Name of Programme   : CE/MT/ME

Programme Code   : 01/04/05

Name of Course   : Applied Mathematics III

Course Code   : SC 281

Time Allotted:

	Hours/Week	Total Hours
Theory	2	32
Term work /Tutorials	1	16

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests of 60 Min. duration	3 Hours	--	--	--
Marks	20	80	--	--	00

Course Aim:

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

Course Objectives:

At the end of the course student will be able to

1. Apply the definition of integration as inverse of differentiation to solve problems.

2. Students will be able to apply various methods of integration.

3. To apply mathematical principle to solve engineering problems.

4. To draw and come to a valid conclusion.

5. To locate the exceptional and critical points in an engineering system.

Course Content:

Sr. No	Name	Periods	Marks
1	**INTEGRATION** Definitions, standard formulae, integration of algebraic sum of two or more functions, integration by substitutions and by trigonometric transformations, integration of $\sqrt{ax^2 + bx + c}$, $1/\sqrt{ax^2 + bx + c}$, integration by parts, integration by partial fractions.	10	24
2	**Definite integrals** Definition and properties of definite integrals Example based on these properties	04	08
3.	**APPLICATION OF INTEGRATION** Area under the curve and area between two curves. Volume of solid of revolution.	04	08
4	**Differential Equations** – Definition, order and degree of differential equations. Formation of differential equations. 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.	05	16
5	**Statistics** – Measures of central tendency : (a)Mean (b) Median (c) Mode Measures of dispersion : a) Standard deviation (b) Co-efficient of variance	05	12
6	**Probability-** Defination of Random experiment, sample space,event,occurrence of events and types of events-(impossible,mutually exclusive,exahaustive,equally likely) Defination of probability, addition and multiplication theorems of probability.	04	12

Reference Books:

Author	Title	Publisher
Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi
Vishwanath	Engineering Mathematics Vol.II	Satya Prakashan, New Delhi
S.P. Deshpande	Mathematics for Polytechnic students	Pune Vidyarthi Griha Prakashan
H.K. Dass	Engineering Mathematics Part II	S. Chand & Co. Ltd. Delhi

Learning Resources: Chock Board etc.

Specification Table:

Sr. No.	Topic / subtopic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Integration	08	16	00	24
2	Definite Integration	04	04	00	08
3	Application of integration	00	00	08	08
4	Differential Equations	04	08	04	16
5	Statistics	04	04	04	12
6	Probabilily	04	04	04	12
	Total	24	36	20	80

Prepared by

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Lect.in Mathematics

(AS.Zampure)
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(N.S.Kadam)
Chairman PBOS

Programme	:	Diploma in MT
Programme Code	:	05/19
Name of Course	:	Furnace Technology
Course Code	:	MT281

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 minutes	3Hrs.	--	--	--
Marks	20	80	--	--	--

Course Rationale:

The subject deals with different types of fuels, refractories and furnaces.

Course Objectives:

After studying this course, the student will be able to
- Understand various fuels.
- Understand various refractories.
- Study various furnaces.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weight age
1	**Refractories**			
	1.1	Definition, classification, important properties, materials and factors affecting selection of proper refractories.	07	12
	1.2	Types & Properties of refractories, Special refractories.		
	1.3	Testing of refractories; Interaction between refractories and metals.		
	1.4	Applications of refractories.		
2	**Fuels**			
	2.1	Introduction to conventional fuels.	05	08
	2.2	Properties of solid, liquid & gaseous fuels.		
	2.3	Classification & characteristics of various fuels.		
3	**Heat Transfer In Industrial Furnaces**			
	3.1	Basic principles	05	08
	3.2	Regenerators and recuperators.		
	3.3	Basic energy calculations for heating and melting furnaces.		
4	**Introduction To Furnaces**			
	4.1	Classification, construction, working & application, lining of various fuel fired furnaces.	07	12
	4.2	Introduction to Sealed quench and Fluidized bed furnace.		
	4.3	Materials for Industrial furnace construction, accessories such as burners, blowers, vacuum pumps, exhaust system.		
	4.4	Operations and control of industrial furnaces.		
	4.5	Industrial furnace atmosphere.		
	4.6	Furnace atmosphere measurement using Oxygen probe, Dew point controller.		
5	**Electric Resistance Heating**			
	5.1	Direct & Indirect resistance heating.	10	16
	5.2	Melting of glasses & Electric salt bath furnace.		
	5.3	Types of heating elements.		
	5.4	Construction of furnace, coil dimensions.		
	5.5	Design & construction of muffle furnace.		

6	Arc Furnaces (Steel melting)			
	6.1	Direct & Indirect arc furnaces, construction, working & application, refractory lining, electrodes, operational parameters.	10	16
	6.2	Induction Furnaces (cast iron & steel melting). Principle, core & coreless type, skin effect, calculation of minimum frequency, power generation, depth of penetration, crucible preparation. Vacuum induction furnace.		
7	Melting of Nonferrous Materials			
	7.1	Crucible furnace- Lift out type, Tilting type.	04	08
	7.2	Reverberatory furnace - Sklener furnace.		
	7.3	Barrel type furnace.		
	7.4	Degassing procedure, charge calculation and other individual problem.		
		Total	48	80

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Refractories	Class room teaching, practical work, group discussion and industrial visits.
2	Fuels	Class room teaching
3	Heat Transfer In Industrial Furnaces	Class room teaching
4	Furnaces	Class room teaching, industrial visits
5	Electric Resistance Heating	Class room teaching, group discussion and industrial visits.
6	Arc Furnaces	Class room teaching, expert lectures
7	Melting of Nonferrous Materials	Class room teaching, expert lectures group discussion and industrial visits.

Text Books:

Sr. No	Author	Title	Publication
1	O.P.Gupta	Element of Fuels, Furnace & Refractories	Khanna Publishers
2	W. Trinks & M.H.Nawhiney	Industrial Furnaces, VI Edition, 2004	Wiley Publisher Newyork
3	Barbers	Electroheat	Granada Publication, London

Reference Books:

Sr. No	Author	Title	Publication
1	D.N.Nandi	Handbook On Refractories	Tata McGraw Hill Co. Ltd.
2	S. Sarkar	Fuels & Combustion	Orient Longmann Mumbai 1990
3	Trinks, Mawhinney, Shannon, Reed & Garvey	Industrial Furnace Vol. I & II	
4	Heine, Loper & Rosenthal	Principal of Metal Casting	

Learning Resources: Models, charts, structures, slides and photographs.

Specification Table:

Sr. No.	Topic	Knowledge	Comprehension	Application	Total
		Cognitive Levels			
SECTION I					
1	Refractories	08	02	02	12
2	Fuels	04	02	02	08
3	Heat Transfer In Industrial Furnaces	04	02	02	08
4	Furnaces	08	02	02	12
SECTION II					
5	Electric Resistance Heating	08	04	04	16
6	Arc Furnaces	08	04	04	16
7	Melting of Nonferrous Materials	04	02	02	08
	Total	44	18	18	80

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