Grade point vs Marks:

**BS / SE BBA/ EE**

**Equivalent % Grade**

**Marks Points**

A 86 4.00 86 A- 82 3.67 82 B+ 78 3.33 78 B 74 3.00 74 B - 70 2.67\* 70 C+ 66 2.33\* 66 C 62 2.00\* 62 C- 58 1.67\* 58 D+ 54 1.33\* 54 D 50 1.00\* 50

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Assistant Prof:Jamil usmani , NU-FAST 2

Grade Point Average : GPA (calculuation)

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Course code: MT119 Course title: Calculus and Analytical Geometry Credit hour :3+0

Book Title: *Calculus Early Transcendental 10th Edition*

Author( Howard Anton)

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What is CALCULUS ?

• Calculus is a branch of mathematics that involves the study of

rates of change.

• Leibniz and Isaac Newton, 17th-century mathematicians, both invented calculus independently. Newton invented it first, but Leibniz created the notations that mathematicians use today.

• There are two types of calculus: 1-Differential calculus determines the rate of change of a quantity 2-integral calculus finds the quantity where the rate of change is

known.

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Practical Applications

• Calculus has many practical applications in real life. Some of the concept that use calculus include motion, electricity, heat, light, harmonics, acoustics, and astronomy.

• Calculus is used in geography, computer vision (such as for autonomous driving of cars), photography, artificial intelligence, robotics, video games, and even movies.

• Calculus is also used to calculate the rates of radioactive decay in chemistry, and even to predict birth and death rates, as well as in the study of gravity and planetary motion, fluid flow, ship design, geometric curves, and bridge engineering.

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Practical Applications

• In physics, for example, calculus is used to help define, explain, and calculate motion, electricity, heat, light, harmonics, acoustics, astronomy, and dynamics.

• Einstein's theory of relativity relies on calculus,

• A field of mathematics that also helps economists predict how much profit a company or industry can make and in shipbuilding.

• calculus has been used for many years to determine both the curve of the hull of the ship (using differential calculus), as well as the area under the hull (using integral calculus), and even in the general design of ships.

• In addition, calculus is used to check answers for different mathematical disciplines such as statistics, analytical geometry, and algebra.

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Detail Outline: Function,Limit and countinuity

• Introduction to Functions, vertical line test, Piecewise and Absolute value function, Domain and Range, Composition of function, Symmetry Test

• Basic Concepts of limit.

• Evaluation of limits.

• Continuity and point of discontinuity. Types of discontinuity

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Differential Calculus:

• Secant line, Equation of Normal and tangent line, Slope ,Rate of change

• Concept and idea of differentiation, Geometrical and Physical meaning of derivatives,

• Rules and techniques of differentiation.

• Product and quotient rule

• Derivative of trigonometric function

• Chain rule

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Applications of Derivative in Graphing:

• Implicit differentiation

• Indeterminate forms ,L’ Hospital Rule

• Role’s and Mean Value’s Theorem.

• Concavity, Increasing and Decreasing interval

• Relative Extrema (Maxima and Minima), 1st derivative and 2nd derivative test

• Absolute Maxima and Minima

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Integral Calculus:

• Concept and idea of Integration, Indefinite Integrals,Riemann sums

• Techniques of integration

• Basic Integration ,Integration by parts Trigonometric substitution

• Integration of Rational function by Partial fraction

• Improper integrals

• Applications of Integration, Definite Integrals ,

• Area bounded by the curves.

• Volume by Disk and washer method

• Applications of Integration : Arc length

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Analytical Geometry:

• Parametric equations of lines in 3D

• Plane in 3-space ,

• Distance Problems involving planes,

• Intersecting planes

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Grading Criteria: Marks Distribution:

• 1. Class participation/Attendance 02

• 2. Quizzes 10

• 3. Assignments 08

• 4. First Mid Exam 15

• 5. Second Mid Exam 15

• 6. Final Exam 50

**Total:- 100**

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Number systems:

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LAWS OF SETS:

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History of Pi and Golden Ratio

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INTERVALS :set of real numbers called intervals

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OR

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Inequalities:

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Rule for

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Solve :

No sol

All Real

No sol

No sol

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Relation and Function:

• A relation is a set of ordered pairs (x, y) OR A subset of AxB

Example: The set {(1,a), (1, b), (2,b), (3,c), (3, a), (4,a)} is a relation

• A relation is not a function.

• A function is a relation (so, it is the set of ordered pairs) that does not contain two pairs with the same first component.

• OR

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**Example:**

**Example:**

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Practice: [composite function]

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Practice:

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Write domain and Range of the given graph

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Domain and Range:

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Inverse Trig.function:

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**Example:**

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**NOTE:**

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Practice:

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Practice: