CO-PO attainment

in

Outcome Based Education

CCFUP UNDER NEP 2020

Department of Mathematics,

Government General Degree College, Kalna-I

Program Outcome (PO)

- ❖ PO1: Disciplinary knowledge
- ❖ PO2: Communication Skills
- ❖ PO3: Critical thinking
- ❖ PO4 : Problem solving
- ❖ PO5: Self-directed learning
- ❖ PO6: Research-related skills
- ❖ PO7: Analytical reasoning
- ❖ PO8: Information/digital literacy
- ❖ PO9: Lifelong learning

Program Specific Outcome (PSO): UG Mathematics

PSO1:
Foundation of Mathematical Concepts: To use mathematical methodologies to crack problems using suitable mathematical analysis and suitable techniques.

PSO2:
Foundation of Mathematical System: The ability to interpret the fundamental concept and methodologies of mathematical systems like group theory, mechanics, metric space and other real and abstract mathematical structures and spaces. Students can understand the functionality of analytical part and analysis of fundamental mathematical structures.

PSO3:
Foundation of Mathematical Development: The ability to grasp the mathematical development lifecycle and methodologies of mathematical systems. Familiarity and practical proficiency with broad area of real life applications and provide new ideas and innovations towards research.

MATHEMATICS MAJOR
Course code : MATH1011
Course name : Calculus, Geometry & Vector Calculus (Marks : 75)
Total Lecture Hours : 60

Contents:

Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax+b}\sin x$, $e^{ax+b}\cos x$, $(ax+b)^n \sin x$, $(ax+b)^n \cos x$, indeterminate forms, L'Hospital's rule, concavity of curves, points of inflection, envelopes, asymptotes, curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves. **[L–12H & T–4H]**

Reduction formulae, derivations and illustrations of reduction formulae for the integration of $\sin nx$, $\cos nx$, $\tan nx$, $\sec nx$, $(\log x)^n$, $\sin^n x \sin^m x$, parametric equations, parametrizing a curve, arc length, arc length of parametric curves, area of surface of revolution. **[L–10H & T–3H]**

Reflection properties of conics, translation and rotation of axes, general equation of second–degree, classification of conics, polar equations of conics, spheres, cylindrical surfaces. central conicoid, paraboloids, plane sections of conicoid, generating lines, classification of quadrics. **[L–11H & T–4H]**

Triple product of vectors, introduction to vector functions, algebraic operations on vector–valued functions, limits and continuity of vector functions, differentiation and partial differentiation of vector functions, gradient of a scalar function, divergence and curl of vector functions. **[L–12H & T–4H]**

Course Outcome (CO)   Paper: MATH1011

Sl. No.	Course Outcome (CO)	Knowledge Level (Bloom's Level)	POs	PSOs
1	**Recall** the definitions and properties of hyperbolic functions and their derivatives.	L1: Remember	1, 3, 4, 6,7, 9	1,2,3
2	**Understand** the concepts of higher-order derivatives, Leibnitz rule, concavity, and inflection points.	L2 : Understand	1, 2, 3, 4, 7.6	1,2,3
3	**Apply** reduction formulae and integration techniques to find arc length and area of surface of revolution.	L3: Apply	1,3, 4, 5, 7	1,2,3
4	**Analyze** the properties and characteristics of conics and quadrics..	L4: Analyze	1, 3, 4, 5, 7	1,2,3
5	**Evaluate** the classifications and characteristics of different types of conics and quadrics.	L5: Evaluate	1,3, 4,5, 7,9	1,2,3
6	**Analyze** the geometric and physical interpretations of derivatives and integrals of vector functions.	L4: Analyze	1, 3, 4, 5,7, 9	1,2,3

MATHEMATICS MAJOR
Course code : MATH1011
Course name : Calculus, Geometry & Vector Calculus (Marks : 75)
Total Lecture Hours : 60

Programme Articulation Matrix (CO-PO Matrix)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	1	2	-	-	-	2	-	3	-	1	1
CO2	1	3	2	3	1	1	2	-	2	-	1	1
CO3	2	2	2	2	2	1	1	-	2	2	2	2
CO4	2	2	2	2	3	3	1	-	1	1	2	2
CO5	2	3	1	2	2	3	1	1	2	2	1	3
CO6	3	2	2	1	2	1	2	-	2	2	2	2
AVG	2.0	2.17	1.83	2.0	2.0	1.8	1.5	1.0	2.0	1.75	1.5	1.83

MATHEMATICS MAJOR
Course code : MATH1051
Course name : Graph Theory (Marks : 50)
Total Lecture Hours : 40

Definition, examples and basic properties of graphs, complete graphs, Havel-Hakimi theorem (Statement and its application), bi-partite graphs, isomorphism of graphs.[L-8H & T-3H]

Königsberg bridge problem, Eulerian graph, Hamiltonian graph, Representation of a graph by a matrix, the adjacency matrix, incidence matrix, weighted graph.[L-9H & T-3H]

Travelling salesman's problem, shortest path, Tree and their properties, spanning tree, Dijkstra's algorithm, Warshall algorithm. [L-9H & T-3H]

Planar and non-planar graphs, Euler's formula, colouring of graphs, four colour problem, five colour theorem. [L-4H & T-1H]

Course Outcome (CO) Paper: MATH1051

Sl. No.	Course Outcome (CO)	Knowledge Level (Bloom's Level)	POs	PSOs
1	**Define** graphs, complete graphs, bipartite graphs, isomorphism of graphs.	L1: Remember	1, 3, 4, 6,7, 9	1,2,3
2	**Interpret** the concept of Eulerian and Hamiltonian graphs.	L2 : Understand	1, 2, 3, 4, 7.6	1,2,3
3	**Apply** matrix representation to analyze graphs.	L3: Apply	1,3, 4, 5, 7	1,2,3
4	**Create** examples of trees and spanning trees.	L6: Create	1, 3, 4, 5, 7	1,2,3
5	**Analyze** and compare planar and non-planar graphs.	L4: Analyze	1,3, 4,5, 7,9	1,2,3
6	**Evaluate** the effectiveness of different graph coloring strategies.	L6: Evaluate	1, 3, 4, 5,7, 9	1,2,3

Programme Articulation Matrix (CO-PO Matrix)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	-	-	1	-	-	-	1	-	1	1
CO2	1	1	-	1	1	-	-	-	1	-	1	1
CO3	2	1	2	2	1	1	1	-	2	2	2	2
CO4	3	2	3	3	3	3	3	3	2	3	2	2
CO5	2	3	2	1	3	3	3	1	2	2	2	3
CO6	2	2	2	3	2	2	3	1	2	2	2	2
AVG	1.83	1.67	2.25	2.0	1.83	2.25	2.5	1.67	1.67	2.25	1.67	1.83