KOLHAN UNIVERSITY, CHAIBASA JHARKHAND

Revised Curriculum and Credit Frame work for SEM – I as per FYUGP, NEP- 2020 (U.G. Mathematics – 2022 Onward)

University Department of Mathematics
Kolhan University, Chaibasa
West Singhbhum, Jharkhand-833202

UNIVERSITY DEPARTMENT OF MATHEMATICS
KOLHAN UNIVERSITY
CHAIBASA

Four-Year under Graduate Programme (FYUGP)

As per Provisions of NEP-2020 to be implemented from Academic Year 2022-23

COMPOSITION OF BOARD OF STUDIES

1. **Dr. Bijay Kumar Sinha**
   Head, University Department of Mathematics,
   Kolhan University Chaibasa

2. **Mr. Mahendra Kumar Rana**
   Assistant Professor,
   University Department of Mathematics,
   Kolhan University Chaibasa

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   Karim City, College, Jamshedpur

4. **Dr. P. C. Banerjee**
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   Karim City, College, Jamshedpur

($Dr. Bijay Kumar Sinha$)
(Chairman & Head)
University Department of Mathematics,
Kolhan University, Chaibasa.

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Semester	**Paper**	**Code**	**Course Title**	**Credit**
I	Major 1	MJ-1	Calculus	4
	Minor-1	MN-1	Calculus	4

Program: **Certificate Class: UG**	Year: **First**		Semester: **I**
Subject: **Mathematics**			
Course Code: **MJ-1**	Course Title: **Calculus**		

Course Learning Outcomes: This course will enable the students to:
  a) Assimilate the notions of the boundary of a sequence and the convergence of a series of real numbers Calculate the limit and examine the continuity of a function at a point.
  b) Understand the consequences of various mean value theorems for differentiable functions.
  c) Sketch curves in Cartesian and polar coordinate systems.
  d) Apply derivative tests in optimization problems appearing in social sciences, physical sciences, life sciences and a host of other disciplines.
   f) Various integration techniques learn which help in engineering and research.

Credit: **4 (Theory)**	**Compulsory**
Full Marks: **75**	Time: **3 Hours**

Unit	Content	Hours
I	**Differential calculus:** Differentiability of a real valued function, Geometrical interpretation of differentiability, Rules of differentiation, Chain rule of differentiation; Darboux's theorem, Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Geometrical interpretation of mean value theorems, Successive differentiation, Leibnitz's theorem.	**15 h**
II	**Expansions of Functions:** Maclaurin's and Taylor's theorems for expansion of a function in an infinite series, Taylor's theorem in finite form with Lagrange, Cauchy and Roche–Schlomilch forms of remainder, Maxima and minima.	**12 h**
III	**Curvature and Asymptotes:** Curvature; Asymptotes of general algebraic curves, Parallel asymptotes, Asymptotes parallel to axes; Symmetry, Concavity and convexity, Points of inflection, Tangents at origin, Multiple points, Position and nature of double points.	**13 h**
IV	**Curve Tracing:** Tracing of Cartesian, polar and parametric curves; Envelope and evolutes.	**10 h**
V	**Integral Calculus:** Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\, dx, \int \cos^n x\, dx, \int \tan^m x\, dx, \int \sin^n x \cos^m x\, dx$ and $\int \sin^m x \cos nx\, dx$, parametric equations, parameterizing a curve, arc length, arc length of parametric curves, Area of bounded curve, volume and area of surface of revolution.	**10 h**
Sessional Internal Assessment (SIA) Full Marks – 25 Marks **A – Internal written Examination – 20 Marks (1 Hr)** **B – Over All Performance including Regularity – 05 Marks**		

Books Recommended:
1. R. K. Dwivedi, Calculus, 1st Edition, Pragati Prakashan, Meerut, India (2019).
2. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition). Wiley India.
3. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.
4. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs. Narosa.
5. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.
6. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.

Program: **Certificate** Class: **UG**	Year: **First**		Semester: **I**
Subject: **Mathematics**			
Course Code: **MN-1**	Course Title: **Calculus**		
Course Learning Outcomes: This course will enable the students to: a) Assimilate the notions of limit of a sequence and convergence of a series of real numbers. b) Calculate the limit and examine the continuity of a function at a point. c) Understand the consequences of various mean value theorems for differentiable functions. d) Sketch curves in Cartesian and polar coordinate systems. e) Various integration techniques appearing in engineering and research. f) Basic idea of sequence and series.			
Credit: **4 (Theory)**	**Compulsory**		
Full Marks: **75**	Time: **3 Hours**		

Unit	Content	Hours
I	**Differential calculus:** Differentiability of a real valued function, Geometrical interpretation of differentiability, Rules of differentiation, Chain rule of differentiation; Darboux's theorem, Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Geometrical interpretation of mean value theorems, Successive differentiation, Leibnitz's theorem.	**15 h**
II	**Asymptotes:** Curvature; Asymptotes of general algebraic curves, Parallel asymptotes, Asymptotes parallel to axes; Symmetry, Concavity and convexity, Points of inflection, Tangents at origin, Multiple points, Position and nature of double points.	**15 h**
III	**Integration**: Antiderivatives, Indefinite and definite integrals, Riemann sums and the definite integral, Fundamental theorem of calculus, Properties of definite integrals, Integration Techniques, Integration of irrational algebraic functions and transcendental function.	**15 h**
IV	**Integral Calculus:** Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\,dx, \int \cos^n x\,dx, \int \tan^m x\,dx, \int \sin^n x \cos^m x\,dx$ and $\int \sin^m x \cos nx\,dx$, parametric equations, parameterizing a curve, arc length, arc length of parametric curves, Area of bounded curve, volume and area of surface of revolution.	**15 h**
Sessional Internal Assessment (SIA) Full Marks – 25 Marks **A – Internal written Examination – 20 Marks (1 Hr)** **B – Over All Performance including Regularity – 05 Marks**		

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