – Gobar gas, fuel cake, Construction – Brick clamp, stone quarry, sand supply, and crusher. Miscellaneous – Handlooms, power looms, Ginning mills, Jaggery making Service Industry – STD/PCO/Net café, Housing support to industrialization.		
5.	**Non Conventional Energy Sources**			
	5.1	Availability of energy sources in India,	**06**	**20**
	5.2	Needs of use of non conventional energy sources.		
	5.3	Availability of such sources in India.		
	5.4	Various types of non conventional energy sources. Solar energy – Solar water heater and solar cooker, wind energy, wind mill and wind turbines, bio-gas-generation.		
6.	**Community Services**			
	6.1	Health and Hygiene awareness,	**04**	**08**
	6.2	Health services,		
	6.3	Educating the community for good habits of health and hygiene, Potable drinking water, purifying well water, low cost latrines, drainage system and soak pits Tree plantation programmes, roads and communications.		
7.	**Waste Management**			
	7.1	Generation of waste, causes	**04**	**08**
	7.2	Types of waste – domestic, commercial, industrial, E-waste, hazardous waste.		
	7.3	Waste separation of domestic waste e.g. wet, dry, reusable, recyclable,		

	7.4	Waste disposal – methods, treatments, etc.		
	7.5	Reduce, Reuse, and Recycle, 3Rs in Waste Management.		
8.	**Developments**			
	8.1	Programmes for all round development of	**04**	**08**
	8.2	Community, Various government schemes, IRDP – Integrated Rural Development Programme.		
	8.3	Active participation of community in development programmes		
	8.4	Motivation for participation.		
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Assignment on manpower development	02
2.	Assignment on appropriate Technology and technology transfer.	02
3.	Assignment on renewal of old industries in villages.	04
4.	Assignment on Non-conventional energy sources.	04
5.	Assignment on Waste Management	04
	Total	**16**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Class rooms teaching
2.	Man power developments	Class rooms teaching, data collection
3.	Appropriate technology & technology transfer	Class rooms teaching
4.	Industrialization	Class rooms teaching
5.	Non-conventional energy sources	Class rooms teaching
6.	Community services	Class rooms teaching
7.	Developments	Class rooms teaching

Text Books:

Sr. No	Author	Title	Publication
1.	Katav Sing	Rural Development Principles, Policies and management.	---
2.	S.P. Sukhatme	Solar Energy	---
3.	G.P. Rai	Non-Conventional Sources of Energy	---
4.	Debendra K. Das	Dynamics of rural development, perspectives	Deep & Deep Publications Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	T.T.T.I. Madras	Environmental Engg.	Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Learning Resources: : Internet, Daily News papers

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	02	04	--	06
2.	Man-power development	04	04	--	08
3.	Appropriate technology & its transfer	04	04	04	12
4.	Industrialization	06	04	04	14
5.	Non-conventional Energy Sources	08	06	06	20
6.	Community Services	06	04	--	10
7.	Developments	06	04	--	10
	Total	**36**	**30**	**14**	**80**

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Programme : Diploma in CE/EE / ET/ ME/MT/ CM / IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Environmental Science
Course Code : AU361

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 min Duration**	**3 hours**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

This course has been introduced to make young engineers aware of the relation between society and environment; the global environmental issues, etc. To motivate them for environmental management and to adopt sustainable development practices.

Course Objectives:

After studying this course, the student will be able to

- Harmony between society and environment.
- Understand global environmental issues.
- Understand environmental pollution and remedial measures.
- Select environmental management practices.
- Adopt the sustainable development strategies in career.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1.	**Introduction**			
	1.1	Society and environment, Indian traditions, customs and culture,	**04**	**08**
	1.2	Role of festivals in protecting environment.		
	1.3	Impact of population on environment.		
2.	**Developments and Environment**			
	2.1	Agriculture and Industry as major sectors of development.	**06**	**16**
	2.2	Impact of development on environment – changing pattern of land use, land reclamation, deforestation, resource depletion, environmental degradation.		
	2.3	Role of society in sustainable development – public awareness through education, campaigns, etc., public participation in decision making.		
	2.4	Causes of Lack of environmental awareness, measures to increase public awareness.		
3.	**Environmental Pollution**			
	3.1	Causes, effects and measures to reduce – air pollution, water pollution, soil pollution, sound pollution.	**06**	**16**
	3.2	Pollution due to radioactive causes, consequences including human diseases.		
	3.3	The price of civilization.		
4.	**Global Environmental Issues**			
	4.1	Ozone layer depletion and its effects.	**06**	**16**
	4.2	Greenhouse effect – global warming climate changes, their effects on human, agriculture, animals, plants.		
	4.3	Disasters - Natural (droughts, floods, earthquakes, cyclones, landslides, avalanches, Tsunamis) Manmade (industrial, technological, atomic). Their impact on environment, prevention and control.		
5.	**Environmental Management (E.M.)**			
	5.1	Need for environmental management,		

	5.2	Three levels of environmental management (Global, national, local),	**05**	**12**
	5.3	Aspects of E.M. – ethical, social, technological, economic.		
	5.3	Legal provision for E.M. – introduction to constitutional provisions, environmental laws.		
6.	**Sustainable Development (S.D.)**			
	6.1	Concept of S.D.	**05**	**12**
	6.2	Need for S.D.		
	6.3	Challenges for S.D. – Social, economic political considerations.		
	6.4	Role of individuals, society, Govt., Non-Govt. organizations, national and international agencies for S.D.		
	6.5	Green evolution.		
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Group Discussion. & Assignment on Developments and Environment	02
2.	Group Discussion Assignment. Articles collection from newspapers, internet on Environmental Pollution	02
3.	Assignment, Articles collection from newspapers, internet on Global Environmental Issues.	04
4.	Assignment on Global Environmental Issues	04
5.	Assignment on Environmental Management	04
	Total	**16**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Class room teaching
2.	Developments and Environment	Class room teaching, Group Discussion.
3.	Environmental Pollution	Class room teaching, Group Discussion.

4.	Global environmental issues	Class room teaching, Group Discussion.
5.	Environmental Management.	Class room teaching.
6.	Sustainable Development	Class room teaching.

Text Books:

Sr. No	Author	Title	Publication
1.	Environmental Engineering	A. Kamala	Tata Mc Graw Hill, New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	Environmental Engineering.	TTTI Madras Chennai	Tata Mc Graw Hill, New Delhi

Learning Resources: Internet, Daily News papers, Environmental magazines

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	04	04	---	08
2.	Developments and Environment	10	06	--	16
3.	Environmental Pollution	04	06	06	16
4.	Global environmental issues	04	06	06	16
5.	Environmental Management.	04	04	04	12
6.	Sustainable Development	04	04	04	12
	Total	**30**	**30**	**20**	**80**

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Programme : Diploma in CE/EE/ET/ME/MT/CM/IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Renewable & Sustainable Energy Management
Course Code : AU363

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**20**
Practical	**01**	**10**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 min Duration**	**3 Hrs**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

Energy is an important aspect in all sectors of country's economy. The energy crisis is mainly caused due to increased population and enhanced standard of living and life style of people. The conventional sources of energy are insufficient to meet these demands. Hence alternative energy sources are utilized for power production. The use of alternative energy source is increasing day by day. Diploma Engineers are to develop, operate and maintain these systems therefore essential to know basics of energy conversion, conservation, energy audit and waste heat recovery techniques.

Course Objectives:

After studying this course, the student will be able to

- Know the National scene of energy production, utilization, consumption and reserves.
- Appreciate the need for non-conventional energy sources.
- Understand relative advantages and disadvantages of various non-conventional energy sources.

- Develop awareness for effective utilization of alternative energy sources.
- Identify different components of solar energy and wind energy sources.
- Identify and analyze biomass plant.
- Identify and apply energy conservation techniques for commonly used Power absorbing and generating devices.
- Apply principles of energy conservation and energy management techniques

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Review of conventional sources of energy**			
	1.1	Types of conventional energy sources availability, important plant in India	**04**	**06**
	1.2	India's production and reserves for fossil fuels, waterpower, nuclear power		
	1.3	Need for non-conventional energy sources		
	1.4	Environmental impact of various energy sources.		
2.	**Solar Energy**			
	2.1	Principle of conversion of solar energy into heat and electricity	**06**	**16**
	2.2	Solar radiation. Solar radiations at earth's surface		
	2.3	Solar radiation geometry- declination, hour Angle, altitude angle, incident angle, zenith angle, solar azimuth angle.		
	2.4	Construction and working of typical flat plate Collector		
	2.5	Solar concentrating collectors and their applications, advantages and limitations		
	2.6	Applications of Solar energy- Space heating and cooling, photovoltaic electric conversion, Solar distillation, Solar cooking and furnace, Solar pumping and Green house, Agriculture and industrial process heat.		
3.	**Wind Energy**			
	3.1	Basic principles of wind energy conversion, power in wind, available wind power formulation, power coefficient, and maximum power	**04**	**12**

	3.2	Main considerations in selecting a site for wind mills, advantages and limitations of wind energy Conversion		
	3.3	Classification of windmills, construction and working of horizontal And vertical axis wind mills, their comparison		
	3.4	Main applications of wind energy for power generation and pumping		
4.	**Energy From Biomass**			
	4.1	Common species recommended for biomass, methods for obtaining energy from biomass, thermal	**06**	**12**
	4.2	Classification of biomass- gasified, fixed bed and fluidized		
	4.3	Application of gasifier		
	4.4	Biodiesel production and application		
	4.5	Agricultural waste as biomass, biomass digester, comparison of biomass with conventional fuels.		
5.	**Geothermal Energy**			
	5.1	Availability, forms of geothermal energy- Dry steam, wet steam, hot dry rock, magnetic chamber system	**02**	**06**
	5.2	Different power plants available		
6.	**Tidal Energy**			
	6.1	Tidal power, factors for selection of tidal power plant	**02**	**06**
	6.2	Classification-Single basin, double basin type		
	6.3	tidal power plants in world, ocean thermal plants.		
7.	**Energy Conservation**			
	7.1	Energy conservation and management, need and importance of energy conservation and management	**02**	**08**
	7.2	concept of payback period, return on investment, life cycle cost, Sankey diagrams, specific energy consumption		
8.	**Energy Conservation Techniques**			
	8.1	Distribution of energy consumption	**06**	**14**
	8.2	Energy audit, types of audit, methods of energy conservation		
	8.3	cogeneration and its application, combined cycle system		

	8.4	concept of energy management, study of different energy Management techniques like- analysis of input, reuse and recycling of waste, energy education, conservative technique and energy audit		
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	**Name of Practical / Experiment/Assignment**	**Hrs**
1.	To collect information about global and Indian energy market	02
2.	One field visit to be conducted to demonstrate application of Solar Energy	04
3.	One field visit to be conducted to Wind Mill	04
4.	To visit a biomass/ biogas plant of municipal waste or elsewhere.	04
5.	Perform energy audit for workshop/Office/Home/SSI unit.	02
	Total	**16**

Instructional Strategy:

Sr. No.	**Topic**	**Instructional Strategy**
1.	Review of conventional sources of energy	Classroom teaching and Internet browsing
2.	Solar Energy	Classroom teaching and field visits, use of charts
3.	Wind Energy	Classroom teaching, field visit & use of charts
4.	Energy From Biomass	Classroom teaching, field visit & use of charts
5.	Geothermal Energy	Classroom teaching and Internet browsing
6.	Tidal Energy	Classroom teaching and Internet browsing
7.	Energy Conservation	Classroom teaching
8.	Energy Conservation Techniques	Classroom teaching and case study

Text Books:

Sr. No	Author	Title	Publication
1.	Non conventional energy resources	Dr B.H.Khan	Tata McGraw Hill
2.	Non conventional energy Resources	G. D. Rai	Khanna publication

Reference Books:

Sr. No	Author	Title	Publication
1.	Solar energy	S. P. Sukhatme	Tata McGraw Hill
2.	Solar energy	H. P. Garg	Tata McGraw Hill
3.	Power plant engineering	Arrora Domkundwar	Dhanpat Rai & co.
4.	India- The energy sector	P.H. Henderson	Oxford University Press
5.	Industrial energy conservation	D. A. Ray	Pergaman Press
6.	Non-conventional energy source	K. M. Mittal	---
7.	Energy resource management	Krupal Singh Jogi	---
8.	Website for Akshay Urja News Bulletin. (www.mnes.nic.in)	---	---

Learning Resources:

Charts of solar water heater and cooker, Models of solar water heater and cooker, Photovoltaic cells etc., video cassette no.131, 365 of G.P.P. library

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Review of conventional sources of energy	06	--	--	06
2.	Solar Energy	02	06	08	16
3.	Wind Energy	04	04	04	12
4.	Energy From Biomass	04	04	04	12
5.	Geothermal Energy	06	--	--	06
6.	Tidal Energy	06	--	--	06
7.	Energy Conservation	02	04	02	08
8.	Energy Conservation Techniques	04	04	06	14
	Total	**34**	**22**	**24**	**80**

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Programme : Diploma in CE/EE/ET/ME/MT/CM/IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Engineering Economics
Course Code : AU364

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**20**
Practical	**01**	**10**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 min Duration**	**3 Hrs**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

Diploma Engineers working in middle level management are no longer confined to the role of professional technicians. They often have to take business decisions, for which they are required to apply economic concepts, logic, tools of analysis and economic theories as they advance in their carrier. It is for this reason that diploma students are required to posses some working knowledge of economic concepts, economic policy of our country, also the effects of globalization, GATT, WTO etc.

Course Objectives:

After studying this course, the student will be able to

- Various concepts, applications, contribution of Micro Economics and macro economics to engineering business decisions.
- Consumer demand, market demand, supply and production.
- Prices and cost - Break even analysis, price decisions.
- Concept of National income.
- Inflation, Deflation and unemployment.
- Money and Banking, New economic environment.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Introduction to Economics**			
	1.1	Engineering Economics –Definition, Objectives ,Importance	**04**	**10**
	1.2	Business Economics - General concepts on micro & macro economics Categories of Economy- Market economy , Command economy , Mixed economy		
2.	**Demand Analysis**			
	2.1	Consumer demand, utility, total and marginal utility, law of diminishing, cardinal and ordinal utility.	**07**	**20**
	2.2	Law of demand, Determinants of Demand, Elasticity of demand, Factors governing the elasticity of demand		
	2.3	Demand for forecasting necessity, techniques, methods		
3.	**Supply, Production and Cost analysis**			
	3.1	Law of supply, supply factors, supply function, Equilibrium of demand and supply	**06**	**14**
	3.2	Theory of production, Laws of production		
	3.3	Cost concepts, Elements of costs, Preparation of cost sheet, Segregation of costs into fixed and variable costs. Break-even analysis-Linear approach. (Simple numerical problems to be solved)		
4.	**Time value of money**			
	4.1	Simple and compound interest	**08**	**16**
	4.2	Cash flow diagram Principle of economic equivalence. Evaluation of engineering projects – Present worth method, Future worth method, Annual worth method, internal rate of return method, Cost-benefit analysis in public projects.		
	4.3	Depreciation policy, Depreciation of capital assets, Causes of depreciation, Straight line method and declining balance method		

5.	**National Income and Inflation**			
	5.1	Concepts, measurement, Gross National production, gross domestic production, methods of measuring national income, India's national income.	**03**	**08**
	5.2	Inflation - deflation, measures, kinds and effects.		
	5.3	Unemployment causes, kinds, effects and remedies.		
6.	**Finance, Money and Banking and New Economic Environment**			
	6.1	Business finance, Profit & Loss (Income) Statement ,Balance sheet, budget and budgetary control, Standards of Financial Reporting, Book – Keeping, Trial Balance	**04**	**12**
	6.2	Money- Kinds and functions, significance, Value.		
	6.3	Banking: Meaning and functions of commercial banks; functions of Reserve Bank of India.		
	6.4	Liberalization, Trade Privatization, Globalization , GATT and W.T.O.		
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical / Experiment/Assignment	Hrs
1.	Assignment on Engineering costs and estimates – fixed, variable, break even	**02**
2.	Assignment on Cash Flows, compounding, and time value of money	**02**
3.	Assignment on Nominal and effective rates, compounding periods, spreadsheets	**02**
4.	Assignment on Depreciation	**02**
5.	Assignment on Replacement analysis	**02**
6.	Assignment on Inflation & Min. rate of return	**02**
	Total	**16**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction to Economics	Lecture method, discussion
2.	Demand Analysis	Lecture method, Assignment, surveys, case study, discussion
3.	Supply Production and cost analysis	Lecture method, Assignment, surveys, case study, discussion
4.	Time value of money	Lecture method, Assignment, surveys, case study, discussion
5.	National income and inflation	Lecture method, Literature survey, discussion.
6.	Finance, money and banking and New economic environment	Lecture method, visits journals review, discussion.

Text Books:

Sr. No	Author	Title	Publication
1.	D.N. Dwivedi and Abhishek Dwivedi	Engineering Economics	Vikas publishing House Pvt. Ltd., New Delhi,
2.	Maheshwari	Managerial Economics (2nd ed)	Prentice Hall of India Pvt. Ltd. New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	**Pannerselvam**	Engineering Economics	Prentice Hall of India Pvt. Ltd. New Delhi
2.	Sasmita Mishra	Engineering economics & Costing	Prentice Hall of India Pvt. Ltd. New Delhi
3.	Newnan, Eschenbach, and Lavelle,	Engineering Economic Analysis, 9th Edition,	Oxford University Press, 2004.
4.	Eschenbach, Ted G.	Engineering Economy - Applying Theory to Practice	Irwin, 1995
5.	Newnan and Wheeler,	Study Guide for Engineering Economic Analysis, 9th Edition,	Oxford University Press, 2004.
6.	Anthony J. Tarquin	Engineering Economy	McGraw-Hill, 1989

Learning Resources: Books, Journals, and Reports etc.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction to Economics	04	06	--	10
2A.	Consumer Demand Analysis	04	04	02	10
2B.	Market demand & elasticities and Fore casting	02	04	04	10
3.	Supply Production and cost analysis	06	04	04	14
4.	Time value of money	06	06	04	16
5.	National Income and Inflation	04	04	--	08
6.	Finance, Money and Banking and New economic environment	06	04	02	12
	Total	**32**	**32**	**16**	**80**

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Programme : Diploma in CE/EE/E&TC/ME/MT/CM/IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Industrial Psychology
Course Code : AU365

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 min Duration**	**3 Hrs**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

The overall purpose of the course is to acquaint with the major sub-areas within Industrial Psychology such as personality and temperament upon industrial psychology, psychology of management, impact of work environment upon the psychology of people in a workplace, psychology to recruitment, psychological testing ,motivation influences work productivity & psychological disorders or abnormalities

Course Objectives:

After studying this course, the student will be able to

- Maintain harmony among workers of various departments.
- Understand needs and requirements of workers.
- Extract maximum work with full cooperation and optimum efforts.
- Proper assigning of the job as per workers capability.
- Able to improve work culture of the organization, thus improving job satisfaction of the workers.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1.	**The Practice of Industrial Psychology**			
	1.1	Definition, objectives, scope, Principles, practices and problems,	**02**	**04**
	1.2	Methods and techniques		
2.	**Understanding the Employee's Thinking**			
	2.1	Sensation and Perception, Thinking and Day Dreaming, Gestalt Approach, Unconscious and Conscious Psychic Elements,	**06**	**14**
	2.2	Explaining Behaviour, Knowledge of Brain Processes, Personal Interpretation of a Given Situation, Instinct.		
3.	**Personality & Temperament**			
	3.1	Mature & immature temperaments (e.g. Sanguine, Melancholic, Choleric, Phlegmatic), emotional types, fear, intelligence, knowledge, deviation, etc	**04**	**08**
4.	**Personnel Management**			
	4.1	Recruitment and selection, Psychological testing, Performance appraisal, Training and development	**04**	**10**
5.	**Organizational Psychology**			
	5.1	Leadership, Motivation, job satisfaction and job involvement,	**06**	**14**
	5.2	Maslow's model of self actualisation, Security, Money, Ambition, Companionship, Social reinforcement, Labour wastage, etc		
6.	**Work Psychology**			
	6.1	Working conditions - Noise, Space, Light, Temperature, Speed of Work, etc. Accidents, Breakages, Fatigue etc. Safety, violence, and health in the workplace, Stress	**04**	**10**
7.	**Recruitment**			
	7.1	Ways of seeking applicants, types of interview, ways of selecting staff.	**04**	**10**
8.	**Social Considerations**			
	8.1	Group Behaviour, Conformity, Industrial Groups, The hawthorne effect	**04**	**10**
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical / Experiment/Assignment	Hrs
1.	Assignment on Identifying similarities and differences that occur in the way different employees perceive their workplace.	02
2.	Assignment on the effect of personality and temperament upon industrial psychology.	02
3.	Assignment on Identifying applications for psychological testing in industrial management.	02
4.	Assignment on Identifying ways that the work environment might impact upon the psychology of people in a workplace	02
5.	Assignment on the application of psychology to recruitment.	04
6.	Assignment on the impact of social factors upon work productivity.	02
7.	Assignment on the significance of psychological disorders or abnormalities in a workplace	02
	Total	**16**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	The practice of Industrial Organizational psychology	Lecture method, Assignment discussion
2.	Characteristics of work place	Lecture method, visit short report
3.	Development of Human Resources	Lecture method, case study visit
4.	Selection, psychological testing and training	Lecture method, visit demonstration
5.	Engineering psychology	Lecture method, discussion, visit case study
6.	Consumer Psychology	Lecture method, discussion, assignment case study

Text Books:

Sr. No	Author	Title	Publication
1.	Thomas Harrel.	Industrial Psychology	
2.	K.K.Ahuja	Industrial management and organizational behaviour	Khanna Publications
3.	R.D.Agarwal	Organization & Management	
4.	O.P.Khanna , Lal	Production Technology Vol. I , II	Dhanpat Rai and sons

Reference Books:

Sr. No	Author	Title	Publication
1.	Schultz, D. & Schultz, S.E. (2006).	Psychology & work today. (9th International ed.)..	New Jersey: Pearson Prentice Hall
2.	Edgar H schien	Organisational Psychology	Prentice Hall of India Pvt. Ltd. New Delhi
3.	H.L. Kaila	Industrial Psychology	The Associated Publishers

Learning Resources: Books, Journals, and Reports etc.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	The Practice of Industrial Psychology	04	--	--	04
2.	Understanding the Employee's Thinking	06	06	02	14
3.	Personality & Temperament	04	04	--	08
4.	Personnel Management	06	04	--	10
5.	Organizational Psychology	06	04	04	14
6.	Work Psychology	04	04	02	10
7.	Recruitment	--	06	04	10
8.	Social Considerations	06	04	--	10
	Total	**36**	**32**	**12**	**80**

(Prof. B.Prasad)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in CE/EE/ET/ME//MT/CM / IT
Programme Code : 01/02/03/04/05/06/07/15/16/
Name of Course : Development of Soft Skills - I
Course Code : NE 376

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**01**	**16**
Practical	**02**	**32**

* NON EXAM.NON CREDIT COURSES (COMPULSORY) - B # Credits over & above 180 credits

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	---	---	---	---	---
Marks	---	---	---	---	**25**

Course Rationale:

This course aims to make students aware of good interpersonal relations, Professionalism in etiquettes, importance of time management and importance of good health. The techniques such as role play, group discussions can be used effectively to demonstrate understanding emotions of persons in daily contact.

Course Objectives:

After studying this course, the student will be able to

- Develop better interpersonal relations among their peer group, subordinates and superiors and work effectively.
- Display corporate etiquettes and professionalism while attending /answering phone calls. Plan time optimally/effectively in office –work as well for their personal growth.

- Understand strengths and weaknesses of self.
- Understand /feel emotions of persons (from office and family) in daily contact and take appropriate actions.
- Demonstrate habits for keeping good health by following good food habits and daily exercise.
- Develop overall personality and be successful in his/her career.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Interpersonal Skills through Personal Development**			
	1.1	Reducing conflict by preventing problems in the classroom.	**03**	**--**
	1.2	Interpersonal Skills through Self Development and change.		
2.	**Corporate Etiquettes & Professionalism**			
	2.1	Understanding Self	**03**	**--**
	2.2	Polished personal habits		
	2.3	Ethics & Etiquettes: a way of life		
	2.4	Personal Attire & Grooming		
	2.5	Cell phone manners		
3.	**Time Management**			
	3.1	Time management skills in groups for completion of project	**03**	**--**
	3.2	Factors that lead to time loss and how they can be avoided		
	3.3	Time matrix & urgent versus Important jobs		
4.	**Managing Emotions**			
	4.1	To understand and identify emotions,	**03**	**--**
	4.2	To know our preferences		
	4.3	Strength, weaknesses ,opportunities and threats , Techniques of self control		
	4.4	To get desirable response from others		
5.	**Health Management**			
	5.1	Importance of health management,	**04**	**--**
	5.2	Relevance of it ,		
	5.3	Tips to maintain good health		
		Total	**16**	**--**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Case studies to be discussed in a group and presentation of the same by group /group leader.	04
2.	Field exercises for the group of students.	02
3.	Role play by individual/group leader.	04
4.	Arranging Quizzes, puzzle- solving and educational games.	02
5.	Group discussions.	04
6.	Sharing of self -experiences in a group.	04
7.	Brain storming sessions	02
8.	Questionnaire -filling & discussing results of the same in a group.	04
9.	Live demonstrations on Yoga and other stress relieving techniques by professional persons.	06
	Total	**32**

Reference Books:

Sr. No	Author	Title	Publication
1.	Mr. Shiv Khera	You can win	
2.	Mr Abdul Kalam	Wings of Fire	
3.	Mr Nirfarake	Prabhavi Vyaktimatwa.(Marathi)	
4.	Mr Iyyengar	YogaDipika	
5.	Mr. Anand Nadkarni	Tan tanavache niyojan (Marathi)	
6.	Mr. Rajiv Sharangpani	Khusit raha ,Mast Jaga.(Marathi)	

Learning Resources:

Video cassettes on 1. Effective Comminication 2 Group Discussions ,3. Corporate Etticates and professionalism.

(Prof. Smt.V.P.Ashwatpur)
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Programme : Diploma in CE/EE/ET/ME/ MT/CM /IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Development of Soft Skills – II
Course Code : NE 377

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**01**	**16**
Practical	**02**	**32**

* NON EXAM.NON CREDIT COURSES (COMPULSORY) - B # Credits over & above 180 credits

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	---	---	---	---	---
Marks	---	---	---	---	**25**

Course Rationale:

This course aims to make students aware of importance of goal setting , develop self study techniques , importance of ethics and value system , This also aims one to inculcate creative mind along with interest in using problem solving techniques while dealing with any work. It also emphasizes about importance of stress relieving techniques to be practiced for good health.

Course Objectives:

After studying this course, the student will be able to

- Understand importance of goal setting and strategies for setting one's goal.
- Develop and practice self- study techniques.
- Use and practice stress management techniques for good health

- Use and practice problem solving skills.
- Understand importance of ethics and value system for positive interpersonal relations.
- Develop overall personality and be successful in his/her career.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Motivation & Goal Setting**			
	1.1	Importance of goal setting,	**02**	**--**
	1.2	How to set SMART goals.		
2.	**Study Habits**			
	2.1	Note taking, Methods of Learning,	**02**	**--**
	2.2	Memory Enhancement, self - Study Techniques,		
	2.3	Techniques for effective Reading and Writing.		
3.	**Stress Management**			
	3.1	Stresses in groups, how to control emotions,	**03**	**--**
	3.2	Strategies to overcome stress, understanding importance of good health to avoid stress.		
4.	**Ethics & Motivation**			
	4.1	What are ethics, how ethics help to ensure positive interpersonal relations,	**03**	**--**
	4.2	Personal value system, and personal quality primer		
5.	**Creativity**			
	5.1	Definition of Creativity, Tips and ways to increase creativity, importance of creativity.	**03**	**--**
6.	**Problem Solving Techniques**			
	6.1	Puzzles and technical quizzes to be organized to develop these skills.	**03**	**--**
		Total	**16**	**--**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Case studies to be discussed in a group and presentation of the same by group /group leader.	04
2.	Field exercises for the group of students.	02
3.	Role play by individual/group leader.	04
4.	Arranging Quizzes, puzzle- solving and educational games.	02
5.	Group discussions.	04
6.	Sharing of self -experiences in a group.	04
7.	Brain storming sessions	02
8.	Questionnaire -filling & discussing results of the same in a group.	04
9.	Live demonstrations on Yoga and other stress relieving techniques.	06
	Total	**32**

Reference Books:

Sr. No	Author	Title	Publication
1.	Mr. Shiv Khera	You can win	
2.	Mr Abdul Kalam	Wings of Fire	
3.	Mr Nirfarake	Prabhavi Vyaktimatwa.(Marathi)	
4.	Mr Iyyengar	YogaDipika	
5.	Mr. Anand Nadkarni	Tan tanavache niyojan (Marathi)	
6.	Mr. Rajiv Sharangpani	Khusit raha ,Mast Jaga.(Marathi)	

Learning Resources:

Video cassettes on 1. Motivation & Goal Setting
2. Stress Management,3. Ethics & Motivation

(Prof. Smt.V.P.Ashwatpur)	(Prof. S. B. Kulkarni)	(Prof. Dr. S. B. Nikam)
Prepared By	Secretary, PBOS	Chairman, PBOS

Programme : Diploma in CE/ ME/ EE/ET/MT/ CM / IT
Programme Code : 01 / 02 / 03 / 04 / 05 / 06 / 07/15/16/17/18
Name of Course : Applied Mathematics – III
Course Code : SC361

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 Min. duration	03 hrs	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

The student shall learn various techniques in integration and differential equations and use these techniques to their related Engineering problems

Course Objectives:

- Apply the definition of integration as inverse of differentiation to solve Problems.
- Students will be able to apply various methods of integration..
- To apply mathematical principle to solve engineering problems.
- To draw and come to a valid conclusion.
- To locate the exceptional and critical points in an engineering system.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Application of Integration**			
	1.1	Mean value and RMS value of the functions.	**04**	**08**
	1.2	Area under the curve and area between two curves.		
	1.3	Volume of solid of revolution.		
2.	**Differential Equations**			
	2.1	Definition, order and degree of differential equations.	**10**	**24**
	2.2	Formation of differential equations.		
	2.3	**Solution of differential equations** : (using following methods) i) Variable separable, ii) Reducible to variable separable, iii) Homogeneous differential equations, iv) Exact diff. equations, v) Linear differential equations.		
3.	**Numerical Methods**			
	3.1	Solution of algebraic equations. Bisection method, Regulafalsi method and Newton – Raphson method.	**06**	**16**
	3.2	Solution of simultaneous equations containing 2 and 3 unknowns Gauss elimination method. Iterative methods- Gauss Seidal and Jacobi's method		
For EE / ET / CM / IT				
4.	**Complex Numbers**			
	4.1	Definition and algebra of a complex numbers.	**06**	**16**
	4.2	Geometrical representation, Argand's diagram, modulus and amplitude of a complex number. De Moivre's theorem (without proof), roots of complex number.		
5.	**Laplace Transforms**			
	5.1	Definition, Laplace Transforms of elementary functions, important properties of Laplace Transforms, Inverse of	**06**	**16**
	5.2	Laplace Transforms, Convolution Theorem and application of Laplace Transform for solving differential equations.		

For CE / ME/ MT				
4.	**Statistics**			
	4.1	Measures of central tendency : (a)Mean (b) Median (c) Mode	**06**	**16**
	4.2	Measures of dispersion : a) Standard deviation (b) Co-efficient of variance		
5.	**Vectors**			
	5.1	Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication)	**06**	**16**
	5.2	Dot (Scalar) product with properties. Vector (Cross) product with properties. Work done and moment of force about a point & line		
		Total	**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1	Application of Integration	02
2	Differential Equations	04
3	Numerical methods	04
For EE / ET / CM / IT		
4	Complex Numbers	03
5	Laplace Transforms	03
For CE / ME/ MT		
4	Statistics	03
5	Vectors	03
	Total	**16**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Application of Integration	Classroom Teaching Method
2.	Differential Equations	Classroom Teaching Method
3.	Numerical methods	Classroom Teaching Method
For EE / ET / CM / IT		
4.	Complex Numbers	Classroom Teaching Method
5.	Laplace Transforms	Classroom Teaching Method
For CE / ME/ MT		
4.	Statistics	Classroom Teaching Method
5.	Vectors	Classroom Teaching Method

Text Books:

Sr. No	Author	Title	Publication
1.	P.N.Wartikar & J.N.Wrtikar	Engineering Mathematics I	Pune Vidyarthi Griha Prakashan,Pune
2.	Patel & Rawal	Applied Mathematics	Nirali Prakashan
3.	S.P.Deshpande	Applied Mathematics	Pune Vidyarthi Griha Prakashan,Pune
4.	G.V.Kumbhojkar	Applied Mathematics	Phadke Prakashan,Kolhapur

Reference Books:

Sr. No	Author	Title	Publication
1.	Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi
2.	Vishwanath	Engineering Mathematics Vol.II	Satya Prakashan, New Delhi
3.	B.L.Agarwal	Basic Statistics	New Age International Publication
4.	H.K. Dass	Engineering Mathematics Part II	S. Chand & Co. Ltd. Delhi

Learning Resources: Chalk Board

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Application of Integration	00	00	08	08
2	Differential Equations	04	12	08	24
3	Numerical methods	04	04	08	16
For EE / ET / CM / IT					
4	Complex Numbers	04	04	08	16
5	Laplace Transforms	04	04	08	16
For CE / ME/ MT					
6.	Statistics	04	04	08	16
7	Vectors	04	04	08	16
	Total	**16**	**24**	**40**	**80**

(Prof. R.A.Pawar)
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(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in CM/IT
Programme Code : 06/07
Name of Course : Operating System
Course Code : CM461

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests, each of 60 minutes**	**3Hrs.**	**--**	**--**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

Operating Systems are system programs, which are very essential components of Computer system. This course is aimed to teach and practice the concept of Operating System design.

Course Objectives:

After studying this course, the student will be able to

•	Use operating system effectively
•	Understand overall issues in Operating System design
•	Understand a process, deadlock & the concept of context switching & multiprogramming
•	Learn various memory management and file management techniques.
•	Implement various algorithms of scheduling
•	Understand different File Systems

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Introduction**			
	1.1	What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating-System Structure	**04**	**06**
	1.2	Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems		
	1.3	Special-Purpose Systems, Computing Environments, Open-Source Operating Systems.		
2	**Operating-System Structures**			
	2.1	Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls	**10**	**15**
	2.2	System Programs, Operating-System Design and Implementation		
	2.3	Operating-System Structure, Virtual Machines, Operating-System Debugging		
	2.4	Operating-System Generation, System Boot.		
3	**Processes and Thread**			
	3.1	Process Concept, Process Scheduling, Operations on Processes	**10**	**12**
	3.2	Inter process Communication, Examples of IPC Systems		
	3.3	Communication in Client–Server Systems, Multithreading Models		
	3.4	Thread Libraries, Threading Issues, Operating-System Examples.		
4	**CPU Scheduling and Process Synchronization**			
	4.1	Basic Concepts, Scheduling Criteria. Scheduling Algorithms	**06**	**07**
	4.2	Thread Scheduling, Multiple-Processor Scheduling		
	4.3	Operating System Examples, Algorithm Evaluation, The Critical-Section Problem		

	4.4	Peterson's Solution, Synchronization Hardware		
	4.5	Semaphores		
	4.6	Classic Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions.		
5	**Deadlocks.**			
	5.1	System Model, Deadlock Characterization	**10**	**10**
	5.2	Methods for Handling Deadlocks		
	5.3	Deadlock Prevention, Deadlock Avoidance		
	5.4	Deadlock Detection, Recovery from Deadlock		
6	**Memory Management**			
	6.1	Main Memory: Background	**10**	**10**
	6.2	Swapping, Contiguous Memory Allocation		
	6.3	Paging, Structure of the Page Table		
	6.4	Segmentation Example: The Intel Pentium		
	6.5	Virtual Memory : Background, Demand Paging, Copy on Write, Page Replacement Allocation of frames, Trashing.		
	6.6	Memory Mapped Files**,** Allocating Kernel Memory, Other Considerations, Operating-System Examples		
7	**Storage Management**			
	7.1	File-System Interface**:** File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection	**08**	**10**
	7.2	File-System Implementation**:** File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery, NFS, Example: The WAFL File System		
	7.3	Mass-Storage Structure**:** Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure, Stable-Storage Implementation, Tertiary-Storage Structure.		

8	**Security & Protection**			
	8.1	Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control	**06**	**10**
	8.2	Revocation of Access Rights, Capability-Based Systems, Language-Based Protection		
	8.3	Security: The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication		
	8.4	Implementing Security Defenses, Firewalling to Protect Systems and Networks, Computer-Security Classifications, Example: Windows XP		
		Total	**64**	**80**

List of Practicals / Experiments/Assignments:

Sr. No.	Name of Practicals / Experiment/Assignment	Hrs
1	Study of the various Operating System i) DOS ii) Windows 9x,Windows NT, Windows 2000 & Windows XP, Exploring Windows 2003 iii) LINUX.	04
2	Study of Hard disk i) Partition creation ii) Share disk iii) Create dual-boot system	04
3	Write a Program in C for calculation of CPU utilization time like Process Time, Waiting Time, Burst Time etc.	02
4	Write a program in C for FCFS Process Scheduling Algorithm	02
5	Write a Program in C for SJF process scheduling algorithm	02
6	Write a Program in C for Round Robin scheduling algorithm.	02
7	Write a program in C using interrupt to **clear the screen.**	02
8	Write a program in C using interrupt to move the BOX on the screen using arrow key.	02

9	Write a Program in C using Interrupt to keep CAPS LOCK off	02
10	Practical based on File Operations(Using C) i) Write a program to copy a file. ii)Write a program to delete a file. iii)Write a program to rename a file. iv)Write a program to count number of files in given directory.	06
11	Demonstration based on different File Systems	02
	Case Studies : i) System call Users View of PC- DOS ii) PC-DOS implementation	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction	Explanation of basic concept
2	Operating-System Structures	Explanation Structure of Operating System
3	Processes and Thread	Explanation of Process concepts
4	CPU Scheduling and Process Synchronization	Explanation & Practical implementation of algorithm
5	Deadlocks	Explain concept & principle
6	Memory Management	Explain concept & principle
7	Storage Management	Explanation of concept & practical implementation of storage Management.
8	Security & Protection	Explanation of concept & policies.

Text Books:

Sr. No	Author	Title	Publication
1	Silberschatz Galvin, Gagne	Operating System Concepts	John Wisley & Sons

Reference Books:

Sr. No	Author	Title	Publication
1	Achyut S. Godbole	Operating Systems	Tata McGraw-Hill
2	D. M. Dhamdhere	System Programming & Operating System	TMH
3	Kamin Jonathan	DOS 6 & 6.2	Galgotia Publication
4	Peterson	Operating System	
5	Milan Milenkovic	Operating System Concept & Design	TMH
6	Andrew S. Tanenbaum	Modern Operating Systems	Prentice Hall of India

Learning Resources: LCD, White board

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction	02	01	03	06
2	Operating-System Structures	04	04	07	15
3	Processes and Thread	06	03	03	12
4	CPU Scheduling and Process Synchronization	04	02	01	07
5	Deadlocks	03	05	02	10
6	Memory Management	03	05	02	10
7	Storage Management	03	05	02	10
8	Security & Protection	03	05	02	10
	Total	**28**	**30**	**22**	**80**

(Prof. R.T. Nemade)	(Prof. S. B. Kulkarni)	(Prof. S.B.Nikam)
Prepared By	Secretary, PBOS	Chairman, PBOS

Programme	**:**	Diploma in Computer Engineering/ Information Technology
Programme Code	**:**	06 / 07
Name of Course	**:**	Computer Graphics
Course Code	**:**	CM463

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	04	64
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Three class tests, each of 60 minutes**	**3Hrs.**	**--**	**--**	**--**
Marks	**20**	**80**	**25**	**--**	**25**

Course Rationale:

Today's graphics oriented PCs require that students explore and understand a dazzling array of graphics techniques and technologies. Graphics under 'C' details the fundamentals of graphics programming for the IBMPC and compatibles, teaching 'C' programmers of all levels how to create impressive graphics easily and efficiently.

Course Objectives:

After studying this course, the student will be able to

- Understand the basics of graphics programming.
- Write programs for creating various shapes.
- Write programs for processing various shaped objects.
- Create a 3D picture.
- Develop graphical interface using minimum available tools for specific needs.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Graphics Systems**			
	1.1	Video Display Devices	**10**	**10**
	1.2	Raster Scan Systems		
	1.3	Input devices		
	1.4	Graphics Software		
	1.5	Coordinate representations		
	1.6	Graphics Functions & Standards		
2	**Raster Scan Graphics**			
	2.1	Line Drawing Algorithms	**16**	**20**
	2.2	Digital Differential Analyzer		
	2.3	Bresenham's Algorithm		
	2.4	Circle Generation- Bresenham's Algorithm		
	2.5	Scan conversion		
	2.6	Generation of the Display		
	2.7	Frame Buffers		
	2.8	Line Display, Character Display		
	2.9	Polygon Filling : Seed fill algorithms: Flood fill, Boundary fill, scanline algorithms		
	2.10	Fundamentals of Antialiasing		
3	**Two-Dimensional Transformations**			
	3.1	Basic Transformations: Translation Scaling, Rotation	**12**	**18**
	3.2	Matrix representations & homogeneous coordinates		
	3.3	Composite Transformations-Scaling relative to a fixed pivot, rotation about a pivot point		
	3.4	Other transformations		
4	**Windowing & Clipping Techniques**			
	4.1	Windowing concepts	**12**	**16**
	4.2	Clipping algorithms		
	4.3	Area clipping		
	4.4	Line clipping: Cohen Sutherland clipping algorithm, Cyrusbeck , Liang Barsky, Mid point subdivision		
	4.5	Polygon clipping: Sutherland Hodgeman		
	4.6	Text clipping		
	4.7	Window to-viewport transformation		

5	**Three Dimensional Graphics**			
	5.1	Three dimensional transformation	**08**	**10**
	5.2	Hidden line elimination & hidden surface elimination (back face removal, z-buffer, painters algorithm and Warnocks algos)		
	5.3	Bezier and B-Spline curves:		
6	**Perspective and Parallel Transformation**			
	6.1	Types of Perspective and Parallel projection	**06**	**06**
	6.2	Vanishing points		
		Total	**64**	**80**

List of Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Study of Video Display Devices.	02
2	Programs for displaying the point on the screen, graphics demonstration program. Programs for drawing: Lines, circles and ellipse. Programs for drawing and 06filling polygon.	08
3	Programs for two-dimensional translation, scaling, rotation & reflection.	06
4	Program for point clipping, line clipping and polygon clipping.	08
5	Programs for drawing 3-D figures. Programs for drawing Bezier and B-Spline curves.	06
6	Study of parallel and perspective transformation	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Graphics Systems	Explanation and Case study
2	Raster Scan Systems	Explanation, Case study and Implementation
3	Two Dimensional transformation	Explanation, Case study and Implementation
4	Windowing & Clipping Techniques	Explanation, Case study and Implementation
5	Three Dimensional Graphics	Explanation, Case study and Implementation
6	Perspective and Parallel Transformation	Explanation and Case study

Text Books:

Sr. No	Author	Title	Publication
1	Donald Hearn and M Pauline Baker	Computer Graphics	Prentice-Hall
2	David F.Rogers	Procedural Elements for Computer Graphics	McGraw-Hill

Reference Books:

Sr. No	Author	Title	Publication
1	William M. Newman Robert F. Sproull	Principles of Interactive Computer Graphics	McGraw-Hill
2	Zhigang Xiang Roy Plastock	Computer Graphics	Schaum O Series

Learning Resources: OHP, LCD, Projector, and Transference, White board

Web Sites:

- http://www.rspa.com
- http://www.doc.ic.ac.uk/~dfg/graphics

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Graphics Systems	05	00	05	10
2	Raster Scan Systems	05	05	10	20
3	Two Dimensional transformation	04	04	10	18
4	Windowing & Clipping Techniques	05	05	06	16
5	Three Dimensional Graphics	04	02	04	10
6	Perspective and Parallel Transformation	02	02	02	06
Total		**25**	**18**	**37**	**80**

(Prof. T.A.Kumbhare & Prof. N.A.Inamdar)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. S.B. Nikam)
Chairman, PBOS

Programme : Diploma in Computer Engg /Information Technology
Programme Code : 06/ 07
Name of Course : RDBMS
Course Code : CM465

Teaching Scheme:

	Hours /Week	Total Hours
Theory	04	64
Practical	04	64

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests, each of 60 minutes**	**3Hrs.**	**--**	**--**	**--**
Marks	**20**	**80**	**25**	**--**	**25**

Course Rationale:

The major objectives of this course are to provide a strong formal foundation in Database Concepts, technology and practice to the students to enhance them into well informed application developers. After learning this subject, the students will be able to understand the designing of RDBMS and can use any RDBMS package as a backend for developing database applications.

Course Objectives:

After studying this course, the student will be able to

- Create Normalized Database structure files.
- Perform all relational database data related operations like, insert, update, delete.
- Write Logical and Conditional statement for Database Query.
- Write PL/SQL block of code.
- Write procedures and functions.
- Create and use Triggers.
- Import and Export Data.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1	**Introduction to Database system**			
	1.1	**Basic Database concepts:** Data, database, Database system, DBMS, Types of DBMS, and Drawbacks of file system, data abstraction, Data independence, Characteristics of a Relational DBMS model, The 12 Rules (Codd's laws) for fully functional RDBMS.	**04**	**10**
	1.2	**Architecture:** Overall architecture of DBMS, Three level architecture.		
	1.3	**Data Models:** Three classical Data Models-Hierarchical, Networking, Relational Data Models.		
	1.4	Advanced Concepts: Introduction to Data warehousing and data mining, Multimedia Databases.		
2	**Relational Data Model**			
	2.1	**Relational Structure**- Tables (Relations), Rows (Tuples), Domains, attributes, extension, Intention.	**08**	**12**
	2.2	**Keys:** Candidate Keys, Primary Keys, Foreign Keys, Super Keys, Unique Keys.		
	2.3	**Data Constraints:** Referential Integrity Constraints, Entity Integrity Constraints, Constraints like Primary key constraint, Unique, Check constraint strong Entity, weak Entity.		
	2.4	**Database Design:** Relational database Design, Normalization based on functional dependencies, Normal forms: 1NF, 2NF, 3NF, BCNF.		
	2.5	**Conceptual Design:** Entity Relationship Model, E-R Diagrams.		
3	**Interactive SQL**			
	3.1	**SQL:** Invoking SQL*PLUS, The Oracle Data-types, Data Defination Language (DDL), Data Manipulation language (DML), data control language (DCL) and all related commands.	**14**	**15**

	3.2	**Queries using Group by and Order by clause & Join:** Querying a Single Table, Ordering results, Grouping the results, Joins, Types of Joins, Sub queries.		
	3.3	**Operators:** Logical, Value, Syntax and Query expression operators. Set operators.		
	3.4	**Functions:** Character, Arithmetic, Date and time, Group and Miscellaneous Functions.		
	3.5	**Format models:** Character, Numeric & Date Format models.		
4	**SQL Performance Tuning**			
	4.1	**Views:** What are Views? The Create View Command, Updating Views, Views and Joins, Views and Sub queries, What Views cannot do? , Dropping Views.	**08**	**13**
	4.2	**Sequences:** Creating Sequences, Altering Sequences, Dropping Sequences.		
	4.3	**Indexes:** Index Types, Creating of an Index: Simple Unique, and Composite Index, Dropping Indexes.		
	4.4	**Snapshots:** Creating a Snapshot, Altering Snapshot, Dropping a Snapshot.		
5	**PL/SQL**			
	5.1	Introduction of PL/SQL: The PL/SQL Syntax, The PL/SQL Block Structure, Fundamentals of PL/SQL, Advantages of PL/SQL data Types.	**10**	**10**
	5.2	Control Structure: Conditional Control, Iterative Control, Sequential Control.		
	5.3	Exception handling: Predefined Exception, User defined Exception.		
	5.4	Cursors: Implicit and Explicit Cursors, Declaring, Opening and Closing a Cursor, Fetching a Record from Cursor, Cursor for loops, Parameterized Cursors.		
6	**PL/SQL Database Objects and Oracle Utilities**			
	6.1	**Procedures:** Advantages, Creating, Executing and Deleting a Stored Procedure.	**20**	**20**
	6.2	**Functions:** Advantages, Creating, Executing and Deleting a Function.		

	6.3	**Database Triggers:** Use of Database Triggers, How to apply database Triggers, Types of Triggers, Syntax for Creating Trigger, Deleting Trigger.		
	6.4	**Oracle Utilities:** Exporting Oracle database information, Importing Oracle database information, ODL & SQL*Loader.		
		Total	**64**	**80**

List of Practical's / Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	• Assignments based on Codd's Rules and data models. • Study of Overall architecture and three level architecture of DBMS.	02
2	• Designing a Normalized Database. • Designing E-R diagrams.	08
3	• Creating a Table, Inserting Data into Tables, Updating Contents of a Table, Delete Operations, Modifying the Structure of the Table, Renaming the table, Dropping Tables. • Applying Constraints such as Primary key, not null, Foreign key, Check, default etc. • Writing Queries using various operators, Functions & Format models.	18
4	• Writing Queries using the Select Command and its clauses. • Working with Views, Sequence, Index and Synonyms.	12
5	• Write the basic PL/SQL Programs. • Write a program to implement cursors. • Programs based on Exceptions handling.(Predefined and user-defined exceptions)	12
6	• Write different Stored Procedures and Functions • Write programs for creating Various Triggers. • Working with Exporting and importing the file.	12
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction to database concepts	Explanation of database concept
2	Relational Data Model	Explanation & implementation queries related to table
3	Interactive SQL	Explanation & implementation queries related to table
4	SQL Performance Tuning	Defining and using views. Implementation of View, Sequence, Index and Snapshot.
5	PL/SQL	Explanation & implementing PL/SQL block of code.
6	PL/SQL Database Objects and Oracle Utilities	Explanation & writing different procedures & functions and Triggers. Also Explanation of different utilities.

Text Books

Sr. No	Author	Title	Publication
1	Junnarkar, Adavi	Applied Mechanics	Charotar Publishers
2	Dadhe, Jamdar, Walawalkar	Applied Mechanics	Sarita Prakashan
3	Khurmi	Applied Mechanics	S. Chand

Reference Books:

Sr. No	Author	Title	Publication
1	Beer & Johnson	Vector Mechanics For Engineers (Statics & Dynamics)	Mc - Graw Hill Co., USA
2	McLean & Nelson (Schaum's Series)	Engineering Mechanics	Mc - Graw Hill Co., USA
3	Timoshenko & Young	Engineering Mechanics	Mc - Graw Hill Co., USA

Learning Resources: Books, Models

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction to Data base systems	04	04	02	10
2.	Relational Data Model	04	04	04	12
3.	Interactive SQL	05	04	06	15
4.	SQL Performance Tuning	04	04	05	13
5.	PL/SQL	04	02	04	10
6.	PL/SQL Database Objects and Oracle Utilities	08	04	08	20
	Total	**29**	**22**	**29**	**80**

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(Prof.Ms A.D Kshirsagar)
Prepared By

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Secretary, PBOS

(Prof. S.B. Nikam)
Chairman, PBOS

Programme : Diploma in Information Technology
Programme Code : 07
Name of Course : Computer Networks
Course Code : IT461

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	--	**25**	**25**

Course Rationale:

There is revolution in Computer Network field with new technologies coming in. This course gives the knowledge of computer networks and its organization. This course is aimed at providing knowledge of protocols and components used in Computer Network and covers basics of addressing and security issues of Networks.

Course Objectives:

After studying this course, the student will be able to

- Understand physical topology and interfacing concepts of Network.
- Classify Networks in different ways.
- Understand OSI & TCP/IP reference model.
- Understand Network Components.
- Understand various Network protocols and issues in Internetworking Environment.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Introduction to Computer Networks**			
	1.1	Advantages of Networks, Structure of Communications Network	06	10
	1.2	Point-to-point and multidrop circuits, data flow & Physical Circuits		
	1.3	Transmission Media		
	1.4	Local Asynchronous Communication		
	1.5	Long-Distance Communication		
2	**Packet Transmission-I**			
	2.1	Packets, Frames, and Error Detection	18	20
	2.2	LAN Technologies and Network Topology		
	2.3	Hardware Addressing And Frame Type Identification		
	2.4	LAN Wiring, Physical Topology, And Interface Hardware		
	2.5	Extending LANs : Fiber Modems, Repeaters, Bridges, and Switches		
3	**Packet Transmission-II**			
	3.1	Long-Distance and Local Loop Digital Connection Technologies	10	12
	3.2	WAN Technologies And Routing		
	3.3	Network Characteristics: Ownership, Service Paradigm and Performance		
	3.4	Protocols & Layering		
4	**Internetworking**			
	4.1	Concepts, Architecture, and issues and Protocols	10	15
	4.2	Internet Protocol Addresses and various issues in class based and classless addressing schemes		
	4.3	Binding Protocol Addresses(ARP)		
	4.4	IP Datagrams And Datagram Forwarding		
	4.5	IP Encapsulation, Fragmentation, And Reassembly		
	4.6	The Future IP: IPv6		

5	**Internetworking Protocols**			
	5.5	An Error Reporting Mechanism(ICMP)	10	13
	5.6	UDP : Datagram Transport Service		
	5.7	TCP : Reliable Transport Service		
	5.8	Network Address Translation		
	5.9	Internet Routing		
6	**Network Applications**			
	6.7	Client-Server Interaction	10	10
	6.8	The Socket Interface		
	6.9	Naming With The Domain Name System		
	6.10	File Transfer And Remote File Access Generalized File Transfer, The File transfer Protocol, FTP General Model And User Interface, FTP commands, Connections, Authorization, And File Permissions		
	6.11	Network Security		
		Total	**64**	**80**

List of Practicals/ Experiments/Assignments:

Sr. No.	**Name of Experiment/Assignment**	**Hrs**
1	Designing layout of a Network for small organization - Deciding upon type of network - Floor designing/ building designing. - Deciding upon number/ length of components	03
2	Study of Structured cabling issues and various components with their specifications involved in it – Connectors, Ports, Labels, Jackpanels, Racks etc	03
3	Study of RS232 standard	02
4	Study of LAN topologies	02
5	Write a program to check and correct the error in the data at receiver end by implementing Hamming code	02
6	Write a Program for bit Stuffing and Byte stuffing	02
7	Study of specifications of layer2 switches, hubs, repeaters and listing their manufacturers	02

8	Study of available ISPs in India	02
9	Study of Network commands like ping ,ipconfig, traceroute	02
10	Study of Router Specifications	02
11	Configuring Static IP address	02
12	Configuring Dynamic IP address	02
13	Study of port configuration for any server	02
14	Study of Gateway Specifications	02
15	Study of a proxy firewall and Configuration	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction to Computer Networks	Explanation & demonstration of Transmission Media
2.	Packet Transmission-I	Explanation & demonstration of N/W Network Topology & LAN Wiring
3.	Packet Transmission-II	Explanation of WAN Technologies, Protocols & Layering.
4.	Internetworking	Explanation of Internetworking Concepts, Architecture, and Protocols.
5.	Internetworking Protocols	Explanation of ICMP, UDP, TCP.
6.	Network Applications	Explanation & demonstration Client-Server Interaction, Domain Name System

Text Books:

Sr. No	Author	Title	Publication
2.	Douglas E. Comer	Computer Networks and Internet	Pearson Education

Reference Books:

Sr. No	Author	Title	Publication
3.	Uyless Black	Computer Networks	Prentice-Hall Of India
4.	Tanenbaum	Computer Networks	Tata Magraw-Hill Publication
5.	Behrouz A. Forouzan	Data Communications and Networking	Tata McGraw Hill (Fourth Edition)

Learning Resources: Books, Models

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction to Computer Networks	03	02	05	10
2.	Packet Transmission-I	07	03	10	20
3.	Packet Transmission-II	04	03	05	12
4.	Internetworking	04	04	07	15
5.	Internetworking Protocols	04	02	07	13
6.	Network Applications	03	02	05	10
	Total	**25**	**16**	**39**	**80**

(Prof. R.T.Nemade)	(Prof. S. B. Kulkarni)	(Prof. S.B.Nikam)
Prepared By	Secretary, PBOS	Chairman, PBOS

Programme : Diploma in Information Technology
Programme Code : 07
Name of Course : Web Designing using HTML/DHTML
Course Code : IT462

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	2Hrs.	--	--	--
Marks	**10**	**40**	**50**	--	**25**

Course Rationale:

In the Era of Web technology it is essential for every Diploma Engg. To have knowledge of Web Designing. This course covers Web designing using HTML/DHTML.

Course Objectives:

After studying this course, the student will be able to

- Create HTML document and text editing
- Giving Links to text, inks to images.
- How to import images
- How to crate tables, text alignments using Fonts
- Creation of Style sheets, HTML forms using various attributes.
- Creation of STATIC Website.
- Adding various controls to web pages.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Introduction to Common HTML and Links and Addressing**			
	1.1	Introduction to HTML	**05**	**06**
	1.2	Web Publishing		
	1.3	HTML Overview & Documents & Type		
	1.4	Linking Basics, What are URL's, Linking in HTML, Anchor Attributes		
	1.5	Images and Anchors, Image Maps ,Semantic Linking with the <Link> Element.		
	1.6	Meta Information, Meta and the Name attribute , Linking Issues		
2	**HTML Images And Layout: Text Alignment, Tables and Fonts**			
	2.1	The Role of Images on the Web, Image preliminaries, Image Download issues.	**05**	**05**
	2.2	Obtaining Images, HTML Image Basics, Images as Buttons.		
	2.3	Image Maps, Full Syntax of Image ,Image and Color attributes for <BODY>		
	2.4	Design Requirements, HTML Approach to Web design, Alignment Choices		
	2.5	Text Alignment, Word Hinting, Alignment with Images, The <SPACER> element, The <MULTICOL> element.		
	2.6	Introduction to Tables, Simple Tables, ROWSPAN and COLSPAN, Tables for Layout, Tables in HTML 4.0 <TABLE> Syntax, Data binding, Fonts		
3	**Advanced Layout: Frames and Layers**			
	3.1	Overview of frames, Simple frame, Example, Frame targeting.	**04**	**04**
	3.2	Floating Frames, Using frames, Frame problems		
	3.3	Positioned Layers, In Flow Layers, Layers Syntax, Intersecting Layers		

4	**Style Sheets and HTML Forms**			
	4.1	Style Sheets:-The Rise of Style, Style Sheet Basics, Style Sheet Example, Style Sheet properties.	**04**	**05**
	4.2	How are Forms Used? Forms Preliminaries, The <FORM> Element, ACTION Attribute, METHOD Attribute, Simple Form Syntax, Complete		
	4.3	Form Syntax, FORM controls, New and Emerging Form Elements,< BUTTON > element, Labels,<FIELDSET>,Form Accessibility Enhancement		
5	**Introduction to Programmed Web Pages and Client side Scripting and HTML:**			
	5.1	Overview of Client / Server	**04**	**05**
	5.2	Programming on the web, -Server side programming		
	5.3	Common gateway Interface, Active Server Pages.		
	5.4	Purpose of Scripting, Including scripts in a HTML Document.		
	5.5	Script Events and --HTML, Dynamic HTML and the Document		
	5.6	Object Model, HTML and Scripting Access		
6	**Java Script And Client Side Programming & HTML**			
	6.1	Embedding Java script in HTML Document	**05**	**06**
	6.2	Variables ,constants, Adding Comments		
	6.3	Operators: Assignment, arithmetic & comparison operators. control structure & looping .		
	6.4	Scripting, Programming and objects, Plug Ins <EMBED Syntax>, Java Applets		
	6.5	Active X Controls Adding controls to Web pages, <OBJECT> Syntax		
	6.6	Cross Platform Support with plug ins & ActiveX controls		
7	**XML : Beyond HTML**			
	7.1	Relationship among HTML, SGML & XML	**03**	**05**
	7.2	Basic XML, Valid Documents, Ways to use XML, XML for data files, Embedding XML into.		

	7.3	HTML document, Converting XML to HTML for display ,Displaying XML documents by using CSS & XML, Reverting HTML as XML.		
8	**Putting it All Together: Delivering the Websites**			
	8.1	Publishing the site, Outsourcing web hosting, Virtual Hosting	**02**	**04**
	8.2	Running a local Web Server, How web servers work ,Maintaining a web Site		
		Total	**32**	**40**

List of Practicals / Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Creation of HTML documents and text Editing using block level & text level elements, heading example	04
2	Giving Links to text, Creating and giving Links to List of items, link to one page to another, link within page, link to image.	04
3	Importing Images in HTML of various Formats, Creation of images as Buttons	06
4	Creation of Tables and text alignments using various Fonts. using multicol, spacer, row span, cols pan , different table layout, example of data binding & Fonts,	06
5	Creation of Frames, targeting Frames, floating Frames. Creation of Layers, inflow layer, intersecting layer	06
6	Creation of Style Sheets Using various attributes. Creation of HTML Forms Using various attributes	06
7	Creation of Active Server Pages.	06
8	Including Scripts in HTML Documents any five program	06
9	Including java Scripts program in HTML Documents using loops 3 program	06
10	Adding Controls to Web. • Introduction to AJAX: Develop script using AJAX. • Introduction to the concept of blogging.	04
11	Adding XML to webpage	06
12	Hosting the web Site. Create a project using Microsoft Expression/Front page	04
	Total	**64**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction to Common HTML and Links and Addressing:	Explanation practical execution
2	HTML Images And Layout: Text Alignment, Tables and Fonts	Explanation & practical execution
3	Advanced Layout: Frames and Layers	Explanation & practical execution
4	Style Sheets and HTML Forms	Explanation & practical execution
5	Introduction to Programmed Web Pages and Client side Scripting and HTML:	Explanation & practical execution
6	Java Script And Client Side Programming & HTML	Explanation & practical execution
7	XML : Beyond HTML	Explanation & practical execution
8	Putting it All Together: Delivering the Web Site	Explanation & practical execution

Text Books:

Sr. No	Author	Title	Publication
1	Thomas A.Powell	The Complete Reference: HTML	TMH

Reference Books:

Sr. No	Author	Title	Publication
1	Deborah S. Ray Eric J. Ray	Mastering HTML 4.0	BPB

Learning Resources: OHP, LCD Projector and Transparency, Whiteboard.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction to Common HTML and Links and Addressing:	02	02	02	06
2	HTML Images And Layout: Text Alignment, Tables and Fonts	01	03	01	05
3	Advanced Layout: Frames and Layers	01	01	02	04
4	Style Sheets and HTML Forms	02	02	01	05
5	Introduction to Programmed Web Pages and Client side Scripting and HTML:	01	02	02	05
6	Java Script And Client Side Programming & HTML	02	02	02	06
7	XML : Beyond HTML	01	02	02	05
8	Putting it All Together: Delivering the Web Site	01	01	02	04
Total		**11**	**15**	**14**	**40**

(Prof. A.S.Paike)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. S.B. Nikam)
Chairman, PBOS

Programme : Diploma in Information Technology
Programme Code : 07
Name of Course : Digital Techniques and Microprocessors
Course Code : IT 463

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	--	**25**	**25**

Course Rationale:

It is essential to know fundamentals of digital electronics to understand the concept of microprocessor and it's application. Microprocessor is challenging, to meet challenges of growing advanced microprocessor technology. The student should be conversant with microprocessor programming.

Course Objectives:

After studying this course, the student will be able to

- Know the concept of digital circuit
- Understand the operations of fundamental digital circuits
- Simplify logical circuit using Boolean Algebra
- Construct simple logical circuits, counters using IC's
- Drawing the architecture of microprocessor 8085/86/88
- Write program using conditional, loop & jumping rotate, compare
- Understand instruction to setup time delay & Understand use of stack, subroutine and interrupts

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Number System & Codes**			
	1.1	Decimal, Binary, Octal, Hex	**04**	**05**
	1.2	Binary addition, subtraction,		
	1.3	One's complement, Two's Complement, Signed Numbers, Codes, Error codes.		
2	**Digital Logic Families**			
	2.5	Gates. Characteristics of Digital IC's	**10**	**10**
	2.6	Register transistor Logic (RTL), Direct coupled transistor logic (DCTL)		
	2.7	Diode transistor logic (DTL), Emitter couple logic (ECL)		
	2.8	MOS logic, CMOS logic, Interfacing of CMOS & TTL.		
	2.9	Tri state logic		
3	**Combinational logic design using MSI circuit**			
	3.5	Multiplexer and their use in combinational, logic design	**09**	**12**
	3.6	De-multiplexer/decoders and their use in combinational logic design		
	3.7	Adders and their use as subtractor		
	3.8	BCD arithmetic, Priority encoders, Decimal to BCD, BCD to Binary Encoder, Parity generator /Checkers, Priority encoder.		
	3.9	Binary to BCD decoder, BCD to 7-segment decoder, 2 line to 4 line decoder. Multiplexer – 4:1, 8:1 and 16:1 mix multiplexer design using stop method.		
	3.10	De-multiplexer- 4 to 16 line DEMUX. Demux design using sopmethod. 1:4, 1:8, 1:16 DEMUX.		
4	**Standard representation for logic function & Sequential Logic Design**			
	4.7	KARNAUGH map representation, Simplification of logic function using K-MAP	**10**	**15**
	4.8	Minimization of logical function specified in minterms/maxterms or truth table		

	4.9	Minimization of logic function not specified in minterms/maxterms. Don't care condition		
	4.10	**Flip Flops:**S-R, J-K, T, D flip-flops, Application of flip-flops, shift registers		
5	**Microprocessor, Microprocessor Architecture & Microcomputer Systems**			
	5.1	Microprocessor architecture & its Operations	**09**	**13**
	5.2	Memory & I/O Devices		
	5.3	8085 MPU, Example of 8085 based microcomputer.		
	5.4	Classification of instruction, Instruction format		
	5.5	How to write & execute 8085 program		
	5.6	8085 instruction set & Instruction timing		
6	**8085 Programming**			
	6.1	Basic instruction of 8085	**10**	**12**
	6.2	All instructions of 8085 like Data transfer, Arithmetic Operations, Branch, Debugging Programs, etc.		
7	**Additional Instructions, Stack, Subroutines, Interrupt**			
	7.4	Looping, indexing, counting	**06**	**05**
	7.5	16-bit arithmetic logic operations, rotate, compare.		
	7.6	Stack, Subroutine & 8085 interrupts		
8	**8086/8088 Architecture**			
	8.5	Internal Architecture, Pins & Signals.	**06**	**08**
	8.6	Addressing Modes.		
	8.7	Instruction Formation		
		Total	**64**	**80**

List of Practicals Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	1. To study and verify the truth tables of basic logic gates 7400, 7404, 7408, 7486, 7432.	02
2	Interfacing CMOS to TTL & TTL to CMOS IC's	02
3	Study of Multiplexer & De-multiplexer	02
4	Study of Priority Encoder.	02

5	BCD to 7-segment decoder	02
6	Study of J-K flip-flop, D flip-flop & T flip-flop.	02
7	Write simple programs and execute it on 8085 kit.	02
8	Addition of 8 bit numbers with carry and without carry.	02
9	Subtraction of 8 bit number with carry and without carry	02
10	Multiplication of two numbers.	02
11	Transfer the block of data from one place to another	02
12	Find the smallest and greatest number of series	04
13	Arrange the given numbers in ascending and descending order	04
14	Transfer the block of data in reverse order from one place to another place	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Number System and Codes	Explanation of Introduction, Number System
2	Digital Logic Families	Explanation of Logic Gates
3	Combinational logic design using MSI circuit	ExplanationofMultiplexer/Demuliplexer, Encoder, Decoder
4	Standard representation for logic function & Sequential Logic Design	Explanation of karnaugh-map, different flip-flop
5	Microprocessor, Microprocessor Architecture & Microcomputer Systems	Explanation of Introduction ,Architecture, instruction format and execution of simple program
6	8085 Programming	Write 8085 based programs & execution of simple program.
7	Additional Instructions, Stack, Subroutines, Interrupt:	Exercising detail programming.
8	8086/8088 Architecture	Explanation of 8086/88 architecture

Text/Reference Books:

Sr. No	Author	Title	Publication
1	R. P. Jain	Modern Digital Electronics	McGraw Hill
2	Awate S.P.	8085 Microprocessor Assembly language Programming & Applications	McGraw Hill
3	Ramesh Gaonkar	Microprocessor Architecture, Programming & Applications with the 8085	Penram International Publishing (India) (Third Edition)
4	B.Ram	Microprocessor programming (8085)	
5	Liu –Gibson	Microprocessor systems 8086/88 family	Prentice Hall of India
6	Douglous Hall	Microprocessor & Interfacing	Tata -McGraw Hill

Learning Resources: , LCD, Projector, and Transparence, White board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Number System and Codes	03	02	--	05
2	Digital Logic Families	04	02	04	10
3	Combinational logic design using MSI circuit	04	03	05	12
4	Standard representation for logic function & Sequential Logic Design	07	04	04	15
5	Microprocessor, Microprocessor Architecture & Microcomputer Systems	07	06	--	13

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
6	8085 Programming	04	04	04	12
7	Additional Instructions, Stack, Subroutines, Interrupt:	02	01	02	05
8	8086/8088 Architecture	04	04	--	08
	Total	**35**	**26**	**19**	**80**

(Prof. T.A.Kumbhare & Prof. H.S.Chaudhari)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme : Diploma in Information Technology
Programme Code : 07
Name of Course : Programming in .Net Technologies
Course Code : IT464

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	2Hrs.	--	--	--
Marks	**10**	**40**	**50**	**--**	**50**

Course Rationale:

Study of .net technologies is becoming a need of today's world. Knowledge of Web Page design is essential for studying this subject. Advanced Web Technologies is based on dot net technology, which is a frame work, which supports many languages so that application designed in one language(like C++, COBOL, JAVA, etc) can be connected/interfaced with this frame work hence it is more flexible and advanced.

Course Objectives:

After studying this course, the student will be able to

- Use GUI tools of. net framework
- Use basic and advance. net controls.
- Interface back-end and front-end.
- Build applications integrated with .net Framework.
- Build net based applications.
- Transfer code form VB to VB.Net.
- Perform ASP Transaction.

Course Contents:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Introduction**			
	1.4	**Why dot Net:** Introduction to Microsoft .Net Framework, Building blocks in .Net**,** Drawback of previous languages, Understand what is .Net	**05**	**06**
	1.5	**VB.Net:** VB.Net overview, Difference between VB and VB.Net		
	1.6	**Introduction to .Net:** Types of application Architecture, .Net initiative, .Net framework: components of .Net framework, Advantages, Requirement of .Net		
2	**Introduction and implementation to VB.Net**			
	2.1	**Introduction to VB.Net:** Features, VB.Net IDE, Data Types, Loops, Control structures, Cases, Operators, Creating forms, Procedures and functions, Form controls.	**05**	**07**
	2.2	**Implementation of OOP**: Creation of class and objects, Inheritance, Constructors, Exception handling.		
	2.3	**Component based programming:** Working with Private assembly, shared assembly, Using COM components developed in VB or other language.		
3	**Introduction to ADO.Net and data manipulation**			
	3.1	**Introduction to ADO.Net:** What is database? Writing XML file, ADO.Net architecture, Creating connection, Dataset and Data reader, Types of Data adapter and ADO controls, Reading data into dataset and data adapter, Binding data to controls, Data table and Data row.	**06**	**07**
	3.2	**Accessing and manipulating Data:** Selecting data, Insertion, deletion, updating, Sorting, How to fill dataset with Multiple tables.		
	3.3	**Multi-threading:** Working with multithreading, Synchronization of Threads.		

	3.4	**Migrating from VB 6.0 to VB.Net:** Updating the applications developed in VB to VB.net		
4	**Introduction to ASP.Net, objects and components**			
	4.1	**ASP.Net:** Difference between ASP and ASP.Net, Introduction to IIS, What is web application? Why it is used? ASP.Net IDE	**05**	**05**
	4.2	**Web forms Controls:** Creation of web forms controls, Using web form controls. Response, Server, Application, Session. ASP.Net scope, state, view state, post back and configuration		
	4.3	**Object creation:** Scripting, Drive, Folder, file, How to use objects? Server components: Ad rotator, Content linker, Browser Capabilities. Use and creation of global .asa file, How to use Application object, Events, Methods and collection, Example. How to use session object enabling and disabling of session, Event, properties, methods, collection. Example.		
5	**ADO.Net**			
	5.1	**ADO.Net in ASP.Net**, Connection, Dataset and data reader, Data table and Data row, Web.config introduction, Binding data with data grid, Accessing and manipulating data.	**06**	**08**
	5.2	**ADO.Net**: Server control templates and Data binding techniques, Understand data access in .Net using ADO.Net, Understand various Server Control Templates available for Data Binding like Repeater, Data List and Data Grid Controls.		
	5.3	**ASP transactions and e-mail:** Transactions, Transaction db design, CDONTS object, Email sending web page creation.		
6	**Client side programming**			
	6.1	**Java script & AJEX technique**, JavaScript essentials, basic JavaScript examples, script injection attacks, custom control with JavaScript, frames understanding ajex, using ajex with client callbacks.	**05**	**07**

	6.2	**ASP.NET AJEX:** - Introduction, server callbacks, server controls, Deeper into client libraries control extenders.		
		Total	**32**	**40**

List of Practicals / Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Introduction to .Net framework	10
2	Design Login form with validation.	2
3	Design Registration form with validation of email address, date of birth, blank field, telephones and mobile numbers etc.	2
4	Design student class, marks class, inherits it in result class and access it using form.	4
5	Create instance of class using new operator of above example	2
6	Design mark sheet of student using XML file and dataset.	2
7	Design employee details with help of database (back-end) using data adapter, data reader and datasets. Use data grid to display result.	4
8	Generation of database (data table) of employee or student with help of data tables of .Net.	2
9	To use multiple table design example of employee and department.	2
10	Design registration form of college using text box, text area, radio list, check list,Button etc. using Auto postback property.	2
11	Simple application for following function: (1) Login (2) Surfing (3) Logout taking into considerations (Application, Session, Server object, global .asa file and their events, methods and collection) also demonstrates enabling and disabling of session.)	4
12	Creation of file, entry, reading data from a file.	2
13	Using components create: (1) Advertisement (using Ad rotator) (2) Book example (using Next function) (3) find capabilities of browser (Browser object capabilities)	4
14	Online application (student, employee, product, shopping mall) (a) Using dataset, data reader. (b) Same application using data table and data row. (use data grid to display data) (c) Bind the data to data grid using properties / templates. (d) Display details (student, employee, product, etc.) using	6

	data list. (4 cols per line)	
15	Application which sends email.	6
16	Programs based on Client side programming, JavaScript, AJEX , ASP.NET AJEX **(Minimum 5)** **Mini Project** :Design the mini project by integrating all the experiment performed as mentioned in the curriculum	10
	Total	**64**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction	Explanation & Introduction to .Net framework
2	Introduction and implementation	Explanation of designing of forms & required classes.
3	Introduction to ADO.Net and data manipulation	Explanation of ADO.Net and data manipulation
4	Introduction to ASP.Net, objects and components	Explanation & Introduction to ASP.Net
5	ADO.Net	Explanation of ASP.Net objects and components
6	Client Side Programming	Explanation of Client Side Programming

Text Books:

Sr. No	Author	Title	Publication
1	Anita & Bradely	Prog. In VB.Net	TATA Mc Grow Hill
2	Dave Mercer	ASP.net	TATA Mc Grow Hill

Reference Books:

Sr. No	Author	Title	Publication
1	Anthony Jones	.net Framework	TATA Mc Grow Hill
2	Robert LandLizer	Designing Application with Microsoft VB.net	TATA Mc Grow Hill
3	--	Operating .net Framework	TATA Mc Grow Hill
4	Grun grundgier	Prog. In VB.net	Oerilly
5	Thwan ThAI , Hoang Lan	.Net Frame Work Essential	Oerilly

Learning Resources: LCD, White board

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction	02	--	--	02
2	Resolution and composition of Forces	02	04	06	12
3	Equilibrium	02	02	08	12
4	Graphic Statics	04	04	--	08
5	Centroid & Center of Gravity	02	02	04	08
6	Friction	02	02	06	10
7	Kinetics	02	02	06	10
8	Work, power, Energy	02	02	04	08
9	Simple lifting machines	02	04	04	10
	Total	**20**	**22**	**38**	**80**

(Prof. J.R.Hange & Prof.A.S.Paike)
Prepared By

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Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme	**:**	Diploma in Information Technology
Programme Code	**:**	07
Name of Course	**:**	Multimedia Techniques
Course Code	**:**	It465

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**10**	**40**	**50**	--	**50**

Course Rationale:

Multimedia techniques is application development technique and used for developing variety of projects related to interfacing of audio, videotext used in real life.

Course Objectives:

After studying this course, the student will be able to

- Handle I/P device like Joy Stick, Mice O/P Device Speakers. Light pen, Accessories Digital Camera,Mp3 Player
- Knowledge of different software like Photoshop For Image Editing
- Coral Draw for Text Editing
- Flash, 3dsMax for animation

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
	SECTION-1			
1	**Introduction To Multimedia**			
	1.1	Definitions -Where to use Multimedia,	**02**	**02**
	1.2	Multimedia in Business, Multimedia in Schools, Multimedia in Home, Multimedia in Public Places		
	1.3	Virtual Reality.		
2	**Multimedia Building Blocks**			
	2.1	**Text.** Using text in multimedia, Computers and Text, Font editing design tools.	**08**	**08**
	2.2	**Sound** The Power of Sound, Multimedia System Sounds, Digital audio, Making audio video, Audio file format, MIDI Versus Digital Audio, Adding sound to Multimedia project, Production tips.		
	2.3	**Images** Organize your Tools, Making Still Images, Color, Image File Formats, Windows Formats		
3	**Animation & Video**			
	3.1	The Power of motion, Principles of Animation, Making Animation that Work, A Rolling Ball, A Bouncing Ball, Creating an Animated Scene.	**08**	**10**
	3.2	Using video, Obtaining Video Clips, How Video Works, and Broadcast Video Standards.		
	3.3	Digital video, Video Recording tape formats, Shooting and Editing Video. Study of story board.		
4	**Basic Software Tools**			
	4.1	Text Editing & Word Processing tools, OCR Software, Painting and Drawing Tools	**06**	**08**
	4.2	3-D Modeling and Animation Tools, Image-Editing Tools, Sound Editing Tools, Animation, Video, and Digital Movie Tools.		

5	**Multimedia Authoring Tools**			
	5.1	Types of Authoring Tools-Different features	**08**	**12**
	5.2	Card- and Page-Based Authoring tools		
	5.3	Icon-and Object Based Authoring tools,		
	5.4	Time-Based Authoring Tools- Director, Flash, Cross-platform Authoring Tools		
		Total	**32**	**40**

List of Practicals / Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Checking the existing setup available for Multimedia. Handling Joystick, Mice, speaker, light pen, Accessories DigitalCamera, Mp3Player.	08
2	-Implementing different fonts of text on the screen By using Corel draw, By using Sound Forge – -Interfacing of sound, editing, mixing sound, cropping, cross fading & effect.	08
3	By using Photoshop -Interfacing of images, Resolution, Editing, color modes. Setting current & background colors. -image formats, movies and Digitized sounds	08
4	Using Adobe Flash. or 3ds Max- Create simple animation of man bowling, Bouncing and Rolling ball down etc,	08
5	Creating Video clips by using adobe flash or 3ds max.	08
6	**Mini project** -Create a movie of minimum 2 minutes.	08
7	Study of advanced Multimedia devices & their Interfacing Using adobe Photoshop,image reader and adobe flash.	08
8	Use of Director and Flash-Sound , animation and video played in card and page based system.	04
9	Director cast futures	04
	Total	**64**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	What is Multimedia	Lecture method, Demonstration
2	Multimedia Building Blocks	Lecture method, Demonstration
3	Animation and Video	Lecture method, Transparencies
4	Basic Software Tools	Lecture method, Transparencies
5	Multimedia Authoring Tools	Lecture, Demonstration & Discussion

Text Books:

Sr. No	Author	Title	Publication
1	Tay Vaughan	Multimedia Making it Work 5th edition	TMH
2	Vikas Gupta	Multimedia and Web Design	Dream tech

Learning Resources: Books, Models, OPH, LCD Projector and Transparency

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	What is Multimedia	01	01	00	02
2	Multimedia Building Blocks	03	02	03	08
3	Animation and Video	03	02	05	10
4	Basic Software Tools	02	02	04	08
5	Multimedia Authoring Tools	03	04	05	12
	Total	**12**	**11**	**17**	**40**

(Prof. S.V.Chavan) Prepared By

(Prof. S. B. Kulkarni) Secretary, PBOS

(Prof. S.B.Nikam) Chairman, PBOS

Programme : Diploma in Computer Engineering/Information Technology
Programme Code : 06/07
Name of Course : LINUX: Operating System
Course Code : CM562

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	**50**	--	**25**

Course Rational:

Linux Operating System is Open source and freely distributed O.S. Apart from the fact that it's freely distributed, Linux's functionality, adaptability and robustness makes it highly suitable for server platform. The course aims at providing in depth knowledge of shell and command line essentials.

Course Objectives:

After studying this course, the student will be able to

- Install and Configure Linux O.S.
- Operate Linux Operating System efficiently.
- Develop programs using shell programming.
- Use and implement various commands of Linux: Operating System
- Configure Users and Groups on Linux Operating System.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
	SECTION – I			
1	**Introduction to Linux Operating system:**			
	1.1	Operating system and Linux	**04**	**06**
	1.2	History, Overview of Linux		
	1.3	Shell: Bourne, Korn, Cshell		
	1.4	File structure : Directories and files		
	1.5	Utilities: Editors. Filters and Communications, Linux software and information sources on the internet		
	1.6	Linux releases, OpenLinux, Linux File Systems(ext) and versions.		
2	**Linux startup and setup:**			
	2.1	Accessing your Linux system	**04**	**04**
	2.2	Linux commands and command line editing		
	2.3	Online manual, Online Documentation		
	2.4	Installing software packages		
	2.5	Command Line Installation: Red Hat Package Manager		
3	**The Linux File Structure**:			
	3.1	Linux Files, The File Structure	**08**	**10**
	3.2	Listing, Displaying and Printing Files: ls, cat, more and lpr, Managing Directories: mkdir, rmdir, ls, cd and pwd, File and Directory Operations: find, cp, mv, rm and ln		
	3.3	Shell Operations: The Command Line, Special Characters		
	3.4	File Name Arguments: *, ?, [ ], Standard Input/ Output and Redirection		
	3.5	Pipes:| Redirecting and Piping the Standard Error: > and 2> , shell Variables		
	3.6	Shell Scripts: User-Defined Commands, invoking command history.		
4	**File Management Operations:**			
	4.1	Displaying File Information : inodes, inodes and directories, cp and inodes, mv and inodes, rm and inodes, ls –l	**08**	**10**
	4.2	File and Directory Permissions: chmod		

	4.3	File Systems: mount and umount		
	4.4	File and Devices: tar		
	4.5	Network File Systems: NFS and etc/exports, Archive		
	4.6	File Compression: gzip, Installing Software from Compressed Archives: .tar.gz, Compiling Software, The mtools Utilities : msdos		
5	**Networking**			
	5.1	Electronic Mail: Local and Internet addresses.	**08**	**10**
	5.2	The Mail Utility, Communications with Other Logged-in Users: Write and Talk, Internet		
	5.3	Tools: Internet Addresses, Remote Login: telnet		
Section II				
6	**Editors and Utilities**:			
	6.1	The vi Editor: vi Command, Input, and Line Editing Modes	**08**	**08**
	6.2	Creating, Saving and Quitting a File in vi, Managing Editing Modes in vi		
	6.3	A. Editing Commands: Common Operations, Advanced B. Editing Commands		
	6.4	Line Editing Commands, Options in vi: set and .exrc		
7	**Shells**:			
	7.1	Filters and Regular Expressions: Using Redirection and Pipes with Filters: cat, tee, head and tail	**12**	**16**
	7.2	Types of Filter Output : wc, spell and sort, Searching Files: grep and fgrep, Editing Filters, Regular Expressions		
	7.3	The Bourne Again Shell(BASH): Command and File Name Completion, Command Line Editing, History, Aliases, Controlling Shell Operations		
	7.4	Configuring Your Login Shell with Special Shell Variables, BASH Shell Programming, Variables and Scripts		
	7.5	Arithmetic Shell Operations: let, Control Structures		

8	**System Administration (Managing Users and Groups)**			
	8.1	System Management : Superuser-The root User Desktop,System Time and Date	**12**	**16**
	8.2	Scheduling jobs with crontab : cron daemon, crontab options, The format of crontab file, Environment variable settings, crontab command lines		
	8.3	System states :init Shutting down and changing Runlevels, Managing Users and Groups: Adding and Removing users with adduser,usermod and userdel commands		
	8.4	Adding and Removing groups with groupadd,groupmod and groupdel commands		
	8.5	Installing and Managing Devices: Creating device files mknod, Installing and managing printers.		
	8.6	Jobs: Background, Kills and Interruptions and setting process priority Get Process status, Find Processes by Pattern or User, Display the Most Active Processes,Kill processes		
		Total	**64**	**80**

List of Practicals / Experiments/Assignments:

Sr. No.	Name of Practicals / Experiment/Assignment	Hrs
1	• Installing Linux: - Hardware, Software , Requirements, Opening Disk space for Linux partitions • Virtual Consoles • Configuring GRUB / LILO Boot Loader.	04
2	• Executing commands related to Login into user accounts, start up and shutdown commands, command line editing commands, man, who, who am i ,info , pwd. • Practising Absolute and Relative Pathnames	02
3	• Executing various file Related commands – cd ,ls ,cp, mv , rm, touch, mkdir,rmdir,ln • Executing Commands I/O redirection and pipes. • Performing various file management operations through following commands- file , cat, less, find,slocate	04

4	• Using pattern matching commands grep and egrep, sed and awk. • Using wild card characters • Practising mounting unmounting external devices. • Setting/Changing file and directory related permissions chmod and umask command.	04
5	• Executing commands like mail, smail, write, talk for sending electronic mails • Configuring telnet	02
6	• Executing various commands related to vi Editor. • Practising editing with vi editor • Practising opening and copying from /to multiple files at a time. • Attaching with mail.	04
7	• Executing various Shell commands • Creating shell variables • Writing shell scripts using decision making and various control structures. • Executing various shell utilities • Using file test and string test conditions in scripts. • Making use of Positional Parameters. • Configuring your own login shell. • Using Functions in Shell scripts.	06
8	• Adding and Removing users through commands. • Installing and managing devices. • Adding and removing groups. • Adding and removing users to and from the group. • Scheduling periodic processes cron utility. • Using fdisk utility. • Changing Runlevels. • Executing commands for process management –ps, fg, bg, kill ,killall, nice, at ,jobs	06
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Linux startup and setup:	Lecture method and Demonstration
2	The Linux File Structure:	Lecture method and Demonstration
3	File Management Operations:	Lecture method and Demonstration
4	Networking	Lecture method and Demonstration
5	Editors and Utilities:	Lecture method and Demonstration
6	Shells:	Lecture method and Demonstration
7	System Administration (Managing Users and Groups)	Lecture method and Demonstration
8	Linux startup and setup	Lecture method and Demonstration

Text Books:

Sr. No	Author	Title	Publication
1	Peterson	The Complete Reference Linux (Second Edition)	Tata McGraw Hill
2	Jon Emmons, Terry Clark	Easy Linux Commands	SPD

Reference Books:

Sr. No	Author	Title	Publication
1	Kerry Cox	Red Hat Linux	PHI

Guideline for conducting practical examination : Practical may include assignments for writing various shell scripts, set of commands, shell configuration and assignments using pattern matching languages like awk and other based on above contents.

Learning Resources: Books, LCD, White board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Linux Operating system	04	02	00	06
2.	Linux startup and setup	02	--	02	04
3.	The Linux File Structure	04	02	04	10
4.	File Management Operations	02	04	04	10
5.	Networking	02	04	04	10
6.	Editors and Utilities	04	02	02	08
7.	Shells	04	06	06	16
8.	System Administration	02	06	08	16
Total		**24**	**26**	**30**	**80**

(Prof. Smt. M.H.Thakare)
Prepared by

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme : Diploma in Computer Engineering/Information Technology
Programme Code : 06 / 07
Name of Course : JAVA Programming
Course Code : CM563

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	**50**	**--**	**25**

Course Rationale:

In the Era of Web technology it is essential for every Diploma Engg To have knowledge of Internet programming. This course covers JAVA as a programming language.

Course Objectives:

After studying this course, the student will be able to

- Design and implement classes and methods
- Understand and implement basic programming constructs
- Apply object oriented features to real time entities
- Differentiate between primitive data types and class data types and implement conversion between them.
- Understand and implement the concept of reusability and extensibility
- Create packages and interfaces and used it in programs
- Design and implement multithreaded programs
- Manage errors and exceptions
- Design and implement applet and graphics programming
- Make use of Data streams in programs

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION - I				
1	**Java Evolution and Overview of Java Language**			
	1.1	Java Features, Java Environment, Simple Java Program	**10**	**10**
	1.2	Java Virtual Machine, Constant, Variables, Data Types, Operators and Expressions		
	1.3	Decision making and Branching, Decision making and Looping		
2	**Classes, Object and Methods**			
	2.1	Defining a class, Fields declaration, Methods declaration, Creating object, Accessing class members	**12**	**15**
	2.2	Constructors, Methods Overloading, Static Members, Nesting of methods		
	2.3	Inheritance: Extending a Class (Defining a subclass Constructor, Multilevel inheritance Hierarchical inheritance)		
	2.4	Overriding Methods, Final variable and Methods, Final variables and methods, Final classes, Finalizer Methods		
	2.5	Abstract methods and Classes, Methods with Var args, Visibility Control (Public access, friend access, Protected access, Private access, Private Protected access)		
3	**Array, Strings ,Vectors, Interfaces and Packages**			
	3.1	Arrays, One Dimensional arrays, Creating an array, Two Dimensional arrays	**10**	**15**
	3.2	Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data conversion using ValueOf(), StingBuffer		
	3.3	Vectors, Wrapper Classes, Enumerated Types, Annotations		

	3.4	Interfaces : Defining interfaces, Extending interfaces, Implementing interfaces, Accessing Interface variables.		
	3.5	Packages: Java API Packages, Using System Packages, Using system Package, Naming Conventions, Creating Packages, Accessing a package, Using a package, Adding a class to a package, Hiding Classes, Static Import		
SECTION - II				
4	**Multithreaded Programming , Managing Errors and Exceptions**			
	4.1	Creating Thread, Extending a thread class, Stopping and Blocking a thread, Life cycle of thread	**10**	**13**
	4.2	Using thread methods, Thread exceptions, Thread priority, Synchronization, Implementing the 'Runnable'' Interface, Inter-thread communication		
	4.3	Exception : Types of errors, Exceptions, Syntax of Exception Handling code		
	4.4	Multiple catch statements, Using finally statement, Throwing our own Exceptions, Using Exception for Debugging		
5	**Applet and Graphics Programming**			
	5.1	Local and remote applets, How applets differ from applications, Preparing to write applets, Building applet code, Applet life cycle	**12**	**15**
	5.2	Creating an Executable Applet, Designing a Web page, Applet tag, Adding Applet to HTML file, Running the Applet		
	5.3	More about Applet Tag, Passing parameters to applets, Aligning the Display, More about HTML Tags, Displaying Numerical values, Getting input from the User, Event Handling		
	5.4	Graphics Programming : The Graphics Class, Lines and rectangle, Circle and Ellipse, Drawing Arcs, Drawing Polygons, Line Graphs, Using control loops in Applets, Drawing Bar charts		
	5.5	Introduction to AWT Package, Introduction to Swings		

6	**Managing Input/Output Files in Java**			
	6.1	Concept of Streams, Stream classes, Byte stream classes, character stream classes, using streams, Other useful I/O classes	**10**	**12**
	6.2	Using the file class, Input/Output Exceptions, Creation of files, Reading/writing characters, Reading/writing bytes		
	6.3	Handling primitive data types, Concatenating and Buffering files, Random Access Files, Interactive Input and Output, Other Stream classes		
		Total	**64**	**80**

Note for Practicals : Practicals should be performed using IDE like ECLIPSE

List of Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Programs based on basic syntactical constructs of Java like: a) Operators and expressions. b) Looping statements. c) Decision making statements. d) Type casting.	02
2	A simple Java program to demonstrate use of command line arguments in Java	02
3	Programs on Constructor, Methods overloading, Nesting of methods	02
4	Programs to implement single inheritance by applying various access controls to its data members and methods	01
5	Programs to implement multilevel inheritance by applying various access controls to its data members and methods	02
6	Programs to implement inheritance and demonstrate use of method overriding.	01
7	Programs on Abstract method and class	02
8	Programs to practice - use of single Dimensional array. - use of multidimensional array.	01

9	Programs to implement array of objects	01
10	Programs to practice - using String class and its methods. - using String Buffer class and its methods.	02
11	Programs to implement Vector class and its methods.	02
12	Programs to implement Wrapper classes and their methods.	02
13	Programs to demonstrate - use of implementing interfaces. - use of extending interfaces.	02
14	Programs on creating package, Accessing a package, Importing class from other package, Adding a class to a package	02
15	Programs Creating thread, Extending thread class, Stopping and blocking thread, Using thread Method, Thread priority	01
16	Programs showing try and catch for exception handling, Catching invalid command line argument, Multiple catch statement	01
17	Creating executable Applet, Designing a Web page, Adding Applet to HTML file, Passing parameter to Applets	02
18	Programs on drawing lines, rectangle, circle and Ellipse, arcs, Polygons, Applet to draw line graph, Applet for drawing Bar charts	02
19	Programs to demonstrate use of I/O streams	01
20	Programs to demonstrate use of File streams.	01
	Total	32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Java Evolution and Overview of Java Language	Explanation of basic concepts
2	Classes, Object and Methods	Explanation & Practical implementation
3	Array, Strings ,Vectors, Interfaces and Packages	Explanation & Practical implementation
4	Multithreaded Programming, Managing Errors and Exceptions	Explanation & Practical implementation
5	Applet and Graphics Programming	Explanation & Practical implementation
6	Managing Input/Output Files in Java	Explanation & Practical implementation

Text Books:

Sr. No	Author	Title	Publication
1	E. Balagurusamy	Programming with Java	TMH
2	Herbert Schildt	The Complete Reference Java2	TMH

Reference Books:

Sr. No	Author	Title	Publication
1	Michael Morrison	The Complete IDIOT's Guide To JAVA 2	PHI
2	Joseph L. Weber	Special Edition Using Java 1.2	PHI
3	Cay S. Horstmann	Core Java Volume I	Pearson

Learning Resources: Books, Models

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Java Evolution and Overview of Java Language	4	0	5	9
2	Classes, Object and Methods	4	0	9	13
3	Array, Strings ,Vectors, Interfaces and Packages	9	0	10	19
4	Multithreaded Programming, Managing Errors and Exceptions	4	3	6	13
5	Applet and Graphics Programming	5	4	9	18
6	Managing Input/Output Files in Java	3	1	4	8
	Total	**29**	**08**	**43**	**80**

(Prof. R.T.Nemade) Prepared By

(Prof. S. B. Kulkarni) Secretary, PBOS

(Prof. S.B.Nikam) Chairman, PBOS

Programme : Diploma in Computer Engineering/Information Technology
Programme Code : 06/07
Name of Course : Object Oriented Programming: C++
Course Code : CM 565

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	20	80	50	**--**	25

Course Rationale:

To study object oriented concepts using C++ language.

Course Objectives:

After studying this course, the student will be able to

- Know Object Oriented concepts.
- Develop object-oriented software using C++ language.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION - I				
1	**Principles of Object-Oriented Programming**			
	1.1	What is Object Oriented Programming?,Programming Paradigm, Benefits of OOP& Applications, Structure of C++ program, A simple C++ program, Creating source file, Compiling & Linking,	**10**	**13**
	1.2	Tokens, Keywords, Identifiers, Basic Data Types, User Defined data types, Derived Data Types, Symbolic Constants, type Compatibility, Declaration Of Variables, Reference Variables		
	1.3	Operators In C++, Scope Resolution Operators, Member Dereferencing Operators, Manipulators, Type Cast Operator, Expressions &their types, Implicit Conversions, Operator Precedence, Control Structure.		
2	**Function in C++**			
	2.1	Introduction, The Main Function, Function Prototyping, Call By Reference, Return By, Reference, Inline Function	**10**	**15**
	2.2	Default Arguments, Const Arguments, Function Overloading, Friend & Virtual Functions		
	2.3	**Classes &** Objects**:** Introduction, Specifying a Class, Defining Member functions, A C++ Program With a Class.		
	2.4	Making An Outside Function Inline, Nesting Of Member Function, Private Member Functions		
	2.5	Arrays Within Class, Memory Allocation For objects Static Data Member, Static Member Functions		
	2.6	Arrays of Objects, Object As a Function Arguments Friendly Functions, Returning Objects, Const Member Function, Pointers To Members.		

3	**Constructors & Destructors**			
	3.1	Introduction, Constructors, Parameterized Constructors Multiple Constructors in a Class	**10**	**12**
	3.2	Constructors With Default Arguments, Dynamic initialization Of Objects, Object Pointers.		
	3.3	Constructing Two Dimensional Arrays, Destructors.		
SECTION – II				
4	**Operator overloading and type conversions**			
	4.1	Introductions Defining Operator Overloading, Overloading Unary Operator, Overloading Binary Operator, Overloading Binary Operators Using Friends	**10**	**10**
	4.2	Manipulation of Strings Using Operators, Rules For Overloading Operators		
	4.3	Type Conversions Overloading, The Subscript operator [ ].		
5	**Inheritance: Extending Classes**			
	5.1	Introduction Defining Derived Classes, Single Inheritance	**10**	**10**
	5.2	Making a Private Member Inheritable Multilevel Inheritance, Inheritance, Hierarchical Inheritance, Hybrid Inheritance		
	5.3	Virtual Base Classes, Abstract Classes, Constructors In Derived Classes, Member Classes: Nesting of classes.		
6	**Pointers, Virtual Function and Polymorphism**			
	6.1	Introduction, Pointers to Objects, this pointer, Pointer to Derived classes, Virtual functions, Pure virtual function	**10**	**12**
	6.2	Managing console I/O Operations, , C++ streams, C++ stream classes, Unformatted I/O operations, Formatted I/O operations managing output with manipulators.		
	6.3	Working with files , Introduction, Classes for file stream operations, Opening & closing a file, Detecting End-of-file, more about open ():		
	6.4	File modes, File pointers and their manipulations, Sequential Input and Output operations		
	6.5	Updating a file: Random access, Error handling during file operations, Command line arguments.		

7	**Templates & Exception Handling**			
	7.1	Class Templates, Class Templates with Multiple Parameters, Function Templates	**04**	**08**
	7.2	Function Templates with multiple parameters, Overloading of Templates function, Member function Templates.		
	7.3	Exception Handling: Introduction, Basics of Exception Handling,Exception handling mechanism		
	7.4	Throwing mechanism, catching mechanism, rethrowing an exception.		
Total			**64**	**80**

List of Experiments/Assignments:

Sr. No.	**Name of Experiment/Assignment**	**Hrs**
1	Programs on: 1) Cout and Cin statements. 2) Operators overloading. 3) One program on each control structure.	**04**
2	Programs on: 1) One and two dimensional array. 2) Function overloading. 3) Simple programs for defining classes and objects.	**06**
3	Programs on constructors and destructors.	**04**
4	Programs on: Manipulation of strings using operator.	**04**
5	Programs on: 1) Derived classes. 2) Constructors in derived classes. 3) Nesting of classes	**06**
6	Programs on: 1) pointers to objects, 2) Pointer to derived classes. 3) Opening and Closing file 4) file pointers and their manipulations.	**06**
7	Simple programs to handle Templates and exceptions.	**02**
	Total	**32**

Practical exam guidelines:

- New program statements may be given based on above concepts.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Principal of Object Oriented Programming	Explanation of basic concept and implementation
2	Function in C++	Explanation of function and implementation of function
3	Constructors & Destructors	Explanation of constructor & Destructors and implementation of constructor & Destructors
4	Operator Over Loading and Type Conversions	Explanation of operator overloading and implementation.
5	Inheritance: Extending Classes	Explanation of Inheritance & it's type and implementation.
6	Pointer, Virtual Function and Polymorphism	Explanation & Implementation of polymorphism, pointer
7	Templates and Exception handling	Explanation and implementation of templates and implementation using exception handling.

Text Books:

Sr. No	Author	Title	Publication
1	E Balagurusamy	Object Oriented Programming with C++	Tata McGRAW Hill

Reference Books:

Sr. No	Author	Title	Publication
1	Ivor Horton	Beginning C++ - The complete Language	Shroff Publishers
2	Robert Lafore	Object Oriented Programming in C++	BPB
3	Herbert Schildt	Teach Yourself C++	Tata McGRAW Hill
4	Bjarne Stoustrup	The C++ Programming Language	Addison-Wesley 2000

Learning Resources: OHP, LCD, Projector, and Transference, White board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Principal of Object Oriented Programming	06	03	04	13
2	Function in C++	04	03	08	15
3	Constructors &Destructors	04	03	05	12
4	Operator Over Loading and Type Conversions	02	02	06	10
5	In heritance: Extending Classes	02	02	06	10
6	Pointer, Virtual Function and Polymorphism	02	02	08	12
7	Templates and Exception handling	03	02	03	08
	Total	**23**	**17**	**40**	**80**

(Prof. Smt. H.S.Chaudhari) Prepared By

(Prof. S. B. Kulkarni) Secretary, PBOS

(Prof. S.B.Nikam) Chairman, PBOS

Programme : Diploma in Computer Engineering/Information Technology
Programme Code : 06 / 07
Name of Course : Data Structures
Course Code : CM566

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	**50**	--	**25**

Course Rationale:

In the present era it is very essential to develop programs and organize data in such a way that it solves a complex problem efficiently. Data structure is such a tool, which aims in developing data organizing and programming skills.

Course Objectives:

After studying this course, the student will be able to

- Write programs in 'C ' using different types of data structures.
- Understand concepts of arrays, pointers, link list, stacks, queues, trees, and graphs.
- Use proper data structures for particular problem.
- Develop efficient software using various data structures.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Introduction to data structures**			
	1.1	Basic terminology, data structure operations, complexity, and time space tradeoff.	**12**	**10**
	1.2	Arrays in C : Single dimensional , Multi dimensional ,strings , Array operations : Insertion, deletion, traversing, searching: linear, binarysearch, sorting:Bubble sort, Sparse Matrices.		
	1.3	Pointers in 'C': Pointers and Arrays, Pointers and Functions		
2	**Link Lists**			
	2.1	Structures in 'C', Dynamic memory Allocation	**14**	**15**
	2.2	Singly link list, Representation of link list.		
	2.3	Link list operations: creating, traversing, inserting, deleting in sorted as well as unsorted link list.		
	2.4	Header links list, Two-way list, Implementation of link list		
3	**Stacks, Queues & Recursion**			
	3.1	Stacks: Concept, representing stacks in 'C', Applications of stacks	**12**	**15**
	3.2	Polish Notations (Prefix, postfix), Infix, Quick sort.		
	3.3	Recursion: Recursive definitions and processes, Recursion in 'C', writing recursive programs factorial, Fibonacci, Ackermann function.		
	3.4	Tower of Hanoi, Implementation of recursive, procedures by means of stack.		
	3.5	Queues: The queue and its sequential representation, concept of queues, priority queues		

SECTION-II				
4	**Trees**			
	4.1	Introduction, Binary trees, Binary tree representation, Traversing binary tree,	**10**	**14**
	4.2	Traversal algorithms using stacks		
	4.3	Header nodes, Threading concept.		
	4.4	Binary search tree (BST), searching and inserting in BST, deleting from BST		
	4.5	Heap, Heap sort, path lengths: Huffmann algorithm, General trees		
5	**Graphs and their applications**			
	5.1	Introduction, Graph theory terminology	**10**	**14**
	5.2	Sequential representation of graphs, Adjacency matrix, Path matrix		
	5.3	Warshalls algorithm, shortest path		
	5.4	Linked representation of graph, Operations on graphs, traversing a graph		
	5.5	Spanning forest, posets typological sorting.		
6	**Sorting and searching**			
	6.1	General background, Exchange sort, Selection sort and tree sorting, insertion sort, merge sort and radix sort.	**06**	**12**
	6.2	Searching: Basic search techniques, tree searching, hashing, general search trees		
	6.3	Storage management:General trees, automatic lists management, dynamic memory management		
		Total	**32**	**80**

List of Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Write Programs based on:Array operations; insertion, deletion.	01
2	Write Programs based on linear search, binary search.	01
3	Write Programs based on bubble sort	01
4	Write Programs based on multidimensional arrays	01
5	Write Programs based on Pointers and arrays, Pointer & Function	02
6	Write Programs based on Creating a link list	01
7	Write Programs based on ins deleting of the node, counting number of nodes, erting at first node, inserting after given position	02
8	Write Programs based on creating a sorted link list, searching, and reverting	02
9	Write Programs based on two way (doubly) link list.	02
10	Write Programs based on Stack implementation using PUSH & POP operations	01
11	Write Programs based on Queue implementation using PUSH & POP operations	01
12	Write Programs based on Tower of Hanoi	02
13	Write Programs based on Infix to postfix operation	02
14	Write Programs based on Creating a binary tree, in order, preorder and post order traversal	03
15	Write Programs based on Inserting, deleting searching BST	02
16	Write Programs based on Shortest path	01
17	Write Programs based on BFS & DFS using Graph	02
18	Write Programs based on operation of graph	02
19	Write Programs based on Various searching operation	01
20	Write Programs based on Various sorting Method	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction to Data Structures	Demonstration of 'C' Compiler, Create simple program array, pointer, string, function.
2	Link Lists	Write 'C' programs based on linked list
3	Stacks, Queues & Recursion	Demonstration of 'C' Compiler, Create simple program Stack,Queue & Recursion.
4	Trees	Write 'C' programs based on Tree
5	Graphs and their applications	Demonstration of 'C' Compiler, Create simple program graphs.
6	Sorting and Searching	Write 'C' programs based on Sorting & searching.

Text Books:

Sr. No	Author	Title	Publication
1	Tanenbaum, Langsman, Augenstein	Data Structures in 'C'	PHI Publications
2	Lipschultz	Data Structures	Schaum Outline Series

Reference Books:

Sr. No	Author	Title	Publication
1	Yashwant Kanetkar	Pointers in 'C'	BPB Publications
2	Tremblie and Sorrenson	Data Structures	TMH Publications

Learning Resources: OHP, LCD, Projector, and Transference, White board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction to Data Structures	07	03	05	15
2	Link Lists	04	04	07	15
3	Stacks, Queues & Recursion	03	02	05	10
4	Trees	04	03	07	14
5	Graphs and their applications	04	03	07	14
6	Sorting and Searching	03	03	06	12
Total		**25**	**18**	**37**	**80**

(Prof. S.V Chavan & Prof. A.S.Paike)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme : Diploma in Computer Engineering /Information Technology
Programme Code : 06 / 07
Name of Course : Software Engineering
Course Code : CM567

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	--	**25**	**25**

Course Rationale:

Software has become the key element in the evolution of Computer-based systems and products. Over the past 50 years, software has evolved from a specialized problem solving and information analysis tool to an industry in itself. Software is composed of programs, data and documents. Each of these items comprises a configuration that is created as part of the software engineering process. The intent of software engineering is to provide a framework for building software with higher quality.

Course Objectives:

After studying this course, the student will be able to

- Software and Software Engineering
- Project management concepts
- Project Management estimation and planning
- Project Scheduling and tracking
- Software Quality assurance
- Software Testing Techniques and Maintenance

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION- I				
1	**Software Engineering Concepts**			
	1.1	The Evolving Role of Software	**10**	**12**
	1.2	Software Characteristics and Application		
	1.3	Software Myths		
	1.4	The Process**:** Software Engineering: A Layered Technology -Process, Methods, and Tools		
	1.5	A Generic View of Software Engineering, The Software Process		
	1.6	Software process models -The Linear Sequential model , Prototyping model , RAD Model Evolutionary Software Process Models, Incremental model , Spiral model, WINWIN spiral model, Concurrent development model ,Component-based development model, Formal methods model, Fourth generation techniques .		
2	**Project** Management **Concepts**			
	2.1	The management spectrum :The people,The product, The process, The project, The W5HH principle	**10**	**12**
	2.2	**Software** Process **and Project Metrics :** Measures, metrics, and indicators ,Software measurement :Size-oriented metrics ,Function-oriented metrics, Metrics for software quality affect quality		
	2.3	Establishing a baseline : Metrics collection, computation, and evaluation		
	2.4	Managing variation: statistical quality control ,Metrics for small organizations, Establishing a software metrics program		
3	**Software Project Planning**			
	3.1	Observations on estimating, Project Planning Objectives, Software Scope	**12**	**16**
	3.2	Resources: Human resources, Hardware resources, Software resources, Reusability		

	3.3	Decomposition Techniques: LOC and FP estimation, Effort estimation		
	3.4	Empirical Estimation Models: COCOMO, Putnam estimation model, Function-point models, Automated Estimation Tools.		
	3.5	Risk Analysis and Management**:** Risk identification, Risk projection, Risk assessment, Risk management and monitoring, Risk Refinement and Mitigation, RMMM Plan		
SECTION- II				
4	**Project Scheduling and Tracking**			
	4.1	Basic concepts,-Basic principles :The relationship between people and effort ,An example	**06**	**08**
	4.2	An empirical relationship:-Effort distribution ,Defining a task set for the software project ,Degree of rigor		
	4.3	Selecting the task set :Selecting software engineering tasks		
	4.4	Defining a task network ,Tracking the schedule -Earned value analysis-Error tracking		
5	**Software Quality Assurance**			
	5.1	Quality concepts ,The quality movement, Software quality assurance ,SQA activities, Software reviews	**12**	**16**
	5.2	Defect amplification and removal -Formal technical reviews ,The review meeting ,Review reporting and record keeping		
	5.3	Software reliability -Measures of reliability and availability		
	5.4	The ISO approach to quality assurance system -The ISO 9001 standard ,The SQA plan		
	5.5	Functional modeling and information flow: Data Flow diagrams, extensions for real time systems, Ward and Mellor extensions, Hartley and Pirbhai extensions		
6	**Software Testing Techniques and Maintenance**			
	6.1	Software testing Fundamentals ,Testing objectives ,Testing principles ,Testability	**14**	**16**

	6.2	White box testing :Basis path testing , Flow graph notation, Cyclomatic complexity , Graph matrices , Control structure testing, Condition testing , Data flow testing, Loop testing		
	6.3	Black box testing: Graph based testing methods .		
	6.4	Testing documentation, Testing for real time systems.		
	6.5	Software Maintenance: A definition of software maintenance, Maintenance Characteristics, Maintainability, Maintenance tasks, Maintenance side effects		
		Reverse engineering and Re-engineering.		
		Total	**64**	**80**

List of Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Study of different models.	2
2	Implementation of planning techniques.	6
3	Perform risk analysis and management of above project.	6
4	Execute the project plan.	6
5	Case study on Software Quality	4
6	Test the project by various testing techniques. Case study on Software Maintenance. Study of Software Engineering Standards	8
Total		**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Software and Software Engineering	Explanation & case study
2	Project management concepts	Explanation & case study
3	Project Management estimation and planning	Explanation & case study
4	Project Scheduling and tracking	Explanation & case study
5	Software Quality assurance	Explanation & case study
6	Software Testing Techniques and Maintenance	Explanation & case study

Text Books:

Sr. No	Author	Title	Publication
1	Roger S. Pressman	Software Engineering	Mc. Graw Hill

Reference Books:

Sr. No	Author	Title	Publication
1	Jawadekar	Software Engineering	

Learning Resources: Black Board, LCD Projector, Transparencies

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Software Engineering Concepts	03	03	04	**10**
2	Project management concepts	05	05	00	10
3	Software Project Planning	05	06	00	11
4	Project Scheduling and tracking	04	04	05	13
5	Software Quality assurance	11	06	06	23
6	Software Testing Techniques and Maintenance	06	03	04	13
Total		**34**	**27**	**19**	**80**

(Prof. S.V.Chavan,T.A.Kumbhare, N.A.Inamdar) Prepared By

(Prof. S. B. Kulkarni) Secretary, PBOS

(Prof. S.B.Nikam) Chairman, PBOS

Programme : Diploma in Information Technology.
Programme Code : 07
Name of Course : Network Management
Course Code : IT561

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests of 60Min. duration	2 hrs.	---.	---	---
Marks	**10**	**40**	**--**	**50**	**50**

Course Rational:

This course is aimed at providing the students with hands on Experience over Network Operating System: Windows 2003 Server, Configuring Server for Network Environment. It would expose students to administration and security issues in Network Environment. This course aims at implementation of Network Fundamentals covered in Computer Network I and II.

Course Objectives:

After studying this course, the student will be able to

- Install Windows Server 2003
- Configure networking resources
- Monitor network performance
- Troubleshoot network faults
- Manage disk quota
- Implement backup and recovery strategy

Course Content:

Chapter No.		Name of Topic/Sub topic	Hrs	Weightage
SECTION - I				
1	**The Windows Server 2003 Environment**			
	1.1	The Windows Server 2003 family and key features, Hardware requirements, Installation of Windows Server 2003. Architecture of windows server 2003,	**06**	**06**
	1.2	Installing and configuring, various peripheral devices and add on card drivers, Configuring Device Driver, Signing Options, Installing, configuring Administrative Tools		
	1.3	Implementing User, Group, and Computer Accounts : Creating User Accounts, Creating Computer Accounts, Modifying User and Computer Account Properties		
	1.4	Creating User Account Template, Managing User and Computer account Accounts		
	1.5	Managing Groups : Creating groups, Managing group membership, Strategies for using groups, Using default groups, Creating Global and Domain Local Groups.		
2	**Managing Access to Resources & Managing User Environment**			
	2.1	File systems – FAT, Fat32, NTFS, Features of NTFS, Creating and Sharing Folders, Configuring NTFS Permissions, Publishing Shared Folders, Testing Permissions	**06**	**06**
	2.2	Manage access to files and folders by using NTFS permissions, Determine effective permissions, Manage access to shared files by using offline caching		
	2.3	Managing Group Policy :Configuring Group Policy Settings, Assigning Scripts with Group Policy, Restricting Group Membership and Access to Software Planning group policy strategy, creating		
	2.4	Group Policy Objects GPOs Group policy inheritance, Managing GPOs, Delegating Administrative control to GPOs Redirecting folders using group policy		

3	**Administrative Templates and Audit Policy**			
	3.1	Using Account policy – password policy, logon policy, disk quota policy, account lockout policy, audit policy, Configuring Auditing ,	**06**	**08**
	3.2	Overview of Security in Windows Server 2003, Using Security templates to Secure Computers, Testing Computer Security Policy, Managing Security Logs, Creating a Custom Security Template, importing security Template		
	3.3	Managing Disks : Preparing Disks, Managing Disk Properties, Mounted Drives, converting Disks, Creating Volumes, Creating Fault-Tolerant Volumes, Importing a Foreign Disk, Initialize and partition a disk, Manage mounted drives, Convert disk from basic to dynamic and dynamic to basic		
SECTION - II				
4	**Windows Server 2003 networking & IP Routing:**			
	4.1	Defining a network infrastructure, basic terms – workgroup, domain, multiple domains, trust relationship.Active directory, remote access, name resolution, TCP/IP network infrastructure – network protocols	**04**	**06**
	4.2	IP address – the hierarchical addressing scheme, classification of IP address, Subnetting network, subnetting concepts – information hiding, subnetting TCP/IP networks, calculating number of subnets		
	4.3	Understanding IP routing, How routing works, Route tables, Types of routing – Static, Dynamic Routing information protocol, Open shortest path first protocol, Border routing		
	4.4	Multicast routing IP routing in Windows Server 2003 – Managing IP routing, creating and managing interfaces, Managing LAN Interfaces, Defining static routes.		

5	**Active directory & Domain Naming Systems :**			
	5.1	The active directory's logical structure, Benefits of active directory, Components and mechanisms in active directory –datastore, Schema, Global catalog, replication.	**05**	**06**
	5.2	Overview of Active directory domains, transitive two way trust relationships, using multiple domains, active directory forest, active directory object names, active directory's physical structure, accessing active directory through LDAP		
	5.3	Understanding DNS, Domain naming, DNS and the internet, DNS and Windows Server 2003, Dynamic DNS, DNS Terminology , Working of DNS		
	5.4	Installation and configuration of DNS server, Creating DNS zones – forward lookup and reverse lookup zone		
6	**Dynamic Host Configuration Protocol , Backup and Recovery Strategy:**			
	6.1	Overview of DHCP, the DHCP lease process, Understanding scope details, Advantages and disadvantages of DHCP. Installing DHCP, authorizing DHCP for active directory, creating and managing DHCP scopes, managing reservations and exclusions, super scope, multicast scopes.	**05**	**08**
	6.2	Overview of Dial-up networking (DUN) and Virtual private networks (VPN) , Installing the remote access services, configuring RAS server. Managing RAS, Remote access security – user authentication, connection security, access control, Using remote access policies, Using remote access profiles.		
	6.3	Backup and Recovery Strategy :Planning backup and recovery strategy, using windows backup, Scheduling backup jobs, Backing up system state data, Using volume shadow copy, automated system recovery .		
		Total	**64**	**80**

List of Praticals / Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	• Installation of Windows Server 2003/Windows 2000 Server/ Windows 2008 Server • Creation and Management of local users . • Creation and Management of group and implementation of its properties. • Installation of Device Drivers. • System Performance Monitoring through Windows Performance Monitoring.	14
2	• Installation and implementation of Remote Desktop. • Sharing and managing Resources. • Creating various file Systems, and configuring them. • Comparative study of FAT, FAT32, NTFS file systems	08
3	• Creating login screen, Configuration of logon policies, password policy. • Implementation and study of Network Monitoring tool. • Testing, creating and importing security templates.	08
4	• Configuration of TCP/IP network i) Assign IP Address ii) Verify IP Communication • Implementation of local, roaming, hardware profile.	10
5	• Installation and verification of Active Directory i. Domain Controller ii. NetBIOS Domain Name iii. Permissions iv. Verifying the Installation • Event Viewer • Event Log • Installation of Domain Name System i. DNS Namespace ii. DNS Zones	10

6	• Installation and implementation of DHCP i) Authorizing DHCP for Active Directory ii) Creating and managing DHCP Scopes • Management of Disk and Disk Quota entries i) Preparing Disk ii) Creating Volumes • Implementation of Backup and Recovery Strategy. • Writing batch scripts for administrative purpose.	14
	Total	**64**

Instructional Strategy:

S.N.	Topic	Instructional Strategy
1.	The Windows Server 2003 Environment , Implementing User, Group, and Computer Accounts , Managing Groups	Introduction and Explanation, Demonstration
2	Managing Access to Resources, Managing the User Environment - Group Policy	Introduction and Explanation, Demonstration
3.	Administrative Templates and Audit Policy, Managing Disks	Introduction and Explanation, Demonstration
4.	Windows Server 2003 networking, IP Routing	Introduction and Explanation, Demonstration
5.	Active directory, Domain Name System	Introduction and Explanation, Demonstration
6.	Dynamic Host Configuration Protocol, Backup and Recovery Strategy	Introduction and Explanation, Demonstration

Text/Reference Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Suzan Sage London, James Chellis	MCSE Windows Sever 2003 Network Infrastructure Planning and Maintenance	BPB
2	Paul Robichaux, Matt Sheltz, James Chellis	MCSA/MCSE Windows Sever 2003 Network Infrastructure Implementation, Management and Maintenance	BPB

3	Anil Desai, James Chellis	MCSE Windows Sever 2003 Active directory, Planning, Implementation and Maintenance	BPB
4	Jerry Honeycutt	Introducing Microsoft Windows Server 2003	PHI
5	Mark Minasi, Christa Anderson, Michele Beveridge,C.A. Callahan, Lisa Justice	Mastering Windows Server 2003	BPB

Learning Resources: LCD Projector, Black Board and Online Demo.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	**Comprehension**	**Application**	
1.	The Windows Server 2003 Environment , Implementing User, Group, and Computer Accounts , Managing Groups	02	02	02	06
2.	Managing Access to Resources, Managing the User Environment - Group Policy	02	--	04	06
3.	Administrative Templates and Audit Policy, Managing Disks	02	02	04	08
4.	Windows Server 2003 networking, IP Routing	02	02	02	06
5.	Active directory, Domain Name System	02	--	04	06
6.	Dynamic Host Configuration Protocol,Backup and Recovery Strategy	02	02	04	08
	Total	**12**	**08**	**20**	**40**

(Prof. Smt. M.H.Thakare)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme : Diploma in CE/EE/ET/ ME/MT/CM/IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Principles of Management
Course Code : MA661

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 Minutes**	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

This subject deals with the evolution of manager with respect to different approaches of management such as project planning, strategic planning, corporate planning, long range planning, decision making & creative problem solving. It also deals with the impact of computers and information technology in innovation and organizational design and planning.

Course Objectives:

After studying this course, the student will be able to

- Understand the managerial roll & skills.
- Understand the evolution of management thought and different approaches to management.
- Assimilate the concept of project planning, strategic planning, corporate planning & long range planning.
- Visualize the impact of computers in organization.
- Visualize the impact of information Technology in organizational communication & leadership.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh t-age
1.	**Principles & Functional Aspects of Management**			
	1.1	Management – Definition, Principles of Management, Functions of Management-Planning Organizing, Leading ,Controlling, Authority , Decision making Organization charts, Leadership, Organizational structure, Budgeting ,Problem solving ,Group dynamics and team functions, Conflict resolution, Communication ,Change, Organizational theory	**08**	**16**
2.	**Forms of ownership**			
	2.1	Types of ownership, individual ownership, partnership, joint stock companies, co-operative organization, Government undertakings (State ownership), their relative advantages and disadvantages.	**04**	**08**
3	**Financial Management**			
	3.1	Financial Management- Objectives & Functions	**08**	**12**
	3.2	Capital Generation & Management- Types of Capitals, sources of raising Capital		
	3.3	Budgets and accounts- Types of Budgets, Production Budget Labour Budget, Introduction to Profit & Loss Account, Balance Sheet (only concepts) ;		
	3.4	Introduction to – Excise Tax, Service Tax, Income Tax, VAT, Custom Duty		
4.	**Human Resource Management**			
	4.1	Personnel Management - Introduction, Definition, Functions	**08**	**12**
	4.2	Staffing- Introduction to HR Planning, Recruitment Procedure, Personnel– Training & Development		
	4.3	Types of training- Induction, Skill Enhancement,		
	4.4	Leadership & Motivation- Maslow's Theory of Motivation,		
	4.5	Safety Management- Causes of accident, Safety precautions, industrial hygiene		
	4.6	Introduction to Factory Act, ESI Act, Workmen Compensation Act, Industrial Dispute Act		

5.	**Materials Management**			
	5.1	Industrial management, forecasting, master planning, schedules.	**06**	**08**
	5.2	Inventory Management - Meaning & Objectives		
	5.3	ABC Analysis, Economic Order Quantity		
	5.4	Purchase Procedure- Objects of Purchasing, Functions of Purchase Dept. Steps in Purchasing		
	5.5	Modern Techniques of Material Management- JIT / SAP / ERP		
6.	**Marketing Management**			
	6.1	Definition, concepts of marketing,, benefits of marketing concept, Functions of marketing management, Market research, its objectives and importance, sales forecasting, advertising and sales promotion.	**06**	**12**
7.	**Quality Management**			
	7.1	Concept of quality, standardization, merits and demerits. Types of standards, quality policy. Introduction to ISO 9001-2000, TQM, Kaizen, 6 Sigma	**06**	**08**
8.	**Project Management**			
	8.1	Introduction CPM & PERT Techniques (Simple Numericals)	**02**	**04**
		Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Principles & Functional Aspects of Management	Class room Teaching
2.	Forms of ownership	Class room Teaching
3.	Financial Management	Class room Teaching
4.	Human Resource Management	Class room Teaching
5.	Materials Management	Class room Teaching
6.	Marketing Management	Class room Teaching
7.	Quality Management	Class room Teaching
8.	Project Management	Class room Teaching

Text Books:

Sr. No	Author	Title	Publication
1.	**Koontz**	Prescribed Text Essentials of Management	Tata McGraw Hill
2.	Saxena	Principles & Practices of Management	Tata McGraw Hill

Reference Books:

Sr. No	Author	Title	Publication
1.	Hannagan.	Management Concepts & Practices	---
2.	Bovee and Schatzman,	Business Communication	Pearson Education
3.	V. S. Rao,	Management Text & Case	Excel
4.	S.A.Sherlekar & V.A. Sherlekar,	Modern Business Organization & Management	Himalaya Publications
5.	O.P.Khanna,	Industrial Organization and Management	Dhanpat Rai and Sons
6.	Banga and Sharma,	Industrial Organization and Management	Khanna Publications
7.	---	Essentials of Management	Tata Mc Graw Hill
8.	---	Principles of practice of Management	Tata Mc Graw Hill

Learning Resources: OHP, LCD, Projector, and Transference, White board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Principles & Functional Aspects of Management	05	05	02	16
2.	Forms of ownership	05	05	02	08
3.	Financial Management	05	05	02	12
4.	Human Resource Management	05	05	02	12
5.	Materials Management	05	05	02	12
6.	Marketing Management	04	04	04	12
7.	Quality Management	03	02	03	08
8.	Project Management	--	--	--	--
	Total	**32**	**31**	**17**	**80**

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Programme : Diploma in CE/ EE/ET/ME/MT/CM/ IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Entrepreneurship Development
Course Code : MA662

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 Minutes**	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

To make the students aware of entrepreneurship as one of the career options and hence to teach them the various aspects of starting a enterprise.

Course Objectives:

After studying this course, the student will be able to

- SWOT analysis.
- Business Environment scanning and opportunity scanning. (Search)
- Market assessment.
- Project formulation.
- Identification of product / Technology / Equipment
- Financial Sources.
- Sales and Marketing
- Reasons of failure of entrepreneurs.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weigh - tage
1.	**Entrepreneurship Awareness**		
	Entrepreneurship – need, scope & philosophy Definition of a entrepreneur, attributes & characteristic. Intrapreneuring & Entrepreneurship. Need Analysis: Human Need, SWOT Analysis, goal setting, business environment, emerging trends, Information & collection techniques, opportunities.	08	10
2.	**Starting & Identification of Project**		
	Product and services, demand availability & resource requirement. Market survey technique – Identification of market, marketing trends, market survey techniques, agencies & organizations to be contacted. Product, suppliers of plant, equipment & raw material technology.	08	14
3.	**Preparation of Project report business plan**		
	Structure of project report, purpose of project report. Working & fixed capital, financial institutions, procedures & Norms for financing feasibility criteria, project planning, time management, legal formalities, municipal by laws. Safety considerations, plant layout commissioning of plant & equipment, trial production & quality assurance.	10	16
4.	**Information & support systems**		
	Information needed & their sources. Information related to Project Information related to procedures & formalities. Support systems a) Small scale business planning Requirements b) Govt. & financial Agencies, Formalities. Role of Central Government and State Government in promoting Entrepreneurship- introduction to various incentives ,, subsidies and grants – Export Oriented Units – fiscal and tax concession available.	10	16
5.	**Management of Enterprises**		
	Forms of business Organization. Human behavior, personnel sales Management. Marketing practice, distribution channels, Advertisings, Packaging.	06	12

6.	**Why do entrepreneurs fail**		
	The four entrepreneurial pitfalls (Peter Ducker) Case studies of successful entrepreneur. Women entrepreneurs – Robeson's for low women entrepreneurs, problems & prospectus.	06	12
	Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Entrepreneurship Awareness	**Lecture, market survey, workshops, interviews.**
2.	Starting & Identification of Project	
3.	Preparation of Project report business plan.	
4.	Information & support systems.	
5.	Management of Enterprises :	
6.	Why do entrepreneurs fail.	

Text Books:

Sr. No	Author	Title	Publication
1.	S. Saini, B.S. Rathore	Entrepreneurship – Theory & Practice	

Reference Books:

Sr. No	Author	Title	Publication
1.	Vasant Dsai, Pragati Desai	Entrepreneurial development Vol. I	
2.	Vasant Dsai, Pragati Desai	Entrepreneurial development Vol. II	
3.	Vasant Dsai, Pragati Desai	Entrepreneurial development Vol. III	
4.	Colombo Staff College, Manila	Entrepreneurship Development Plan	TMH, New Delhi

5.	Jerald Greenberg, Robert A. Baron/ Carol A. Sales/ Frances A. Owen / Verlag (1999)	Behaviour in organizations, Pearson Education.	Tata Mcgraw Hill.
6.	The winning Edge, corporate creativity.	Pradip N. Kandwalla	Tata Mcgraw Hill.(2006)
7.	John L. Colley, Jacqueline L. Doyle,	Corporate Governance	Tata Mcgraw Hill. (2003)
8.	Timpe, Dale A	Creativity	M/s. Jaico Publishing House, New Delhi. Tata Mcgraw Hill. (2005),

Learning Resources:

Books, Articles, Case studies

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Entrepreneurship Awareness	02	06	02	10
2	Starting & Identification of Project :	04	06	04	14
3.	Preparation of Project report business plan.	03	10	03	16
4	Information & support systems.	04	08	04	16
5	Management of Enterprises :	04	06	02	12
6	Why do entrepreneurs fail.	04	04	04	12
	Total	**21**	**40**	**19**	**80**

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Programme : Diploma in CE/ EE/ ET/ ME/ MT/ CM/ IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Project Management
Course Code : MA663

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 Min. duration	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

In all projects, huge financial investments are made. It is therefore necessary to manage all the resources for effective project implementation. A Diploma technician has to acquire this knowledge as per the job requirements.

Course Objectives:

After studying this course, the student will be able to

- Appreciate the importance of planning, scheduling, and controlling resources.
- Calculate project durations
- Understand the importance of cost – time analysis

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1.	**Introduction**			
	1.1	What is Project Management?	**04**	**08**
	1.2	Principles and Functions of Project Management		
	1.3	Project life cycle		
	1.4	Major types of Projects		
	1.5	Role of Project Manager		
2.	**Organising For Project Management**			
	2.1	Organization of project participants	**08**	**12**
	2.2	Types – Line, Line and staff, Functional organization		
	2.3	Merits and demerits of each type		
	2.4	Leadership and Motivation for the project team		
	2.5	Interpersonal behaviour and communication – Its types, barriers in communication		
3.	**Project Planning**			
	3.1	Basic concepts in the development of project plans	**08**	**12**
	3.2	Defining work tasks / activities		
	3.3	Defining precedence relationships among activities		
	3.4	Estimating activity durations		
	3.5	Estimating resource requirements for activities		
4.	**Fundamental Scheduling Procedures**			
	4.1	Critical path method	**10**	**16**
	4.2	Meaning of terms – events, activity, earliest start time, Latest start time, earliest finish time, latest finish time, total float, free float, critical activity, dummy activity, critical path, project duration, .		
	4.3	PERT, Comparison between CPM and PERT		
5.	**Cost – Time Analysis in Network Planning**			
	5.1	Importance of Time – Cost analysis	**04**	**08**
	5.2	Project cost, direct cost, and indirect cost.		
	5.3	Variation of direct cost with time		

	5.4	Normal time, normal cost, crash time, crash cost, cost – slope.		
	5.5	Variation of indirect cost with time.		
6.	**Use of Computers in Project Management**			
	6.1	Computer aids for project. Software available in PJM. Project information – Types and Uses.	**04**	**08**
7.	**Introduction to Important Laws**			
	7.1	Factories Act – Scope and provisions	**04**	**08**
	7.2	Minimum Wages Act – Scope and provisions		
	7.3	Workmen's compensation Act– Scope and Provisions.		
8.	**Safety in Execution Of Works**			
	8.1	Importance of Safety, Causes of accidents at work places. Precautions to avoid accidents, Safety programmes. Terms-Accident cost, Injury frequency rate, Injury severity rate.	**06**	**08**
		Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Class room teaching
2.	Organizing for project management	Class room teaching
3.	Project planning	Class room teaching
4.	Fundamental scheduling procedures	Class room teaching
5.	Cost – time analysis in network planning	Class room teaching
6.	Use of computers in project Management	Class room teaching
7.	Introduction to important laws	Class room teaching
8.	Safety in execution of works	Class room teaching

Text Books:

Sr. No	Author	Title	Publication
1.	M. Spinner	Elements of Project Management	Prentice Hall Englewood Cliffs, New Jersey
2.	Victor G. Hajek	Project Engineering	McGraw – Hill Book Company

Reference Books:

Sr. No	Author	Title	Publication
1.	Chris Hedrickson and Tung Au.	Project Management for Construction	Prentice Hall Englewood Cliffs, New Jersey
2.		Bar Laws	

Learning Resources: Computer software, OHP, LCD, Projector, and Transference, PPTS, White board

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	04	04	---	08
2.	Organizing for Project Management	04	04	04	12
3.	Project Planning	04	06	02	12
4.	Fundamental scheduling procedures	02	02	12	16
5.	Cost – time analysis in network planning	04	04	--	08
6.	Use of computer in project management	04	--	04	08
7.	Introduction to important laws	04	04	---	08
8.	Safety in execution of works	--	04	04	08
Total		**26**	**28**	**26**	**80**

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Programme : Diploma in CE/ EE/ ET/ ME/ MT/ CM/ IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Material Management
Course Code : MA664

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 Minutes**	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

This course deals with management of materials. Smooth running of any industry depends upon the interdepartmental relations and planning for execution of work jointly. Efficiency of production department also depends upon the availability of raw material of required quality and quantity. Therefore there should be proper co-ordination between production department, production planning, stores department and purchase department. Incorrect materials planning can also lead to higher inventories & high cost.

Course Objectives:

After studying this course, the student will be able to

- To know the importance of materials and inventory management
- To know the different aspects of buying procedure and price forecasting.
- To acquaint with latest techniques in materials management

- To know procedure for giving requisition of materials along with specifications
- To know different features of negotiation technique and management of obsolete and scrap materials.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weight -age
1.	**Importance of Materials Management**			
	1.1	Growing importance of Materials Management	**10**	**16**
	1.2	Scope of Materials Management		
	1.3	Objectives and functions of Materials Management		
	1.4	Organising for Materials Management		
	1.5	Introduction to Materials planning		
	1.6	Importance of specifications in Materials Management		
2.	**Inventory Management**			
	2.1	Selective control – ABC Analysis - Purpose and objectives of ABC Analysis Mechanics &	**10**	**16**
	2.2	Advantages of ABC Analysis limitations of		
	2.3	ABC Analysis		
	2.4	Order point – Lead Time, safety stock, Re-order point, standard order. Economic order		
	2.5	Quantity (EOQ), Graphical & Analytical Method		
3.	**Buying procedure**			
	3.1	Sourcing, Buy or lease	**10**	**16**
	3.2	Purchase systems		
	3.3	Problems in relations with supplier		
	3.4	Value Analysis → Definition & scope		
	3.5	Selection of products for value analysis		
	3.6	Value analysis framework		
	3.7	Implementation & methodology		
	3.8	Ethics in purchasing		
4.	**Price forecasting**			
	4.1	Importance & Approaches	**06**	**10**
	4.2	Types of forecasting		
	4.3	Elements of good forecasting method		
	4.4	Different price forecasting techniques		

5.	**Latest Techniques in Materials Management**			
	5.1	Just in Time (JIT) zero inventory concept	**05**	**10**
	5.2	Integrated computerised management systems in Materials Management		
6.	**Management of obsolete Surplus and Scrap material**			
	6.1	Definitions, Reasons for generation and accumulation of obsolete Surplus and scrap, Survey committee, presale preparations, sale, auction, sale by tender.	**07**	**12**
		Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Importance of Materials Management	Class room teaching
2.	Inventory Management	Class room teaching
3.	Buying procedure	Class room teaching
4.	Price forecasting	Class room teaching
5.	Latest Techniques in Materials Management	Class room teaching
6.	Management of obsolete & scrap material	Class room teaching

Text Books:

Sr. No	Author	Title	Publication
1.	Ammer Deans S.	Materials Management	R.D. Irwin Hllions
2.	P. Gopalkrishan and M. Sundaresan	Materials Management An Integrated approach	Prentice – Hall of India Pvt. Ltd. New Delhi.
3.	M.M. Shah	An integrated concept of Materials Management	Tata McGraw Hill Publisher Co. Ltd. New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	P.G. Menon	Materials Management	
2.	A Deb	Materials Management	Academic Publishers
3.	Dobler D.W. and Lee C	Purchasing and Materials Management	---
4.	Brandy C.S.	Materials Handbook	---

Learning Resources: OHP, LCD, Projector, and Transference, White board

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Importance of Materials Management	6	6	4	16
2.	Inventory Management	6	6	4	16
3.	Buying procedure	6	6	4	16
4.	Price forecasting	--	6	4	10
5.	Latest techniques in Materials Management	2	4	4	10
6.	Management of obsolete and scrap materials	6	6	--	12
	Total	**26**	**34**	**20**	**80**

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(Prof. Dr. S. B. Nikam)
Chairman, PBOS

Programme : Diploma in CE/EE / ET/ ME/MT/ CM / IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Supervisory Management
Course Code : MA665

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 Min. duration	03 Hrs	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

The diploma holders are intended to work as a supervisor in the industry. He has to perform a versatile role in the activities of an industry; he has to coordinate his subordinates and the higher personals.
The students are required to understand to function as a supervisor. He should be able to plan, organize, and direct the subordinates to achieve better results within time for a task assigned to him.

Course Objectives:

After studying this course, the student will be able to

- Know the basic duties of a supervisor.
- Plan a particular job by splitting the whole job into pieces and monitoring each step.
- Understand human behaviors, identify skills, utilize skills, and observe safety of workers.
- Achieve better overall efficiency and utilize maximum capacity of machineries.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	**Introduction**			
	1.1	Management of a job. Necessity for Scientific Management for supervisor. Handling complexity and achieving optimization.	**02**	**04**
2	**Planning by Supervisor**			
	2.1	Objectives of planning. Planning activities. Planning by supervisor. Detailing and following of each step. Prescribing standard forms for various activities. Budgeting at supervisory level for materials and man power. Planning a programme and actions for a job.	**04**	**08**
3	**Organizing by supervisor**			
	3.1	Organizing physical resources. Matching human needs with job needs. Allotment of tasks to individual and establishing relationship among persons working in a group.	**04**	**08**
4	**Directions by supervisor**			
	4.1	Need for such directions and instructions to subordinates. Need for clarity, completeness and feasibility of instructions. Reviving of effectiveness of communication. Personal counseling. Advance predictions of possible mistakes. Elaborating decisions. On the spot adjustments during execution of job. Laying disciplinary standards in over all working.	**06**	**10**
5	**Motivation to subordinates**			
	5.1	Workers participation in management of a job. Achievement motivation. Recognition for devotion. Delegating responsibilities to subordinates. Activities and intensions towards the growth of an individual. Identification of human needs and providing safety to the workers.	**06**	**10**

6	**Coordination & implementation**			
	6.1	Understanding link between various departments in respect of process and quality standards. Synchronization of duties of subordinates. Control over the performance in respect of quality; quality of production; time and cost. Measuring performance, comparing with standard, correcting unfavorable deviations.	**10**	**14**
7	**Check list by supervisor**			
	7.1	Introduction to subordinates regarding the job undertaken. Planning the days work suitable for the job. Responsibility survey. Checking possibility for acceptance of assignment from new department.	**08**	**10**
8	**Moving up in the organization**			
	8.1	Demonstration of job competence. Exhibition of leadership and initiative. Looking for to accept challenging responsibilities and acceptance of the same. Attitude and actions to be followed and avoided. Stressing the value of own contribution. Achievement of trust of subordinates and the higher management.	**08**	**16**
		Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Lecture method
2.	Planning by supervisor	Lecture method
3.	Organizing by supervisor	Lecture method
4.	Directions by supervisor	Lecture method
5.	Motivation to subordinates	Lecture method
6.	Coordination & implementation	Lecture method
7.	Check list by supervisor	Lecture method
8.	Moving up in the organization	Lecture method

Text Books:

Sr. No	Author	Title	Publication
1	Industrial Management	Shrinivasan	Khanna publisher,New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	Industrial organization and Engineering Economies	Banga and sharma.	Khanna publisher,New Delhi
2.	Industrial Engineering and Management	O.P. Khanna	Dhanpat Rai and Sons, New Delhi
3.	What every Supervisor Should Know	Lestec R. Bittel John W. Newstrom	McGraw Hill Publishing Company, (GREGG Division)

Learning Resources:

Books, Articles, C.D.'s, Visits, Video Cassettes
No. 115 and 120

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	02	02	-	04
2.	Planning by supervisor:	06	01	01	08
3.	Organizing by supervisor	04	02	02	08
4.	Directions by supervisor	05	03	02	10
5.	Motivation to subordinates	05	03	02	10
6.	Coordination & implementation	10	02	02	14
7.	Check list by supervisor	06	02	02	10
8.	Moving up in the organization	08	04	04	16
	Total	**46**	**19**	**15**	**80**

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Programme : Diploma in CE/EE / ET/ ME/MT/ CM / IT
Programme Code : 01/02/03/04/05/06/07/15/16/17/18
Name of Course : Total Quality Management
Course Code : MA666

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical / Tutorial	---	---

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests, each of 60 minutes**	**3Hrs.**	--	--	--
Marks	**20**	**80**	--	--	--

Course Rationale:

In today's international market the quality is another name for universal acceptance for product and services .Hence the mechanical engineers must have consciousness about various quality aspects required for manufacturing /service sector.
To fulfill this need this subject about various factors and philosophies in quality development is introduced. So that student will have most of basic inputs before they enter their profession.

Course Objectives:

After studying this course, the student will be able to

- To understand the importance of Quality Standards and consumer need for quality items for price paid by him..
- To understand Quality Management Foundation and introduction to total quality management
- To know about Quality circle, Kaizen and various Quality improvement tools.
- To know about Quality Assurance Systems and Quality Management through ISO 9000 series.
- To know about Toyota way and Six Sigma concepts.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Introduction**			
	1.1	Basic concepts related with quality, Various definition of quality. Quality of design and quality of conformance, Service quality Vs product quality.	**06**	**12**
	1.2	Quality policy: definition and objectives. Quality audit.		
	1.3	Quality assurance: - definition, meaning it's various forms and advantages .Quality audit, quality mindedness, inspection and quality control.		
2.	**Quality Management Foundation and introduction to total quality management.**			
	2.1	Strategic quality management (Hoshin Kanri) Strategic quality planning, quality goals. The vision – future state of organization, good understanding by everyone, inspiration, achievable QCDF (Quality Cost Delivery Flexibility), Customer focus, sharing by all values of the leadership, organization and employees.	**08**	**12**
	2.2	Total Quality:- definition ,objectives, eight dimensional model of total quality.		
	2.3	Total Quality management:- definition , need ,mission, initiative and concept. Barriers, implementation and advantages..		
	2.4	TQM Models: - Juran trilogy , Deming programme , Mckinsey model, Crosby program..		
3.	**Quality Management Processes**			
	3.1	**Quality planning** Quality culture (Kaizen and Quality circle) Quality Circle: - concept, objective, structure, steps in formation of quality Circle. Roles of people involved in quality Circle. Advantages of quality Circle.	**12**	**16**

	3.2	What is Kaizen. i) The concept, meaning and definition ,areas for Kaizen ii) 10 ground rules for change. iii) Traditional methods Vs Kaizen , Kaizen Vs innovation iv) Types of waste and Waste elimination, value added work, hidden waste and obvious waste, Identification of wastes. v) 5S in housekeeping and their meaning vi) Improvement in work methods. vii) Achievement after Kaizen		
	3.3	Quality improvement Old statistical and analytical tools for quality. i) Tally-sheet ii) Graphs iii) Histograms iv) Stratification v) Scatter diagram vi) Control chart vii) Pareto diagram		
	3.4	New tools of quality i) Ishikawa diagram ii) Arrow diagram iii) Relations diagram iv) Tree diagram v) Affinity diagram vi) Matrix diagram		
	3.5	Additional tools of quality improvement i) Brains storming ii) Flow charts iii) 5W & 1H iv) 5 WHYS		
4.	**Quality Management Infrastructure**			
	4.1	History of ISO 9000. European economic community (EEC), need for quality system standards, International organization for standardization (ISO) adopted by Bureau of Indian Standards (BIS)	**12**	**16**

	4.2	**ISO 9000: 2000** Quality system ISO 9000 series standards, ISO 9000 elements understanding requirement, assessment with respect to quality system. Documentation and implementation, quality manual, structure, internal quality audit, external audit and certification.		
	4.3	**Various Quality Systems Vocabulary and features** **ISO 9001**: Requirements for a quality management system ISO 9004 : Guidelines for the effectiveness and efficiency of the quality management system IS 14000: 2004 series, its importance ISO 19011: guidance on auditing and environmental management systems.		
5.	**Principles of the Toyota way**			
	5.1	Introduction to Toyota way, Toyota production system (TPS), lean production, '4' P model of Toyota way.	**04**	**12**
	5.2	Toyota way principles and their meaning.		
6.	**Six Sigma**			
	6.1	Introduction to six sigma, Psychology of six sigma,	**06**	**12**
	6.2	**Six sigma DMAIC process**		
	6.3	The six sigma players, their roles and Responsibilities. Champions, Master black Belts, Black belts, Green belts.		
	6.4	Factors to be considered while selecting a project for six sigma, Do's and Don'ts for making six sigma effective. Advantages of six sigma. The zero defects concept.		
		Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Lecture method
2.	Quality Management Foundation and introduction to total quality management.	Lecture method
3.	Quality Management Processes	Lecture method, Transparencies, Internet surfing.
4.	Quality Management Infrastructure	Lecture method, Transparencies, Internet surfing.
5.	Principles of the Toyota way	Lecture, Ppt & Discussion
6.	Six Sigma	Lecture method, Ppt & Discussion

Text Books:

Sr. No	Author	Title	Publication
1	Dr. K.C.Arora	Total Quality Management	S.K.Kataria and sons
2	B.Janakiraman and R.K. Gopal	Total Quality Management Text and cases	Prentice Hall of India pvt. Ltd. New Delhi.
3	Subburaj	Total Quality Management	Tata Mc - Graw Hill Co., New Delhi.
4	Gupta, Srinivas N & B Valarmathi	Total Quality Management	Tata Mc - Graw Hill Co., New Delhi.

Reference Books:

Sr. No	Author	Title	Publication
1	Peter S.Pande Robert P. Neuman Roland R.Cavanagh	Six Sigma way	Tata Mc - Graw Hill Co., New Delhi.
2	Jeffrey K. Liker	The Toyota Way	Tata Mc - Graw Hill Co., New Delhi.
3	Suganthi and Samuel	Total Quality Management	Prentice Hall of India pvt. Ltd. New Delhi

Learning Resources: Books, journals, Internet searches.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	12	--	--	12
2.	Quality Management Foundation and introduction to total quality management.	08	04	--	12
3.	Quality Management Processes	08	08	--	16
4.	Quality Management Infrastructure	08	08	--	16
5.	Principles of the Toyota way	08	04	--	12
6.	Six Sigma	08	04	--	12
	Total	**52**	**28**	**--**	**80**

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Programme : Diploma in CE/ EE/ ET/ME/MT/CM/IT
Programme Code : 01/ 02/ 03 / 04 / 05 / 06 /07/15/16/17/18
Name of Course : Software Project Management
Course Code : MA667

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 Minutes**	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

This subject forms the foundation of Software Project Management. It is essential to know these fundamentals to understand the concept of Project Management.

Course Objectives:

After studying this course, the student will be able to

- Understand the core concept of Software Project Management.
- Understand how to create the software projects.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weight -age
1.	**Starting Your Software Project**			
	1.1	Examining the Big Picture of Project Management • Understanding Universal Constraints (Time, Cost, and Scope) • Understanding What Makes Software Project Management So Special	**08**	**14**
	1.2	Initiating a Software Project • Identifying the Project Purpose • Moving from Here to There • Living with Stakeholders • Understanding How Executives Select Projects • Making Your Project Wish List		
	1.3	Creating the Software Scope • Understanding Product Scope and Project Scope • Understanding Product Scope and Project Scope • Building the Software Scope • Creating the Project Scope • Creating a Work Breakdown Structure		
2.	**Planning Your Software Project**			
	2.1	Planning for Communications • The Importance of Communicating Effectively • Avoiding Communication Breakdowns • Building an Effective Communication Management Plan Defining Who Needs What Information, Defining When Communication Is Needed, Defining Communication Modalities	**16**	**24**
	2.2	Planning for Software Project Risks • Identifying Pure and Business Risks • Managing Risks in Your Organization • Using Software Models for Risk Management • Preparing a Risk Response Plan • Examining Risk Responses and Impacts		

	2.3	Planning for Software Quality • Defining Quality • Working with a Quality Policy • Balancing Time, Cost, and Quality		
	2.4	Building the Project Team • Determining Your Project Needs • Asking the Right Questions • Determining Who Is Really in Charge		
	2.5	Creating Project Time Estimates • Preparing to Create Your PND • Identifying Activity Duration Influencers • Making the Project Duration Estimate • Understanding the Way PND Paths Interact • Creating the Project Schedule		
	2.6	Building Your Project Budget • Creating Cost Estimates • Controlling Project Costs • Following simple strategies to manage project expenses • Having More Project than Cash		
3.	**Executing Your Software Project Plan**			
	3.1	Working the Project Plan • Authorizing the Project Work • Managing Software Project Risks	**08**	**14**
	3.2	Working with Project People • Examining the Phases of Team Development • Managing Project Conflicts • Using Your Super Magic Project Manager Powers		
	3.3	Procuring Goods and Services • Finding a Vendor • Selecting the Vendor • Negotiating for the Best Solution • Administering Contracts • Closing the Vendor Contract		

4.	**Controlling Your Software Project**			
	4.1	Managing Changes to the Software Project • Controlling the Project Scope • Controlling Project Costs • Controlling the Project Schedule	**08**	**14**
	4.2	Using Earned Value Management in Software Projects • Defining Earned Value Management • Playing with Values		
		Tracking Project Performance • Planning Project Metrics • Implementing a Tracking Plan • Tracking Project Performance • Communicating Project Performance		
5.	**Closing Your Software Project**			
	5.1	Finalizing the Project Management Processes • Closing the Software Project • Completing the Project • Releasing project team members from the project team	**08**	**14**
	5.2	Documenting Your Software Project • Completing the Lessons Learned Documentation • Organizing Your Lessons Learned Document • Creating the User Manual & Help System		
		Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Class room teaching
2.	Organizing for project management	Class room teaching
3.	Project planning	Class room teaching
4.	Fundamental scheduling procedures	Class room teaching
5.	Cost – time analysis in network planning	Class room teaching
6.	Use of computers in project Management	Class room teaching
7.	Introduction to important laws	Class room teaching
8.	Safety in execution of works	Class room teaching

Text Books:

Sr. No	Author	Title	Publication
1.	Teresa Luckey	Software Project Management For Dummies	John Wiley and Sons

Reference Books:

Sr. No	Author	Title	Publication
1.	Software Project Management	Bob Hughes, Mike Cotterell	--

Learning Resources:

OHP, LCD, Projector, and Transference, White board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Starting Your Software Project	08	04	02	14
2.	Planning Your Software Project	11	07	06	24
3.	Executing Your Software Project Plan	07	05	02	14
4.	Controlling Your Software Project	06	06	02	14
5.	Closing Your Software Project	**07**	05	02	14
	Total	**39**	**27**	**14**	**80**

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Programme : Diploma in CE/ EE/ET/ ME/MT/ CM /IT
Programme Code : 01/02/03/04/05/06 /07/15/16/17/18
Name of Course : Management Information System
Course Code : MA668

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 Min. duration	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

MIS is a concept continuous to evolve; emerging trend consistent with the evolution of the MIS concept endures computing. It is the power of computers, which makes MIS feasible. From this point of view, the course is introduced.

Course Objectives:

After studying this course, the student will be able to

- Understand the role of MIS in various functional areas of management.
- Understand the determination of requirement and analysis it to design information system necessary.
- Understand the supporting role of MIS in decision-making.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Information and Management**			
	1.1	Types of information, why do we need a computer based information system? Management structure, Management and information requirements, qualities of information. Examples of Information Systems Various functions in organizations, Information processing for a store- An overview, Varieties of information systems. Information Systems Analysis Overview:	**04**	**10**
	1.2	Overview of design of an information system. The role and tasks of systems analysts, Attributes of systems analyst, Tools used by system analyst.		
2.	**Information Gathering**			
	2.1	Strategy to gather information, Information sources, Methods of searching for information, Interviewing techniques, Questionnaires, Other methods of information search, Case example-Hostel information system.	**04**	**10**
	2.2	System Requirements Specification: System requirements specification: Example, Data dictionary, Steps in Systems Analysis, Modularizing requirements specifications, Conclusions.		
3.	**Feasibility Analysis**			
	3.1	Deciding on project goals, Examining alternative solutions, Evaluating proposed solution, Cost-benefit analysis, Pay back period, Feasibility report, and System proposal.	**08**	**15**
	3.2	Data flow diagrams Symbols used in DFD's Describing a system with a DFD, Good conventions in developing DFDs Leveling of DFDs, Logical and Physical DFDs.		
	3.3	Process Specifications Process specification methods, structured English Some examples of process specification.		

4.	**Decision Tables**			
	4.1	Decision table terminology and development, Extended entry decision tables, Establishing the logical correctness of decision tables, Use of Karnaugh maps to detect logical errors in decision tables, Eliminating redundant specifications. Importance of Logical Database Design in MIS	**08**	**15**
	4.2	Entity-relationship model, Relationship cardinality and participation, relations, Normalizing relations, Why do we normalize a relation? Second normal form relation. Third normal form, Boyce-Codd normal form (BCNF), Fourth and Fifth normal forms, Some examples of Database design.		
	4.3	Data input Methods: Data input, Coding techniques, Detection of error in codes, Validating input data, interactive data input.		
5.	**Database and Database Management Systems for MIS**			
	5.1	Problem with file based systems, -Objectives of Database management, -Overview of database management systems,	**12**	**15**
	5.2	Database administrator,		
	5.3	Database design, Conclusions		
	5.4	Object Oriented System Modeling		
	5.5	Object and their properties, Implementation of classes, Identifying objects in an application, Modeling systems with objects, Conclusions.		
	5.6	Object Oriented System Modeling: Object and their properties, implementation of classes, Identifying objects in an application, Modeling systems with objects, Conclusions.		
	5.7	Designing Outputs: Output devices, objectives of output design, Design of output reports, Design of screens, Use of business graphics.		

6.	**Control, Audit and Security of Information Systems**			
	6.1	Control in information systems, Audit of Information Systems, Testing of Information Systems, Security of Information Systems.	**12**	**15**
	6.2	Electronic Commerce What is E-Commerce? Advantages and Disadvantages of E-Commerce, E-Commerce System architecture, Electronic data interchange, Security in E-commerce, Electronic payment systems, Conclusions.		
	6.3	System Design Example: A system for journal acquisition, Document and Data flow diagrams, Feasibility of the system, System specification, Database design, Control, audit and test plan, implementation plan, conclusions.		
		Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Information and Management	**Class room teaching for all**
2.	Information Gathering	
3.	Feasibility Analysis	
4.	Decision Table	
5.	Database Management Systems (DBMS)	
6.	Control Audit and security of information systems	

Text Books:

Sr. No	Author	Title	Publication
1.	V Rajaraman	Analysis & design of Information system	PHI

Reference Books:

Sr. No	Author	Title	Publication
1.	Gordon B. Davis and Margeth H. Olson	MIS	
2.	Kroenke Davis	Management information System	2nd edition
3.	Sein	MIS	
4.	Jawadekar W.S.	MIS	
5.	Millind Oka	MIS	
6.	Jayashankar	Decision Support Systems	
7.	Lucas	Information System Concepts for Management	4th edition

Learning Resources: OHP, LCD Projector and Transparency.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Information and Management	04	04	02	10
2.	Information Gathering	04	02	04	10
3.	Feasibility Analysis	02	08	05	15
4.	Decision Table	02	08	05	15
5.	Database Management Systems (DBMS)	06	04	05	15
6.	Control Audit and security of information systems	04	05	06	15
	Total	**22**	**31**	**27**	**80**

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Programme : Diploma in Computer Engg/Information Technology
Programme Code : 06 / 07
Name of Course : Advanced Java Programming
Course Code : CM761

Teaching Scheme:

	Hours /Week	Total Hours
Theory	04	64
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests, each of 60 minutes**	**3Hrs.**	**--**	**--**	**--**
Marks	**20**	**80**	**25**	**--**	**25**

Course Rationale:

In the Era of Web technology it is essential for every Diploma Engg. To have knowledge of Internet programming. This course covers Advance JAVA as a programming language.

Course Objectives:

After studying this course, the student will be able to

- Create network based applications.
- Create business applications.
- Implement Server side programming.
- Develop dynamic software components.
- Develop database application.
- Design and develop powerful GUI based components.
- Create Animation using Applet, Thread and AWT controls

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1	**Event Handling and Introducing the AWT**			
	1.1	Two event handling mechanisms, The delegation Event Model	**14**	**16**
	1.2	Event classes, Sources of Events, Event Listener Interfaces		
	1.3	Using the Delegation Event Model, Adapter classes, Inner classes		
	1.4	AWT classes, Window fundamentals, Working with frame Windows, Creating a frame Window in an Applet, Creating windowed program, Display information within with in a window,		
	1.5	Working with graphics, Working with color, Setting the paint mode,		
	1.6	Working with Fonts, Managing text output using Font Metrics, Exploring text & graphics		
	1.7	Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, Checkbox Group, Choice Controls, Using Lists, Managing scroll Bars, Using a Text Field, Using a Text Area		
	1.8	Understanding Layout Managers, Menu Bars and Menus, Dialog Boxes, File Dialog		
	1.9	Handling events by Extending AWT Components, Exploring the Controls, Menus, and Layout Managers		
2	**JDBC and Swing Component**			
	2.1	Java as a Database front end Database client/server methodology Two-Tier Database Design Three-Tier Database Design The JDBC API The API Components Limitations Using JDBC (Applications vs Applets) Security Considerations A JDBC Database Example JDBC Drivers JDBC-ODBC Bridge Current JDBC Drivers	**12**	**12**

	2.2	Alternate connectivity strategies Remote Method Invocation (RMI) The common object request broker Architectures (CORBA) Connectivity to object databases Connectivity with Web based Database systems		
	2.3	The Tour of Swing : Japplet, Icons and Labels ,Text Fields, Buttons		
	2.4	Combo Boxes, Tabbed Panes, Scroll Panes, Trees, Tables, Exploring the Swings.		
3	**Networking basics**			
	3.1	Socket overview, client/server, reserved sockets, proxy servers, internet addressing.	**06**	**12**
	3.2	interfaces Inet address Factory methods, instance method TCP/IP Client Sockets		
	3.3	What is URL Format URL connection TCI/IP Server Sockets		
	3.4	Datagrams Datagram packets Datagram server & client Net worth		
4	**JAVA Beans**			
	4.1	What is Java Beans? Advantages of Java Beans	**12**	**12**
	4.2	Application Builder Tools, The Bean Developer kit(BDK), JAR Files, Introspection, Developing a simple Bean Using Bound properties Using the BDK		
	4.3	Using Bound properties, Using the BeanInfo Interface, Constrained properties		
	4.4	Persistence Customizers, The Java Beans API, Using Bean Builder		
5	**Remote Method Invocation**			
	5.1	Introduction to Distributed Computing with RMI : Goals, Comparison of Distributed and Non distributed Java Programs	**08**	**10**
	5.2	Java RMI Architecture Interfaces: The Heart of RMI, RMI Architecture Layers, Stub and Skeleton Layer, Remote Reference Layer, Transport Layer		

	5.3	Naming Remote Objects, Using RMI, Interfaces, Implementation, Stubs and Skeletons, Host Server, Client		
	5.4	Running the RMI System, Parameters in RMI, Parameters in a Single Java Virtual Machine, Primitive Parameters, Object Parameters, Remote Object Parameters		
	5.5	RMI Client-Side Callbacks, Distributing and Installing RMI Software, Distributing RMI Classes, Automatic Distribution of Classes, Firewall Issues		
6	**Servlets**			
	6.1	Background: The Life Cycle Of a Servlet, Using the Tomcat For Servlet Development	**12**	**18**
	6.2	A Simple Servlet, The Servlet API, The Javax.Servlet Package, Reading Servlet Parameters, Reading Initialization Parameters		
	6.3	The Javax.Servlet.http package, Handling HTTP Requests and responses, Using Cookies, Session Tracking, Security Issues		
		Total	**64**	**80**

List of Practical/ Experiments/Assignments:

Sr. No.	**Name of Experiment/Assignment**	**Hrs**
1	Program to design a form using components textbox, text field, checkbox, buttons, list and handle various events related to each component.	02
2	Program to design a calculator using Java components and handle various events related to each component and apply proper layout to it.	02
3	Program to demonstrate use of - Grid Layout. - Flow Layout. - Card Layout. - Border Layout.	02

4	Program to display any string using available Font and with every mouse click change the size and / style of the string. Make use of Font and Font metrics class and their methods.	01
5	Program to create a menu bar with various menu items and sub menu items. Also create a checkable menu item. On clicking a menu Item display a suitable Dialog box.	01
6	An Application program /Applet to make connectivity with database using JDBC API	02
7	Application program/Applet to send queries through JDBC bridge & handle result	01
8	Program to design a form using basic swing components.	01
9	Program to demonstrate the use of scroll panes in Swing.	01
10	Program to map Directory tree.	02
11	Program to demonstrate the use of Tables.	01
12	Program to retrieve hostname using methods in Inet Address class.	01
13	Program that demonstrates TCP/IP based communication between client and server.	01
14	Program that demonstrates UDP based communication between client and server.	02
15	Program to demonstrate use of URL and URL Connection class for communication.	02
16	Program to develop simple bean using BDK (Bean Developing Kit)	02
17	Client/Server application using RMI	02
18	A servlet for demonstrating the genericservlet class.	02
19	A servlet to demonstrate the HttpServlet class using do Get ().	01
20	A servlet to demonstrate the HttpServlet class using do Post ().	01
21	A servlet to demonstrate the cookie.	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Event Handling and Introducing the AWT	Explanation's of basic concept
2	JDBC and Swing component	Explanation & Practical implementation
3	Networking basics	Explanation & Practical implementation
4	Java Beans	Explanation & Practical implementation
5	RMI	Explanation & Practical implementation
6	Servlets	Explanation & Practical implementation

Text Books:

Sr. No	Author	Title	Publication
1	Patrick Naughton-Herbert Schildt	The Complete Reference Java 2 (Fifth Edition)	Tata – Mcgraw hill

Reference Books:

Sr. No	Author	Title	Publication
1	Jaworski	Java 1.2 Unleased	Techmedia
2	Michael Morrison	The Complete IDIOT's Guide To JAVA 2	Prentice Hall of India
3	Keyur Shah	Java2 Programming	Tata McGraw hill
4	Cay S. Horstmann	Core Java Volume II	Pearson

Learning Resources: Books, Models

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Event Handling and Introducing the AWT	04	03	07	14
2	JDBC and Swing component	04	03	07	14
3	Networking basics	06	04	04	14
4	JAVA Beans	04	04	04	12
5	RMI	06	02	02	10
6	Servlets	04	06	06	16
Total		**28**	**22**	**30**	**80**

(Prof. J.R.Hange)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme : Diploma in Computer Engineering/Information Technology
Programme Code : 06/07
Name of Course : Software Testing
Course Code : CM765

Teaching Scheme:

	Hours /Week	Total Hours
Theory	02	32
Practical	04	64

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	**Practical**	**Oral**	**Term work**
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**10**	**40**	**50**	**--**	**50**

Course Rationale:

Software testing will introduce you to basic of software testing, teaching you not just the fundamentals of teaching skills but also supporting skills necessary to become a successful software tester .You will learn how to immediately find problems in any computer program, how to plan an effective test approach, how to clearly report your finding, and to tell when your software is ready for release.

Course Objectives:

After studying this course, the student will be able to

- Understand the impact of software bugs and importance of software testing.
- Develop the skills necessary to find bugs an any types of software testing
- Learn how to effectively plan test, communicate the bugs you find and measure your success as a software tester.

- Use your new testing skills to test not just the software ,but also the product specification the raw code, and even the user's manual
- Learn how to test software for compatibility, usability and cultural issues.
- Discover how to improve testing efficiency by automating your test.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION- I				
1	**Basics of Software Testing**			
	1.1	Error and bug terminology, Testing terms, Test effort, The Fundamental Test Process	**04**	**05**
	1.2	Test planning and control , Test analysis and design, Test implementation and execution ,Evaluation of the test exit criteria and reporting,		
	1.3	Test closure activities, General principles of testing		
	1.4	Requirement gathering and analysis, Planning, Design, Coding, Testing, Maintenance		
	1.5	Quality Assurance and Quality Control, Testing, Verification and Validation.		
2	**Types of Testing**			
	2.1	White box testing : Static testing , Structural testing	**08**	**09**
	2.2	Black box testing : Requirement based testing, Positive and Negative testing , Boundary value analysis, Decision tables, Equivalence partitioning, User documentation testing		
	2.3	Integration testing: Top-Down and Bottom-Up integration, System integration, Scenario testing,		
	2.4	System and Acceptance testing: Functional system testing, Design /Architecture testing, Deployment testing, Beta testing,		
	2.5	Non-functional system testing: Configuration testing, Scalability and Reliability testing, Acceptance testing, Internationalization testing, Localization testing		
3	**Special Tests**			
	3.1	GUI testing: Compatibility testing, Security testing	**04**	**06**

	3.2	Performance and Stress testing, Recovery and Installation testing		
	3.3	Smoke and Sanity testing: Regression testing, Usability testing		
	3.4	Object oriented application testing: Client-Server testing, Web based testing		
SECTION - II				
4	**Test Management**			
	4.1	Test Planning : Preparing a test plan, Scope management, Deciding test approach, Setting up criteria for testing, Identifying Responsibilities, Staffing, Training needs, Resource requirements, Test deliverables, Testing tasks	**06**	**08**
	4.2	Test Management: Choice of standards, Test infrastructure management, Test people management , Integrating with product release		
	4.3	Test Process: Baselining a test plan, Test case specification, Update of Traceability matrix, Executing test cases, Collecting and analyzing metrics, Preparing test summary report		
	4.4	Test Reporting: Recommending product release.		
5	**Defect Management**			
	5.1	Introduction, Defect classification, Defect management process	**04**	**05**
	5.2	Defect life cycle, Defect template		
	5.3	Estimate expected impact of a defect, Techniques for finding a defects, Reporting a defect		
6	**Testing Tools and Measurements**			
	6.1	Features of test tool: Guideline for selecting a tool	**06**	**07**
	6.2	Static and dynamic testing tool, Advantages and Disadvantages of using tools		
	6.3	When to use Automated test tools, Testing using Automated tools		
	6.4	What are metrics and measurement.: Types of Metrics, Project metrics, Progress and Productivity Metrics		
		Total	**64**	**80**

List of Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Introduction to software Testing Concepts.	08
2	Case Study:-Study any system specification and report bugs. Display "Hello world" Write a program to demonstrate use of 1) For… Loop 2) Switch……case 3) Do…While 4) If….else Automate Notepad Application.	16
3	Automate any installation procedure (e.g. WinZip) Automate Microsoft Word Application a. Open Microsoft Word b. Type text (automatically) c. Generate random file name. Save file and close Microsoft Word. Assignment for web Testing (use any web testing tools e.g. Selenium)	08
4	Create any GUI Application e.g. Calculator. Write Test Cases For any Application (e.g. Railways reservation Form)	12
5	Case study on Defect Management.	08
6	Case study on Testing Tools and Measurements.	12
	Total	**64**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Basics of Software Testing	Explanation & case study
2	Types of Testing	Explanation, Case study & Implementation
3	**Special Tests**	Explanation, Case study & Implementation
4	Test Management and planning	Explanation, Case study & Implementation
5	Defect Management	Explanation, Case study & Implementation
6	Testing Tools and Measurements	Explanation, Case study & Implementation

Text Books:

Sr. No	Author	Title	Publication
1	Srinivasan Desikan Gopalaswamy Ramesh	Software Testing: Principles and Practices	PEARSON
2	M G Limaye	Software Testing: Principles, Techniques and Tools	McGraw-Hill

Reference Books:

Sr. No	Author	Title	Publication
1	Andreas Spillner, Tilo Linz, Hans Schaefer	Software Testing Foundations	Rocky nook
2	John A. Estrella Maria C. Estrella	Sample Exam Questions ISTQB	SPD

Learning Resources:

Black Board, Transparencies, Overhead projector, LCD, White Board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Basics of Software Testing	01	02	02	05
2	Types of Testing	03	02	04	09
3	Special Tests	02	01	03	06
4	Test Management and planning	02	02	04	08
5	Defect Management	02	01	02	05
6	Testing Tools and Measurements	02	01	04	07
	Total	**12**	**09**	**19**	**40**

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Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme : Diploma in CM/IT
Programme Code : 06 / 07
Name of Course : Windows Programming
Course Code : CM766

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	**25**	--	**25**

Course Rationale:

Today's workplace is constantly changing and adopting new technologies. In this era of Visual Programming it has become necessary to be able to develop GUI programs. As the industries rely on Visual C++ for its power and efficiency, VC++ has been used as the Windows Programming Tool. In this course the students will get the most out of Windows Programming.

Course Objectives:

After studying this course, the student will be able to

- To handle Keyboard Input
- To handle Mouse Input
- To create Check Boxes, Radio Buttons, List Boxes, Combo Boxes, Scroll Bars
- To create Menus, Toolbar buttons etc.
- To create Dialog Boxes, add controls etc.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION - I				
1	**Overview of MS-Windows**			
	1.1	The Windows Environment, Windows Programming Options, Your First Windows Program,	**08**	**10**
	1.2	A brief History of Character Sets, Wide Characters And C, Wide Characters And Windows,		
	1.3	Windows and Messages		
2	**An Exercise in Text Output:**			
	2.1	Introduction to GDI	**12**	**18**
	2.2	Scroll bars, Building a better Scroll		
	2.3	The Structure of GDI, The Device Context		
	2.4	Drawing Dots and Lines, Drawing Filled Areas		
	2.5	The GDI Mapping Mode		
	2.6	Rectangles, Regions and Clipping.		
3	**The Keyboard and Mouse**			
	3.1	Keyboard Basics	**12**	**12**
	3.2	Key-stroke Messages, Character Messages, Keyboard Messages and Character Sets		
	3.3	Mouse Basics,		
	3.4	Client- Area Mouse Messages, Non-Client- Area Mouse Messages, Hit-Testing in your Programs, Capturing the Mouse		
SECTION - II				
4	**The Timer**			
	4.1	Timer Basics	**12**	**16**
	4.2	Using the Timer: Three Methods, Using the Timer for a Clock, Using the Timer for a Status Report		
	4.3	Child Window Controls:		
	4.4	The Button Class, Controls and Colors, The Static Class, The Scroll Bar Class, The Edit Class, The List Box Class		

5	**Menus and Other Resources**			
	5.1	Icons, Cursors, strings and Custom Resources	**10**	**12**
	5.2	Menus, Keyboard Accelerators		
6	**Dialog Boxes:**			
	6.1	Modal Dialog Boxes, Modeless Dialog Boxes,	**10**	**12**
	6.2	The Common Dialog Boxes		
		Total	**64**	**80**

List of Practicals/ Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Getting Familiar with VC++, parts of a VC++ Program	02
2	Writing Simple Programs using VC++.	02
3	Programs on drawing dots, lines	02
4	Programs on drawing filled areas, rectangles.	02
5	Programs on Reading Keystrokes from the Keyboard, Displaying Our Text, Finding the size of the window	04
6	Programs for handling the Mouse.	04
7	Creating Check Boxes, Radio buttons, List Boxes, Combo Box, Scroll Bar	06
8	Programs for creating Menus, Toolbar buttons etc	06
9	Programs for creating Dialog boxes, adding controls, connecting methods to dialog box controls	04
Total		**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Overview of MS-Windows	Lecture method, Demonstration
2	**An Exercise in Text Output**	Lecture method, Demonstration
3	The Keyboard and Mouse	Lecture method, Implementation
4	The Timer	Lecture method, Implementation
5	Child Window Controls	Lecture, Demonstration & Discussion
6	Menus and Other Resources	Lecture method, Demonstration
7	The Clipboard	Lecture method, Demonstration
8	Dialog Boxes	Lecture method, Demonstration

Text Books:

Sr. No	Author	Title	Publication
1	Charles Petzold	Programming Windows	Microsoft Press

Reference Books:

Sr. No	Author	Title	Publication
1	Steven Holzner	Microsoft Visual C++ 5	BPB
2	Brent E. Rector Joseph M. Newcomer	Win32 Programming	Addison Wesley

Learning Resources: Books, Models

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Overview of MS-Windows	04	02	02	08
2	**An Exercise in Text Output**	02	02	04	08
3	The Keyboard and Mouse	04	02	06	12
4	The Timer	04	02	06	12
5	Child Window Controls	02	02	06	10
6	Menus and Other Resources	02	02	04	08
7	The Clipboard	02	02	06	10
8	Dialog Boxes	04	02	06	12
Total		**24**	**16**	**40**	**80**

(Prof. A.K.Sawant)
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Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme : Diploma in Information Technology
Programme Code : 07
Name of Course : Programming in PHP
Course Code : IT761

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**64**
Term Work / Practical	**04**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**10**	**40**	**50**	--	**50**

Course Rationale:

In the growing field of Web technology it is essential for every Diploma Engineers to learn PHP Language to help them build large and complex web applications.PHP can be used in three Primary ways: for server side scripting, for command line scripting and to develop client side GUI applications.

Course Objectives:

After studying the course students will be able to know the following features of PHP:

- PHP a fully object oriented language and its platform independence and speed Helps to design your own large and complex dynamic web applications
- With the use of standard and optional extension modules ,a PHP application can Interact with database such as MYSQL or oracle, draw graphs, create PDF files, and Parse XML files
- PHP can run scripts from the command line which helpd in developing some system Administrative tasks like backup and log parsing

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
SECTION-I				
1	**Introduction to PHP**			
	1.1	What does PHP do ?	**03**	**04**
	1.2	A brief history of PHP, Installing PHP		
	1.3	A walk through on PHP		
2	**Language basics:**			
	2.1	Lexical structure, Data types, Variables Expressions and operators	**04**	**05**
	2.2	Flow control statements, Including code.		
3	**Functions:**			
	3.1	Calling a function, Defining a function	**03**	**05**
	3.2	Variable scope		
	3.3	Function parameters , Return values		
	3.4	Variable Functions, Anonymous Functions		
4	**Strings and Arrays:**			
	4.1	Quoting String Constants, Printing Strings, Accessing Individual characters, Cleaning Strings, Comparing strings.	**05**	**06**
	4.2	Indexed Versus Associative Arrays, Identifying Elements of an Array		
	4.3	Storing data in arrays, Multiplying arrays		
	4.4	Extracting Multiple Values, Traversing Arrays, Sorting, Using array		
SECTION-II				
5	**Objects:**			
	5.1	Terminology, Creating an Object	**06**	**06**
	5.2	Accessing Properties and Methods, Declaring a class, Introspection,		
	5.3	Serialization		

6	**Databases :**			
	6.1	Using PHP to access database, Relational Database and SQL	**05**	**07**
	6.2	PEAR BD basics, Advanced Database Techniques		
	6.3	Sample Application		
7	**Graphics and PDF:**			
	7.1	Embedding an Image in Page, The GD Extension.	**06**	**07**
	7.2	Basics Graphics Concepts, Creating and Drawing Images, Images with text		
	7.3	Dynamically generated Buttons, Scaling Images, Color Handling		
	7.4	PDF extensions, Documents and pages, Text		
		Total	**32**	**40**

List of Practicals / Experiments/Assignments:

Sr. No.	Name of Practicals /Experiment/Assignment	Hrs
1	Sample PHP program.	2
2	Programs using expressions and operators.	4
3	Programs using if else, while loop and switch case.	4
4	Programs on anonymous and variable functions.	4
5	Program on Printing strings.	2
6	Program on comparing strings.	2
7	Program on Removing and inserting elements in array.	2
8	Program on stacks using arrays.	4
9	Creating an Object, Accessing Properties and Methods, Declaring a class in PHP program.	6
10	Program on introspection	4
11	Program on serialization	4
12	PHP program to draw table using PEAR DB basics	6
13	To build a sample PHP-database application using database connectivity and displaying database	6
14	Program using basic drawing functions	2
15	Program to create dynamic button	2
16	Program on scaling images and color handling	2
17	Program on converting an image to text	2

18	Program to create sample PDF document	2
19	Programs on mages and links in PDF documents	4
	Total	**64**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction to PHP	Explanations of basic concepts
2	Language basics	Explanation & Practical implementation
3	Functions	Explanation & Practical implementation
4	Strings and Arrays	Explanation & Practical implementation
5	Objects	Explanation & Practical implementation
6	Databases	Explanation & Practical implementation
7	Graphics and PDF	Explanation & Practical implementation

Text Books:

Sr. No	Author	Title	Publication
1.	Rasmus Lerdorf , Kevin.T & Peter M.	Programming PHP	O'Reilly

Reference Books:

Sr. No	Author	Title	Publication
1.	Steven Holzner	The Complete Reference PHP (Third Edition)	Tata - Macgraw hill

Learning Resources: OPH, LCD Projector and Transparency

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction to PHP	02	01	01	04
2	Language basics	02	01	02	05
3	Functions	02	01	02	05
4	Strings and Arrays	02	01	03	06
5	Objects	02	01	03	06
6	Databases	02	01	04	07
7	Graphics and PDF	02	01	04	07
Total		**14**	**07**	**19**	**40**

(Prof. J.R.Hange)
Prepared By

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Secretary, PBOS

(Prof. S.B.Nikam)
Chairman, PBOS

Programme : Diploma in Information Technology
Programme Code : 07
Name of Course : Database Administration
Course Code : IT762

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	**25**	--	**25**

Course Rationale:

Database Administration has evolved from a specialized computer Application to a central component of a modern computing environment. As such, Knowledge about database administration has become an essential part of an Education in computer science. This course is aimed to present concepts of database Administration.

Course Objectives:

After studying this course, the student will be able to

- Study Relational Database Architectural Components, RDBMS Server, Control File
- Manage Table Spaces and Data Files, Managing Tables, Instance
- Handle Database Creation, Maintaining Redo Log Files, Storage Structure and Relationships, Managing Undo data
- Managing Indexes, Data Dictionary Content and Usage, Managing Password Security and Resources, users, Privileges, Roles.
- Maintaining Data Integrity, Usage Globalization Support, Performance Tuning etc.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
	SECTION - I			
1	**Introduction**			
	1.1	Database Basics, Data Modeling	**06**	**07**
	1.2	The Oracle DBA's World, Relational Database Modeling and Database Design Essential, UNIX (and Linux) for the RDBMS DBA		
	1.3	RDBMS architecture and its main components, Describe the structures involved in connecting a user to RDBMS instance		
2	**The RDBMS, SQL, and PL/SQL,RDBMS Server**			
	2.1	Identify common database administrative tools available to a DBA,.	**13**	**17**
	2.2	Identify the features of the RDBMS universal installer, Explain the benefits of Optimal Flexible architecture, Setup password file authentication,		
	2.3	List the main components of the oracle enterprise manager and their users		
	2.4	Using SQL*Plus and iSQL*Plus		
3	**Database Creation, Connectivity, and User Management**			
	3.1	Schema Management, Transaction Management Creating RDBMS Database	**13**	**16**
	3.2	Describe the prerequisites necessary for database creation, Create a database using database configuration assistant, Create a database manually		
	3.3	Managing an RDBMS Instance - Create and manage initialization parameter files, Configure OMF, Startup and shut down an instance, Monitor the use of diagnostic files Maintaining Redo Log Files -Explain the purpose of online redo log files, Describe the structure of online redo log files.		
	3.4	Control log switches and checkpoints, Multiplex and maintain online redo log files, Manage online redo log files with OMF.		

4	**Data Backup and Recovery**			
	4.1	Data Loading, Backup, and Recovery Connectivity and Networking ,	**12**	**13**
	4.2	User Management and Database Security , Loading and Transforming Data Using the Export and Import Utilities.		
	4.3	Storage structure and Relationships -Describe the logical structure of segments within the database, Describe the segment types and their uses,		
	4.4	List the keywords that control block space usage, Obtain information about storage structures from the data dictionary Managing Undo Data -Describe the purpose of undo data, Implement automatic undo management		
SECTION - II				
5	**Managing the Operational Relational Database**			
	5.1	Backing Up Databases, Database Recovery , Managing the Operational Database	**10**	**13**
	5.2	Using Enterprise Manager Data dictionary content and usage Identify key data dictionary components, Identify the contents and uses of the data dictionary, Query the data dictionary		
	5.3	Managing Privileges - Identify system and object privileges, Grant and revoke privileges		
	5.4	Identify auditing capabilities		
6	**Performance Tuning and Troubleshooting the Production Database**			
	6.1	Improving Database Performance: SQL Query Optimization, Performance Tuning: Tuning the Instance .	**10**	**14**
	6.2	The Data Dictionary and the Dynamic Performance Tables Using PL/SQL Packages ,		
	6.3	Managing Relational Databases on Windows and Linux Systems ,Using Globalization Support- Choose database character set and national character set for a database, specify the language-dependent behavior using initialization parameters,		

	6.4	Environment variables and the ALTER SESSION Command, Use the different types of National Language Support(NLS) Parameters, Explain the influence on language dependent application behavior, Obtain information about Globalization support usage.		
		Total	**64**	**80**

List of Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1	Study of the Oracle/MySQL architecture and its main components	2
	• Relational database Installation, • Using SQL*plus, Maintaining the Control File- Uses of the control file, Contents of the control file, Multiplex and manage the control file • Manage the control file with oracle managed files Obtain control file Information	6
2	• Managing Table spaces and Data files- Create table spaces, Change the size of the table space, Allocate space for temporary segments, Change the status of table spaces, Change the storage settings of table spaces • Implement oracle managed files. • Managing Tables-Various methods of storing data, Distinguish between an extended versus a restricted ROWID, Structure of a row, Create regular and temporary tables, Manage storage structures within a table, Reorganize, truncate, drop a table, Drop a column within a table	8
3	• Managing Indexes- Different types of indexes and their uses, Create various types of indexes, Reorganize indexes, Drop indexes, Get index information from the data dictionary, Monitor the usage of an index	4
4	• Managing password security and Resources -Manage passwords using profiles, Administer profiles, Control use of resources using profiles, Password management • Managing Users-Create new database users, Alter and drop existing database users, Monitor information about existing users.	4

5	• Performance Tuning and Troubleshooting the Production Database • Managing roles-Create and modify roles, Control availability of roles, Remove roles, Use predefined roles, Display role information from the data dictionary • Maintaining and Implementing data Integrity-Implement data integrity constraints, maintain integrity constraints	8
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Database Basics, Data Modeling, and UNIX/Linux, RDBMS Server	Practical approach on database handling
2	The RDBMS, SQL, and PL/SQL, Control File, Table spaces and Data files, Tables	Practical approach on Oracle/MySQL RDBMS
3	Database Creation, Connectivity, and User Management, Redo-Log files, Storage structure and Relationships, Undo data	Practical approach on Database Creation, Connectivity, User Management
4	Data Loading, Backup, and Recovery, Indexes, data Dictionary content and usage, password security	Practical approach on Data Loading, Backup and Recovery
5	Managing the Operational Database, Users, privileges, Roles	Practical approach on management
6	Performance Tuning and Troubleshooting the Production Database, Maintaining data Integrity, Using Globalization support	Practical approach on Tuning

Text Books:

Sr. No	Author	Title	Publication
1	Sam R. Alapati	Expert Oracle9i Database Administration	A press Publication
2	Oracle Education	Oracle9i: DBA Fundamentals	Oracle Education
3	Sam R. Alapati	Expert Oracle9i Database Administration	A press Publication

Reference Books:

Sr. No	Author	Title	Publication
1	Kelvin Loney	Oracle 9i: Complete Reference	BPB Publication
2	Nancy Greenberg Priya Nathan	Introduction to Oracle 9i:SQL(Volume 1 and Volume 2) Oracle 9i: Program with PL/SQL (Volume 1 and Volume 2)	ORACLE Education

Learning Resources: Books, Models

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Database Basics, Data Modeling, and UNIX / Linux	05	03	05	13
2	The RDBMS, SQL, and PL/SQL	05	03	05	13
3	Database Creation, Connectivity, and User Management	05	03	05	13
4	Data Loading, Backup, and Recovery	05	03	05	13
5	Managing the Operational Database	05	03	05	13
6	Performance Tuning and Troubleshooting the Production Database	05	05	05	15
	Total	**30**	**20**	**30**	**80**

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