MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO
DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES

Title of Subject : Applied Calculus Code: MTH 108
Discipline : EL/ME/ES/TL/CS/SW/PG/CH/MN/MT/IN/
: CE/EE/BM
Semester : 1st semester and 2nd semester
Effective : 17 Batch onwards
Pre-requisites : Pre – Engineering
Assessment : 20% sessional work Mid-sem. Exam: 20% End-Sem Exam: 60%
Marks : TH: 100 PR: 00
Credit Hours : TH: 03 PR: 00
Min. Contact Hours : TH: 45 PR: 00

Course Learning Outcomes

After completion of this course the student should be able to:

CLO	Description	Taxonomy Level	PLOs
1	Determine the functions and their derivatives.	C2	1
2	Compute the Integral calculus with applications	C2	1
3	Apply the vector calculus in the field of engineering	C3	1

Assessment Methods of CLOs of Subject name

CLOS	Sessional Tests and Assignments	Mid Exam	Final Exam	Learning Levels	PLOs
CLO 1	20%	70%	10%	C2	1
CLO 2	40%	30%	30%	C2	1
CLO 3	40%	-------	60%	C3	1

Contents

Introduction to functions: Mathematical and physical meaning, graphs and types of function.

Introduction to limits: Theorems of limits and their applications to functions. Right hand and left hand limits. Continuous and discontinuous functions and their applications.

Derivatives: Introduction to derivatives. Geometrical and physical meaning of derivatives. Partial derivatives and their geometric significance. Application problems (rate of change, marginal analysis).

Higher Derivatives: Leibnitz theorem, Rolle's theorem,Mean value theorem. Taylors and Maclaurins series.

Evaluation of limits using L' Hospital's rule: Indeterminate forms (0/0), (∞/∞), (ox∞), (∞-∞), 1^{∞}, ∞^0, 0^0.

Application of Derivatives: Asymptotes, curvature and radius of curvature, differentials with application.

Application of partial Derivatives: Euler's theorem, total differentials; maxima and minima of function of two variables.

Integral Calculus: Methods of integration by substitution and by parts. Integration of rational and irrational algebraic functions. Definite integrals, improper integrals. Gamma and Beta functions; reduction formulae.

Application of Integral Calculus: Cost function from marginal cost, rocket flights; area under curve.

Vector Calculus: Vector differentiation and vector integration with their physical interpretation and applications.∇operator, gradient, divergence and curl with their application.

Books Recommended:

- Benice, D.D., Brief calculus and its applications,
- Raymond, A.B., Applied calculus
- Yousuf, S.M., Calculus and analytical Geometry, IlmiKitabKhana, Lahore, latest edition.

Approval: Board of Studies: 01/2018 Res. No. 01, dated: 26-03-2018
Board of FOST&H, Res. No. 3.1, dated: 11-4-2018
Academic Council: Res. No. 17 (ii), dated: 23-4-2018