



COMSATS University Islamabad
Defence Road, Off Raiwind Road, Lahore

COURSE HANDBOOK
with Specified Exercises and Questions

(Book: Munem. M. A, Foulis. D. J, Calculus with Analytical Geometry (second edition))

1	Course Title	Calculus and Analytic Geometry
2	Course Code	MTH104
3	Credit Hours	3(3,0)
4	Semester	Spring 2024
5	Resource Person	Dr. M. Kamran Siddiqui
6	Supporting Team Members	--
7	Contact Hours (Theory)	3 hours per week
8	Contact Hours (Lab)	Not Applicable
9	Office Hours	8:30am to 11am
10	Course Contents	Inequalities, Functions, Shifting Graphs, Limits of Functions, Continuity, Derivative of a Function and its Applications, Integration, Indefinite Integrals, Definite Integrals, Applications of Integrals, Techniques of Integration, Improper Integral, L'Hopital's rule, Infinite series, Sequences and Limit of Sequence of numbers, Convergence and Divergence Tests, Alternating Series Test, Absolute and conditional convergence, Power Series, Taylor's Series and Maclaurin Series, Convergence of Taylor's Series, Error Estimates, Application of Power Series.
13	Lecture/Lab Schedule	
	<u>Weeks</u>	<u>Topic of Lecture</u>
		<u>Exercises with questions to be completed</u>
Week 1	Inequalities <ul style="list-style-type: none"> Real Number System Inequalities and Absolute Value 	Ex: 1.1—Questions: 1—24, 31—39, 41—45.
Week 2	Functions. <ul style="list-style-type: none"> Definition and Graph of a Function Vertical Line Test Types of Functions 	Ex: 1.4—Qstns: 1—37, Ex: 1.5--Q: 1—43 .
Week 3	Functions. <ul style="list-style-type: none"> Algebra of Functions Shifting Graphs 	Ex:1.6—Only intro to trigonometric functions
Week 4	Limits of Functions <ul style="list-style-type: none"> What is a Limit? (Algebraically and Geometrically) Properties of Limits 	Ex: 1.8—Qstns: 1—66, 77
Week 5	Continuity of Functions <ul style="list-style-type: none"> Definition with Graphical Interpretations Basic Algebraic Properties of Continuous Functions. 	Ex: 1.9—Qstns: 1—43.

Week 6	Derivative of a Function and its Applications <ul style="list-style-type: none"> • Rates of Change and Slopes of Tangent Lines • The Derivative of a Function • Basic Algebraic Rules for Differentiation • Tangent and Normal Lines. 	Ex: 2.1—Qstns: 3-20. Ex: 2.3—Qstns: 1-43. Ex: 2.4—Qstns: 1-33. Ex: 2.5—Qstns: 1-36, 39,40.
Week 7	Derivative of a Function and its Applications <ul style="list-style-type: none"> • The Chain Rule • Implicit Differentiation • Higher Order Derivatives • Algebraic Signs 	Ex: 2.7—Qstns: 1-62. Ex: 2.8—Qstns: 1-46. Ex: 2.10—Qstns: 1-46. Ex: 2.11—Qstns: 19-32.
Week 8	Antidifferentiation <ul style="list-style-type: none"> • Antiderivatives • Basic Algebraic Rules • Change of Variables 	Ex: 4.2—Qstns: 1-40. Ex: 4.3—Qstns: 1-50.
Week 9	Definite Integrals <ul style="list-style-type: none"> • Sigma Notation • The definite integral • Basic properties of the definite integral • The Fundamental Theorems of Calculus. 	Ex:5.1—Qstns: 1-20. Ex:5.3—Qstns: 1-29,31-34. Ex:5.4—Qstns: 1-43.
Week 10	Techniques of Integration <ul style="list-style-type: none"> • Integration by Substitution. • Integration by Parts. • Partial Fraction. 	Ex:8.3—Qstns: 1-22, 25-48. Ex:8.4—Qstns: 1-50. Ex:8.5—Qstns: 1-36.
Week 11	Applications of Integral <ul style="list-style-type: none"> • Area • Arc length L'Hopital's rule <ul style="list-style-type: none"> • The Indeterminate Form $0/0$ 	Ex:5.6—Qstns:1-44. Ex:6.4—Qstns: 1-13. Ex:10.1—Qstns: 1-22.
Week 12	L'Hopital's rule <ul style="list-style-type: none"> • Other Indeterminate Forms Improper Integrals <ul style="list-style-type: none"> • Improper Integrals with Infinite limits • Improper Integrals with Unbounded Integrands. 	Ex:10.2—Qstns:1-50. Ex: 10.3—Qstns: 1-24.
Week 13	Infinite series <ul style="list-style-type: none"> • Sequences and Limits of Sequences • Infinite series • Properties of Infinite series • Convergence and Divergence Tests 	Ex: 11.1—Qstns: 1-44. Ex: 11.2—Qstns: 1-29. Ex: 11.3—Qstns: 1-14. Ex: 11.4—Qstns: 1-20.
Week 14	Infinite series <ul style="list-style-type: none"> • Convergence and Divergence Tests • Alternating Series • Alternating Series Test • Absolute and conditional convergence 	Ex: 11.5—Qstns: 15-54.
Week 15	Infinite series <ul style="list-style-type: none"> • Power Series • Taylor's Series and Maclaurin Series 	Ex: 11.6—Qstns: 1-38. Ex: 11.8—Qstns: 1-24.
Week 16	Revision.	

14	Course Assessment		
The assessment of this module shall have following breakdown structure			
Mid terme Exam 25%			
Quizzes/Assignments 25%			
Terminal Examination 50%			
The minimum pass marks for each course shall be 50%. Students obtaining less than 50% marks in any course shall be deemed to have failed in that course. The correspondence between letter grades, credit points, and percentage marks at CIIT shall be as follows:			
Grades	Letter Grade	Credit Points	Percentage Marks
A	(Excellent)	4.0	90and above
A-		3.7	85-89
B+		3.3	80-84
B	(Good)	3.0	75-79
B-		2.7	70-74
C+		2.3	65-69
C	(Average)	2.0	60-64
C-		1.7	55-59
D	(Minimum passing)	1.3	50-54
F	(Failing)	0.0	Less than 50
Note: The marks to be assigned to students shall be in whole numbers and are not same as followed in the annual system of Lancaster University.			
17.	Text Book	Munem. M. A, Foulis. D. J, Calculus with Analytical Geometry (second edition), Worth Publishers, Inc.	
18.	Reference Books	Thomas Calculus (11th Edition). Anton, H, Calculus: Eighth Edition, John Wiley & sons, Inc.	
19.	Attendance Policy		
Every student must attend 80% of the lectures/seminars delivered in this course and 80% of the practical/laboratory work prescribed for the respective courses. The students falling short of required percentage of attendance of lectures/seminars/practical/laboratory work, etc., shall not be allowed to appear in the terminal examination of this course and shall be treated as having failed this course.			