GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

DEPARTMENT OF MATHEMATICS

Minutes of the Meeting

Date: Feb. 25, 2023.

Today on 25/02/2023 at 12:00 Noon onwards a meeting of the Board of Studies in online mode has been conducted. The following members are present in the meeting:

1) Dr. J. P. Jaiswal, Chairman, BOS
2) Prof. Bankteshwar Tiwari, External Subject Expert, BOS
3) Prof. A.S. Ranadive, Member BOS
4) Dr. M. K. Gupta, Member BOS

In the online mode meeting the following points have been concluded:

1. The amendments in the course structure of B. Sc. Maths. (Hon.) under LOCF (w.e.f. AY 2021-22) is approved (Annexure-I).
2. The syllabus of generic course "Geometry" (Code: AMUATG2) of B. Sc. under LOCF (w.e.f. AY 2021-22) is approved (Annexure-II).
3. The syllabus of generic course "Theory of Equations" (Code: AMUDTG3) of B. Sc. under LOCF (w.e.f. AY 2021-22) is approved (Annexure-III).
4. The syllabus of AEC course "Curve Tracing" (Code: AMUCTA1) of B. Sc. under LOCF (w.e.f. AY 2021-22) is approved (Annexure-IV).
5. The syllabus of AEC course "Matrix and Determinant" (Code: AMUDTA1) of B. Sc. under LOCF (w.e.f. AY 2021-22) is approved (Annexure-V).
6. The syllabus of AEC course "Integral Transform" (Code: AMUETA1) of B. Sc. under LOCF (w.e.f. AY 2021-22) is approved (Annexure-VI).
7. The syllabus of SEC course "Special Function" (Code: AMUATL2) of B. Sc. under LOCF (w.e.f. AY 2021-22) is approved (Annexure-VII).
8. The syllabus of SEC course "Linear Programming" (Code: AMUBTL2) of B. Sc. under LOCF (w.e.f. AY 2021-22) is approved (Annexure-VIII).
9. The syllabus of the DSE course "Advanced Numerical Analysis" (Code: AMPCTD9) of M. Sc. under CBCS (w.e.f. AY 2021-22) is approved (Annexure-IX).

The Chairman, BOS extended his thanks to all the members.

Seen 01/03/23
Dr. J. P. Jaiswal

Prof. Bankteshwar Tiwari
(Approved on email)

Seen Ranadive 01-03-2023
Prof. A.S. Ranadive

Seen Gupta 01/3/23
Dr. M. K. Gupta

Gmail

HoD_Maths. GGV <hodmathsggv@gmail.com>

Information about BOS meeting to be conducted on 25/02/2023 Reg.

Bankteshwar Tiwari <banktesht@gmail.com> Wed, Mar 1, 2023 at 3:21 PM
To: "HoD_Maths. GGV" <hodmathsggv@gmail.com>

Approved the syllabi and its structure as proposed
thanks and regards
Bankteshwar
[Quoted text hidden]

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Bankteshwar Tiwari
DST-Centre for Interdisciplinary Mathematical Sciences
Institute of Science
Banaras Hindu University
Varanasi-221005
INDIA

The amendments in the course structure of B. Sc. Maths. (Hon.) under LOCF(w.e.f.AY2021-22)

COURSE STRUCTURE
of
B.Sc. Honours in Mathematics

As per the university latest amendment

(Ref. No.: 433/Academic/2022 dated 22/09/2022)

Sem	Course Type	Course Code	Course Name	Credit/Hours (L-T-P)	Marks CCA^	Marks ESE#	Total Marks
I	CORE 1	AMUATT1	Calculus	5(4-1-0)	30	70	100
	CORE 2	AMUATT2	Algebra and Geometry	5(4-1-0)	30	70	100
	GE-1		Opted from the pool Course and offered by Sister Departments	5	30	70	100
	AEC-1		Opted from the Pool Course offered by University	2	30	70	100
	SEC-1		Opted from the Pool Course offered by University	2	30	70	100
	Additional Credit Course						
			Total Credit	**19**			
II	CORE 3	AMUBTT1	Multivariable Calculus	5(4-1-0)	30	70	100
	CORE 4	AMUBTT2	Ordinary Differential Equations	5(4-1-0)	30	70	100
	GE-2		Opted from the pool Course and offered by Sister Departments	5	30	70	100
	AEC-2		Opted from the Pool Course offered by University	2	30	70	100
	SEC-2		Opted from the Pool Course offered by University	2	30	70	100
	Additional Credit Course						
			Total Credit	**19**			
III	CORE 5	AMUCTT1	Real Analysis	5(4-1-0)	30	70	100
	CORE 6	AMUCTT2	Group Theory	5(4-1-0)	30	70	100
	CORE 7	AMUCTT3	Probability and Statistics	5(4-1-0)	30	70	100
	GE-3		Opted from the pool Course and offered by Sister Departments	5	30	70	100
	AEC-3		Opted from the Pool Course offered by University	2	30	70	100
	Additional Credit Course						
			Total Credit	**22**			

IV	CORE 8	AMUDTT1	Mechanics	5(4-1-0)	30	70	100
	CORE 9	AMUDTT2	Linear Algebra	5(4-1-0)	30	70	100
	CORE 10	AMUDTT3	Partial Differential Equations and Calculus of Variations	5(4-1-0)	30	70	100
	GE-4		Opted from the pool Course and offered by Sister Departments	5	30	70	100
	AEC-4		Opted from the Pool Course offered by University	2	30	70	100
	Internship*	AMUDEF1		06			100
	Additional Credit Course						
			Total Credit	**22+6***			
V	CORE11	AMUETT1	Set Theory and Metric Spaces	5(4-1-0)	30	70	100
	CORE 12	AMUETT2	Advanced Algebra	5(4-1-0)	30	70	100
	DSE (any two)	AMUETD1	Tensors and Differential Geometry	5(4-1-0)	30	70	100
		AMUETD2	Mathematical Logic	5(4-1-0)	30	70	100
		AMUETD3	Integral Transforms and Fourier Analysis	5(4-1-0)	30	70	100
		AMUETD4	Linear Programming	5(4-1-0)	30	70	100
		AMUETD5	Information Theory and Coding	5(4-1-0)	30	70	100
		AMUETD6	Graph Theory	5(4-1-0)	30	70	100
		AMUETD7	Special Theory and Relativity	5(4-1-0)	30	70	100
	AEC-5		Opted from the Pool Course offered by University	2	30	70	100
	Additional Credit Course						
			Total Credit	**22**			
VI	CORE 13	AMUFTT1	Complex Analysis	5(4-1-0)	30	70	100
	CORE 14	AMUFTT2	Numerical Analysis	5(4-1-0)	30	70	100
	DSE (any one)	AMUFTD1	Discrete Mathematics	5(4-1-0)	30	70	100
		AMUFTD2	Wavelets and Applications	5(4-1-0)	30	70	100
		AMUFTD3	Number Theory	5(4-1-0)	30	70	100
		AMUFTD4	Mathematical Finance	5(4-1-0)	30	70	100
		AMUFTD5	C++Programming for Mathematics	5(4-1-0)	30	70	100
		AMUFTD6	Cryptography	5(4-1-0)	30	70	100
		AMUFTD7	Advanced Mechanics	5(4-1-0)	30	70	100
	Seminar	AMUFST1~		02			100
	Dissertation /Project	AMUFDT1~		07			100
	Additional Credit Course						
			Total Credit	**24**			

~The Code generated by the Department., *May be offered during the summer;
^ Continuous Comprehensive Assessment (CCA), # End-Semester Examination (ESE)

Generic Elective (GEN) offered by the Department:

	Course Type	Course Code	Course Name	Credit/Hour(L-T-P)	Marks CCA^	Marks ESE#	Total Marks
1	GE-1 (Any one)	AMUATG1	Finite Element Methods	5(4-1-0)	30	70	100
		AMUATG2	Geometry	5(4-1-0)	30	70	100
2	GE-2 (Any one)	AMUBTG1	Algebra and Matrix Theory	5(4-1-0)	30	70	100
		AMUBTG2		5(4-1-0)	30	70	100
3	GE-3 (Any one)	AMUCTG1	Differential Calculus	5(4-1-0)	30	70	100
		AMUCTG2	History of Indian Mathematics	5(4-1-0)	30	70	100
4	GE-4 (Any one)	AMUDTG1	Applications of Algebra	5(4-1-0)	30	70	100
		AMUDTG2	Combinatorial Mathematics	5(4-1-0)	30	70	100
		AMUDTG3	Theory of Equations	5(4-1-0)	30	70	100

Ability Enhancement Course (AEC) offered by the Department:

	Course Type	Course Code	Course Name	Credit/Hour (L-T-P)	Marks CCA^	Marks ESE#	Total Marks
1	AEC-1 (Any one)	AMUATA1	Set Theory and Logic	2(2-0-0)	30	70	100
		AMUATA2	Basics of Statistics	2(2-0-0)	30	70	100
2	AEC-2 (Any one)	AMUBTA1	Theory of Interpolation	2(2-0-0)	30	70	100
		AMUBTA2		2(2-0-0)	30	70	100
3	AEC-3 (Any one)	AMUCTA1	Curve Tracing	2(2-0-0)	30	70	100
		AMUCTA2		2(2-0-0)	30	70	100
4	AEC-4 (Any one)	AMUDTA1	Matrix and Determinant	2(2-0-0)	30	70	100
		AMUDTA2		2(2-0-0)	30	70	100
5	AEC-5 (Any one)	AMUETA1	Integral Transform	2(2-0-0)	30	70	100
		AMUETA2					

Skill Enhancement Course (SEC) offered by the Department:

	Course Type	Course Code	Course Name	Credit/Hour (L-T-P)	Marks CCA^	Marks ESE#	Total Marks
1	SEC-1 (Any one)	AMUATL1	Introduction to Cryptography	2(2-0-0)	30	70	100
		AMUATL2	Special Function	2(2-0-0)	30	70	100
2	SEC-2 (Any one)	AMUBTL1	Graph Theory	2(2-0-0)	30	70	100
		AMUBTL2	Linear Programming	2(2-0-0)	30	70	100

L-Lecture, T- Tutorial, P- Practical

The syllabus of B. Sc. Generic elective paper name- Geometry(Code: AMUATG2) is added now.

Code-AMUATG2: Geometry (05 Credit: L:4-T:1-P:0)

Course Objective: To learn about fundamental idea of geometrical concept which are used frequently to understand graphical explanations.

Planes, Straight Lines and Spheres: Direction cosines, direction ratios, Planes: Distance of a point from a plane, Angle between two planes, pair of planes, Bisectors of angles between two planes; Straight lines: Equations of straight lines, Distance of a point from a straight line, Distance between two straight lines, Distance between a straight line and a plane; Spheres: Different forms, Intersection of two spheres, Orthogonal intersection, Tangents and normal, Radical plane, Radical line, Coaxial system of spheres, Pole, Polar and Conjugacy.

Locus, Surfaces, Curves and Conicoids: Space curves, Some standard surfaces, Classification of quadric surfaces, Cone, Cylinder, Central conicoids, Tangent plane, Normal, Polar planes ,and Polar lines, paraboloid.

Course Learning Outcomes: This course will enable the students to: Explain the properties of one, two and three-dimensional fundamental shapes.

Text Book:

1. S. L. Loney (1994). The elements of Coordinate Geometry. Macmillan India Ltd.

Reference Books:

1. Robert J.T. Bell (1994). An Elementary Treatise on Coordinate Geometry of Three Dimensions. Macmillan India Ltd.
2. D. Chatterjee (2009). Analytical Geometry: Two and Three Dimensions. Narosa Publishing House.

The syllabus of B. Sc. Generic elective paper name- Theory of Equations (Code: AMUDTG3) is added now.

Code-AMUDTG3: Theory of Equations (05 Credit: L:4-T:1-P:0)

Course Objective: To learn about fundamental idea of solving algebraic equations.

General Properties of polynomials, graphical representation of a polynomial, maximum and minimum values of a polynomial, general properties of equations, Descarte's rule of signs positive and negative rule, relation between the roots and the coefficients of equations.

Symmetric functions, applications of symmetric function of the roots, transformation of equations, solutions of reciprocal and binomial equations, algebraic solutions of cubic and biquadratic, properties of the derived functions.

Symmetric functions of the roots, Newton's theorem on the sums of powers of roots, homogeneous products, limits of the roots of equations.

Separation of the roots of equations, Sturm theorem, application of Sturm's theorem, sufficient condition for existence of real roots an equation and biquadratic equation.

Course Learning Outcomes: This course will enable the students to find the roots of general algebraic equations

Text Book:

1. C. C. MacDuffee (1954). Theory of Equations, John Wiley & Sons Inc.

Reference Books:

1. W.S. Burnside and A. W. Panton (1954). The Theory of Equations, Dublin University Press.
2. D. Chatterjee (2009). Analytical Geometry: Two and Three Dimensions. Narosa Publishing House.

The syllabus of B. Sc. AEC elective paper name- Curve Tracing (Code: AMUCTA1) is added now.

Code-AMUCTA1: Curve Tracing (02 Credit: L:2-T:0-P:0)

Course objective: To learn about basics of tracing complicated curve.

Introduction, curves in Cartesian form, general procedure for tracing the algebraic curve-symmetry, region, Asymptotes, origin, tangents to the curve at the origin, intercepts, sign of first and second derivative, nature of curve, maxima and minima, inflection point, multiple point or singular point, curve tracing of standard curves in Cartesian form, folium of Descartes, Cissoid, lemniscate of Bernoulli, Strophoidetc, tracing of curves in polar and parametric curves.

Expected Outcomes: After the completion of the course student will be able to draw the diagram of standard as well as little bit complicated curve which may occur in their problem of studies.

Text Books:

1. Gorakh Prasad (2009), Differential Calculus, Pothishala Private Limited, Allahabad.
2. B. V. Ramana(2017), Higher Engineering Mathematics, McGraw Hill Education.

Reference Books:

1. E. H. Lockwood (1961), A book of Curves, Cambridge University Press.
2. W. W. Johnson(2010), Curve Tracing in Cartesian Coordinates,Coss Press.

The syllabus of B. Sc. AEC elective paper name- Matrix and Determinant (Code: AMUDTA1) is added now.

Code-AMUDTA1: Matrix and Determinant (02 Credit: L:2-T:0-P:0)

Course objective: To learn about fundamental concept of determinants and matrices and their some popular properties.

Elementary transformation of a matrix, Rank of a matrix- normal form and Echelon form, inverse of matrix-Gauss-Jordan Method and Partition method, consistency of system of linear equations, solution of linear system of equations-Cramer's Rule, Gaussian Elimination Method and matrix inversion method, orthogonal matrix, eigen values and eigen vectors of a matrix, Cayley-Hamilton theorem (without proof), diagonalization of a matrix (without proof).

Expected Outcomes: After the completion of the course student will be able to understand basic idea of matrix and determinants which may be applied in various area of the studies.

Text Books:.

1. Kenneth Hoffman & Ray Kunze (2015), Linear Algebra (2nd edition), Prentice Hall India Learning Private Limited.
2. B. V. Ramana(2017), Higher Engineering Mathematics, McGraw Hill Education.

Reference Books:

1. Stephen H. Friedberg, Arnold J.Insel & Lawrence E. Spence (2003), Linear Algebra (4rth edition), Prentice-Hall of India Pvt. Ltd.
2. Nathan Jacobson (2009), Basic Algebra I (2nd edition), Dover Publications.

The syllabus of B. Sc. AEC elective paper name- Integral Transform (Code: AMUETA1) is added now.

Code-AMUETA1: Integral Transform (02 Credit: L:2-T:0-P:0)

Course objective: To learn about fundamental idea of Laplace and Fourier transforms with some popular properties.

Laplace Transforms: Laplace and inverse Laplace transforms, linearity property, existence theorem, Laplace and inverse Laplace transforms of derivatives and integrals, shifting theorems, translations theorems, change of scale property, Laplace transforms of periodic functions Dirac's delta function, application of Laplace transform.

Fourier Transforms: Fourier and inverse Fourier transforms, Fourier Sine and Cosine transforms, inverse Fourier Sine and Cosine transform, linearity property, change of scale property, shifting property, modulation theorem, Relation between Fourier and Laplace transforms, application of Fourier sine and cosine transforms.

Expected Outcomes: After the completion of the course student will be able to aware about the possibility of existence & applicability of Laplace and Fourier transforms in their problem of interests.

Text Books:.

1. Erwin Kreyszig (2011), Advanced Engineering Mathematics (10th edition). Wiley Publication.
2. B. V. Ramana (2017), Higher Engineering Mathematic, McGraw Hill Education.

Reference Books:

1. James Ward Brown & Ruel V. Churchill (2011), Fourier Series and Boundary Value Problems. McGraw-Hill Education.
2. J. K. Goyal&K. P. Gupta (2016), Laplace and Fourier Transforms, Pragati Prakashan.

The syllabus of B. Sc. SEC elective paper name- Integral Transform (Code: AMUATL2) is added now.

Code-AMUATL2: Special Function (02 Credit: L:2-T:0-P:0)

Course Objective: To learn fundamental concepts of some special functions and its applicability.

Gamma function, Standard results for Gamma function, Beta function, Standard results for Beta function,
Bessel's function, Generating function, Orthogonality of Bessel's function, Recurrence relations for Bessel's function, Elementary Bessel's function, Legendre polynomial, Rodrigues's formula, Generating function Legendre polynomial, Orthogonality of Legendre polynomials.

Course Learning Outcomes: This course will enable the students to aware some well special functions and understanding the applicability of special functions.

Text Book:

1. B. V. Ramana (2007). *Higher Engineering Mathematics,* McGraw Hill Education (India) Pvt. Ltd.

Reference Book:

1. Z. X. Wang, D. R. Guo, Zhi Xu Wang (1989), Special Functions, World Scientific Publishing Company

The syllabus of B. Sc. SEC elective paper name- Linear Programming (Code: AMUATL2) is added now.

Code-AMUATL2: Linear Programming (02 Credit: L:2-T:0-P:0)

Course Objective: To learn about various concepts of linear programming problem and its methods for its solution.

Linear Programming Problem, Convexity and Basic Feasible Solutions: Formulation, Canonical and standard forms, Graphical method; Convex and polyhedral sets, Hyperplanes, Extreme points; Basic solutions, Basic Feasible Solutions, Reduction of feasible solution to basic feasible solution, Correspondence between basic feasible solutions and extreme points.
Optimality criterion, Improving a basic feasible solution, Unboundedness, Unique and alternate optimal solutions; Simplex algorithm and its tableau format; Artificial variables, Big-*M* method.

Course Learning Outcomes: This course will enable the students to: analyze and solve linear programming models of real life situations, Provide graphical solutions of linear programming problems with two variables, and illustrate the concept of convex set and extreme points and Understand the theory of the simplex method.

Text Book:

1. Hamdy A. Taha (2017).Operations Research: An Introduction (10thedition).Pearson.

Reference Books :

1. Mokhtar S. Bazaraa, John J. Jarvis& Hanif D. Sherali (2010). Linear Programming and Network Flows(4thedition). John Wiley& Sons.
2. G. Hadley (2002). Linear Programming .Narosa Publishing House.

The syllabus of M. Sc. DSE elective paper name- Advanced Numerical Analysis (Code: AMPCTD9) is added now.

Code-AMPCTD9:Advanced Numerical Analysis (05 Credit: L:4-T:1-P:0)

Course Objective: To learn numerical methods for solving numerical problems of linear systems, integral equation, and finite element method.

Numerical linear algebra: Brief review of LU decomposition, vector and matrix norm, solution of linear systems-direct methods, necessity of pivoting, number of arithmetic operations, computation procedure for LU decomposition method, solution of tridiagonal systems, ill-conditioned linear systems, method for ill-conditioned linear systems, solution of linear systems-iterative methods, singular value decomposition.

Numerical solution of integral equation: Transformation of integral equation in initial value problem and vice-versa, Numerical method for Fredholm equations: method of degenerate kernels, method of successive approximations, quadrature methods, cubic Spline method, singular kernels.

Finite element methods: functionals, base functions, method of approximation, Rayleigh-Ritz method, Galerkin's method, finite element, shape function, finite element method for one-dimensional problems, finite element of linear boundary value problems.

Course Learning Outcomes: This course will enable the students to: aware about numerical methods for lineal algebra problems, aware about Numerical solution of integral equation, fundamental idea about finite element methods

Text Books:

1. M. K. Jain, S.R.K. Iyenger, R. K. Jain (2012), Numerical Methods for scientific and Engineering Computation, New Age Int. Publ, New Delhi.
2. S. S. Sastry (2013), Introductory Methods for Numerical Analysis, PHI Learning Pvt. Ltd, New Delhi.

Reference Book:

1. N. H. Kim (2016), Introduction to Nonlinear Finite Element Analysis, Springer.