BAGALKOT UNIVERSITY
JAMKHANDI

PROGRAM /COURSE STRUCTURE AND SYLLABUS
For

Bachelor of Science with MATHEMATICS
I and II Semester

w.e.f.
Academic Year 2024-25 and onwards

PROGRAM STRUCTURE

Syllabus and Credits Structure under Choice Based Credit System [CBCS] General Degree for the Three Years B.Sc. with Mathematics Undergraduate Programme with effect from 2024-25

First Semester B.Sc. With Mathematics Scheme

SEMESTER-I											
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/ week**			**Credits**	**Duration of Exam** (Hrs)	**Teaching Department**
			IA	**SEE**	**Total**	**L**	**T**	**P**			
L1	--------	Language 1	20	80	100	4	-	-	3	3	-
L2	--------	Language 2	20	80	100	4	-	-	3	3	-
Major	2A1MATM01T	Algebra and Calculus	20	80	100	4	-	-	3	3	Mathematics
	2A1MATM01L	Theory based practical's Algebra and Calculus. Lab	10	40	50	-	-	4	2	3	Mathematics
Major	--------	Major Subject 2	20	80	100	4	-	-	3	3	---
	--------	Practical	10	40	50	-	-	4	2	3	---
Major	--------	Major Subject 3	20	80	100	4	-	-	3	3	---
	--------	Practical	10	40	50	-	-	4	2	3	---
Common	2S1XXXC01T	Constitutional Values	1s0	40	50	2	-	-	2	2	Constitutional Values: Political Science
	2S1XXXC02T	Environment Studies									Environmental Studies: Chemistry/ /Geography/ Botany
Total Marks					**700**	**Semester Credits**			**23**		

Second Semester B.Sc. Mathematics Scheme

	SEMESTER-II										
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/ week**			**Credits**	**Duration of exams (Hrs)**	**Teaching Department**
			IA	**SEE**	**Total**	**L**	**T**	**P**			
L3	--------	Language 3	20	80	100	4	-	-	3	3	-
L4	--------	Language 4	20	80	100	4	-	-	3	3	-
Major	2A2MATM02T	Calculus and Three dimensional Geometry(Theory)	20	80	100	4	-	-	3	3	Mathematics
	2A2MATM02L	Theory based practical's Calculus and Three dimensional Geometry Lab	10	40	50	-	-	4	2	3	Mathematics
Major	--------	Major Subject 2	20	80	100	4	-	-	3	3	------
	--------	Practical	10	40	50	-	-	4	2	3	------
Major	--------	Major Subject 3	20	80	100	4	-	-	3	3	----
	--------	Practical	10	40	50	-	-	4	2	3	------
Common	2S1XXXC01T	Constitutional Values	10	40	50	2	-	-	2	2	Constitutional Values: Political Science
	2S1XXXC02T	Environment Studies									Environmental Studies: Chemistry/Geography / Botany
Total Marks					**700**	**Semester Credits**			**23**		

First Semester B.Sc Mathematics Theory

Paper Title : Algebra and Calculus (Theory)	**Marks:Th-80+IA-20=100**
Paper Code: 2A1MATM01T	**Total hours:52**
Teaching Hours:4 Hours/Week	**Credits:03**

UNIT-I:MATRICES AND DETERMINANTS	**13Hours**
Recapitulation of Elementary Transformations of matrices, Rank of a Matrix, Row and column reduction to Echelon form. Reduction to Normal forms, Inverse of matrix by elementary transformations, Cayley-Hamilton theorem (Without Proof), .	
UNIT-II:REAL NUMBER SYSTEM	**13 Hours**
Properties of real number system, inequalities & absolute values, l.u.b, g.l.b and Archimedean properties of real numbers. Limits and Continuity: Recapitulation of limits and continuity. Algebra of limits (with proofs). Algebra of continuous functions (without proofs). Properties of Continuous functions. Boundedness of continuous functions, Intermediate value theorems.	
UNIT-III: HIGHER ORDER DERIVATIVES	**13 Hours**
The nth derivative of a polynomial function $(ax+b)^n$, $1/ax+b$, logarithmic function $(ax+b)$, exponential function $(ax+b)$, Trigonometric function $\sin(ax+b)$, $\cos(ax+b)$, e^{ax}. $\sin(bx+c)$, $e^{ax}.\cos(bx+c)$, Leibntz's theorem for n^{nt} derivative of a product of two functions.	
UNIT-IV:MEAN VALUE THEOREMS	**13 Hours**
Rolle's Theorem, Lagrange's MeanValueTheorem, Cauchy's MeanValue Theorem, Taylor's Theorem (with Sclomilch and Rouche's form of reminder)	

Reference Books:

1. Differential Calculus–Shanti Narayan and Mittal
2. Real Analysis-NP Bali
3. First Course in Real Analysis-M.K.Singal and Asha Rani
4. Text book of B.Sc Mathematics-G.K. Raganath
5. Matrices and determinants- M.L.Khanna

First Semester B.Sc Mathematics Practicals

Paper Title: Theory based Practicals Algebra and Calculus	**Marks:PR-40+IA-10**
Paper Code: 2A1MATM01L	**Total Marks:50**
Teaching Hours: 4Hours/Week/ batch	**Credits:02**

Introduction to Sci Lab/Maxima and commands related to the topic.

1. Computation of Sum, Difference and Product of two Matrices.
2. Computation of trace and transpose of matrices.
3. Computation of rank of matrix and row reduced echelon form.
4. Computation of inverse of a matrix using Cayley–Hamilton theorem.
5. Solution of system of homogeneous and non-homogeneous equations.
6. Finding n^{th} derivative of exponetial, trigonometric and hyperbolic functions.
7. Finding n^{th} derivative of algebraic functions and Logarithmic functions.
8. Finding n^{th} derivative of $e^{ax}.\sin(ax+b)$, $e^{ax}.\cos(ax+b)$.
9. Examples on Rolle's theorem, Lagrange's and Cauchy's mean value theorem.
10. Taylor's and Maclaurin's series expansion of a given function.

NOTE: Use the SciLab / MAXIMAOpen – source Software to execute the practicalproblems. SciLab:is an open-source software and it can be downloaded from http://www.scilab.org/download. Some materials for Sci Lab can be found on http://wiki.scilab.org/Tutorialsarchives.

MAXIMA: is an Open-sourceComputer Algebra System for solving typical calculus problems. The latest version is available on http://maxim.source.forge,net/documentation.html

Second Semester BSc Mathematics Theory

Paper Title: DSC: Calculus and 3-Dimensional Geometry (Theory)	Marks:Th-80+IA-20
Paper Code: 2A2MATM02T	**Totalhours:52**
Teaching Hours:4 Hours/Week	**Credits: 03**

UNIT-I: Polar Coordinates	**13 Hours**
Polar coordinates of a point and polar curve. Angle between the radius vector and the tangent at a point on the curve. Angle of intersection of two curves. Polar and pedal equation of the curves. Polar sub-tangent and polar sub - normal. Derivative of arc length, Curvature, Radius of curvature in Cartesian, Parametric, polar and pedal forms. Centre Of curvature.	
UNIT-II: Partial derivatives and Jacobians.	**13 Hours**
Limits, continuity of functions of two variables. Partial derivatives, higher order partial derivatives, Euler's theorem on homogeneous functions. Total derivatives and differentiation of implicit and composite functions. Jacobian of second and third orders and its properties	
UNIT-III: Reduction Formulae	**13 Hours**
Reduction formulae for integration of $\sin^n x$, $\cos^n x$, $\tan^n x$, $\cot^n x$, $\sec^n x$, $\operatorname{cosec}^n x$, sinmx cosnx, x^n, e^{ax} and $x^m.(\log x)^n$.	
UNIT-IV: Sphere	**13 Hours**
Sphere: Equation of a sphere, section of a sphere by a plane, Equation of a sphere through a circle, Equation of a sphere through two given points as ends of a diameter. Equation to a tangent and normal planes of a sphere, Condition for tangency, Orthogonality of two spheres. Radical plane and coaxial system of spheres.	

Booksof reference:

1. Differential Calculus: Shanti Narayan and Dr.P.K. Mittal
2. Integral Calculus :Shanti Narayan and Dr.P.K.Mittal
3. Differential Calculus and integral Calculus :N.P.Bali
4. Text Book of B.Sc Mathematics : G.K. Ranganath
5. Differential Calculus and integral Calculus :P. N.Chatterji.
6. Analytical Solid Geometry: Shanti Narayan and Dr.P.K.Mittal
7. Solid Geometry: N.P.Bali

Second Semester B.Sc. Mathematics Practical

Paper Title: Calculus and 3-Dimensional Geometry	Marks:PR-40+IA-10
Paper Code: 2A2MATM02L	**TotalMarks:50**
Teaching Hours:4 Hours/Week/Batch	**Credits:02**

1. Program to find the angle between radius vector and tangent of a polar curve
2. Finding radius of curvature of the given curves.
3. Finding center of curvature of the given curves.
4. Computation of arc length of Cartesian, Parametric curves
5. Computation of arc length of Polar form
6. Evaluation of definite integrals and Reduction formulae.
7. Program to verify Euler's theorem and its extension.
8. Program to find Jacobian of second and third orders.
9. Program to find equation of a sphere and plot the graph.
10. Program to verify the condition for orthogonality of two spheres.

NOTE: Use the Sci Lab / MAXIMA Open – source Software to execute the practical problems. Sci Lab: is an open-source software and it can be downloaded from http://www.scilab.org/download. Some materials for Sci Lab can be found on http://wiki.scilab.org/Tutorialsarchives.
MAXIMA: is an Open-source Computer Algebra System for solving typical calculus problems. The latest version is available on http://maxim.source.f