गणित विभाग
गुरु घासीदास विश्वविद्यालय
(केंद्रीय विश्वविद्यालय)
कोनी, बिलासपुर-495009, छत्तीसगढ़, भारत
(नैक से संबद्धता A++ ग्रेड)

Department of Mathematics
Guru Ghasidas Vishwavidyalaya
(A Central University)
Koni, Bilaspur-495009, Chhattisgarh, Bharat
(NAAC Accredited A++ Grade)

No.: 283 /Maths/2025/Bilaspur

Date: 22/07/2025

To,

The Members of BOS
Department of Mathematics
GGV, Bilaspur (CG)

Subject: Regarding BOS Meeting on 25/07/25 (Friday)

Respected BOS Members,

After due consultation with our external member of BOS, a meeting is being convened on 25/07/25 (Friday) in the Department of Mathematics Meeting Hall (Room No. 13) at 12:30 P.M. onwards to discuss and include in the present curriculum of the UG/PG/Ph.D. program. Also any correction / suggestion or inclusion of new specialization may also be discussed. Your presence in this regard is highly appreciable.

Agenda of the Meeting:

1. Implementation of UG NEP 5th Semester syllabus.
2. Correction / Modification of 2nd Semester VOC "Engineering Mathematics" in the place of minor paper "Algebra and Matrix Theory" UG NEP Syllabus, 4th VOC "Industrial Mathematics" in place of minor "Vector Calculus" UG NEP Syllabus, 3rd Semester VOC "Numerical Techniques" in the place of Minor paper "Differential Calculus".
3. Inclusion of three new Ph.D. Course Work Papers "Integral Transforms", "Operator Theory" and "Nonlinear Analysis".
4. Correction / Modification of Paper M.Sc. II Semester "Numerical Analysis".
5. Any other matter with the permission of Chair.

Prof. A. K. Thakur
(Chairman - BOS)

Copy to:

1) PS to VC for information to HVC.
2) PA to Registrar for information to Registrar.
3) Prof. Navnit Jha, Faculty of Mathematical Sciences, South Asian University, Rajpur Road, Maidan Garhi, New Delhi, External Subject, BOS
4) Dr. Ashutosh Kumar Pandey, IT (AI and Machine Learning) Datamatrics Tru AI Pattern Bangalore – 560054, Industry Expert, BOS
5) Dean, School of Studies of Mathematical and Computational Science.
6) AR (Academic), for necessary action.
7) Hon'ble Members of BOS
8) Finance Officer GGV, for necessary action.
9) Notice Board
10) Office Copy

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Minutes of the Meeting of Board of Studies

A meeting of Board of Studies has been conducted today on 25/07/2025 at 12:30 PM in the department of Mathematics in hybrid mode. The following members are present in the meeting:

1.	Prof. A.K. Thakur	- Chairman
2.	Prof. Navnit Jha	- External Subject Expert
3.	Dr. Ashutosh Kumar Pandey	– Industry Expert
4.	Prof. A.S. Ranadive	- Member, BoS
5.	Prof. P.P. Murthy	- Member, BoS
6.	Dr. K. Sarkar	- Member, BoS
7.	Mr. C.P. Dhuri	- Member, BoS
8.	Dr. J.P. Jaiswal	- Special Invitee
9.	Dr. M. K. Gupta	- Special Invitee
10.	Dr. B.B. Chaturvedi	- Special Invitee
11.	Dr. K.N.V.V. Vara Prasad	- Special Invitee
12.	Dr. Uma Devi Patel	- Special Invitee
13.	Dr. Santosh Verma	- Special Invitee
14.	Dr. Brijendra Paswan	- Special Invitee
15.	Mr. Hapka Surendra	- Special Invitee

In the meeting, the following points have been concluded:

1. Syllabus of B.Sc. V Sem is approved. (Annexure – I)
2. Correction / Modification of 2nd Semester VOC "Engineering Mathematics" in the place of minor paper "Algebra and Matrix Theory" UG NEP Syllabus, 4th VOC "Industrial Mathematics" in place of minor "Vector Calculus" UG NEP Syllabus, 3rd Semester VOC "Numerical Techniques" in the place of Minor paper "Differential Calculus" is approved. (Annexure – II)
3. Proposal for inclusion of three new Ph.D. Course Work Papers "Integral Transforms", "Operator Theory" and "Nonlinear Analysis" is approved. (Annexure – III)
4. Correction / Modification of Paper M.Sc. II Semester "Numerical Analysis" is approved. (Annexure – IV)
5. The MOOC/SWAYAM Course "Numerical Methods" for B.Sc. V sem is approved. (Annexure – V)

The chairman, BoS extended his thanks to all the members.

Prof. A.K. Thakur | Prof. Navnit Jha 29-07-2025 | Dr. Ashutosh Kumar Pandey 30-07-2025 | Prof. A.S. Ranadive

Prof. P.P. Murthy | Dr. K. Sarkar | Mr. C.P. Dhuri | Dr. J.P. Jaiswal

Dr. M.K. Gupta | Dr. B.B. Chaturvedi | Dr. K.N.V.V. Vara Prasad

Dr. Uma Devi Patel | Dr. Santosh Verma | Dr. Brijendra Paswan | Mr. Hapka Surendra

Prof. D. Gopal

Phone: 07752-260104, E-mail: hodmathsggv@gmail.com
URL: http://www.new.ggu.ac.in/department-details/20/0/

SUB CODE	L	T	P	DURATION/WEEK	TOTAL MARKS	CREDITS
MaPhD15	3	1	0	4 HOURS	100	4

INTEGRAL TRANSFORMS

Course Objective: A course on Integral Transforms aims to introduce students to:

1. This paper is to develop the advanced concept of Integral Transforms with the special interest Special Functions and recurrence relations.
2. To learn the students time space integral equations and boundary value problems.
3. It can be utilized to solve initial/boundary value problems.
4. To understand the developed of research orientation.
5. To learn applications in Science and Technologies etc.

Course Contents:

Laplace transform: Introduction of Laplace Transform, Convolution theorem, Initial and final value theorems, Differentiation and integration in the time domain, Heaviside expansion formula and applications

Fourier transform: Introduction of Fourier Transform, Modulation theorem, Convolution theorem, Parseval's identity, Fourier transform of derivatives and applications

Mellin transform: Introduction of Mellin transform , Mellin transform of derivatives and integrals, Inversion theorem, Convolution theorem and applications

Hankel transform: Introduction of Hankel transform, Hankel transform of Inversion formula, Hankel transform of derivatives, Parseval's theorem and applications

Reference books:

1. L. Debnath and D.D. Bhatta, Integral Transforms and Their Applications, Book World Enterprises, 2006.
2. M. Ya. Antimirov, A.A. Kolyshkin, R. Valliancourt, Applied Integral Transforms, CRM Monograph Series, American Mathematical Society, 2007.
3. An introduction to the fractional calculus and fractional differential equation: Kenneth S. Miller and Bertram Ross, John Wiley & Sons, Inc. New York.
4. A.D Poularikas, The Transforms and Applications Handbook, CRC Press, 1996.
5. F.G Tricomi, Integral Equations, Dover Publications Inc. New York, 1985.

SUB CODE	L	T	P	Duration /week	Total Marks	Credits
MaPhD16	3	1	0	4Hrs	100	4

OPERATOR THEORY

Course Objective:

1. Understand the properties and classifications of operators on Hilbert spaces, including self-adjoint, normal, unitary, and isometric operators.
2. Analyze the spectrum of operators and apply key results such as the spectral radius formula and spectral mapping theorem.
3. Study compact operators and their spectral characteristics, including singular value decomposition and the spectral theorem for compact operators.
4. Comprehend the spectral theorem for self-adjoint and normal operators and the concept of polar decomposition.
5. Apply continuous functional calculus to operators in Hilbert spaces for advanced operator analysis.

Course Contents:

Operators on Hilbert spaces: Self adjoint, normal, unitary, isometry, partial isometry, projections, positive operators.

Spectrum of operators: spectral radius formula, spectral mapping theorem.

Compact operators: Spectrum of compact operators, spectral theorem for compact self adjoint and compact normal operators, singular value decomposition of compact operators.

Statement of spectral theorem for self adjont and normal operators, polar decomposition, Continuous functional calculus.

Text books

1. J.B.Conway, A course in functional Analysis, GTM (96), Springer, 2007
2. B. V. Limaye, Functional Analysis, 3rd Ed, New Age International Ppublishers, 2014.

Reference Books

1. Kreyszig, E. Introductory Functional Analysis and Applications, John Wiley and Sons, Delhi, 2001.
2. C.D. Kubrusly, Elements of operator theory, Birkhauser, 2001.
3. V.S. Sunder, Operaors on Hinbert spaces, Springer, 2016.
4. W. Rudin, Functional Analysis, 2nd Edn. McGraw Hill Educations 2017.

5. C.W Groetsch, Elements of applicable functional analysis, 2nd edition, M.Dekker, 1980.
6. K. Yoshida, Functional Analysis, 6th edn, Springer, 1995.

SUB CODE	L	T	P	Duration /week	Total Marks	Credits
MaPhD17	3	1	0	4Hrs	100	4

NON - LINEAR ANALYSIS

Course Objective: A course on nonlinear analysis aims to study

1. Understand various notions of continuity and operator theory in normed spaces, including duality mappings and nonlinear integral operators
2. Develop proficiency in advanced concepts of differentiability in Banach spaces, including Gateaux and Frechet derivatives, the Inverse Function Theorem, and the Implicit Function Theorem.
3. Analyze the subdifferential calculus of convex functions and utilize it in optimization and vibrational problems.
4. To fixed point theory by studying Banach's contraction principle, nonexpansive mappings, and classical fixed point theorems such as Brouwer's and Schauder's, along with their extensions to multifunctions and generalized contractions.
5. Explore best proximity point theory and proximal contractions in distance spaces, enabling the resolution of approximation problems when exact fixed points do not exist.

Course Contents:

Various forms of continuity- Geometry in normed spaces and duality mapping, Nemytskii, Hammerstein and Urysohn operators

Gateaux and Frechet derivative, Properties of derivative, Taylor's theorem, Inverse function theorem and Implicit function theorem, Sub differential of convex functions

Banach's contraction principle and its generalization, Nonexpansive mappings, Fixed point theorems of Brouwer and Schauder

Fixed point theorems for multifunctions, common fixed point theorems, Sequences of contractions, generalized contractions and fixed points.

Best Proximity Point, Proxcontractions in distance spaces, Proximity Point Theorems.

Text Book:

1. Mohan C. Joshi and Ramendra K. Bose, Some topics in Nonlinear functional analysis Wiley Eastern limited- Hyderabad, 1985.
2. W. Takahasi, Nonlinear Functional Analysis: Fixed Point Theory and its Applications, Yokohama Publishers, Yokohama, 2000.
3. E.Zeidler, Nonlinear functional Analysis and its applications, Springer, 2005.