KUVEMPU UNIVERSITY

DEPARTMENT OF P.G. STUDIES & RESEARCH IN MATHEMATICS

PROCEEDINGS OF U.G. B.O.S. MEETING IN MATHEMATICS & STATISTICS (combined)

The Meeting of the Board of Studies in B.Sc. Mathematics and Statistics (combined) Courses was held through by circulation on 7th January 2020 with only one agenda, that is approvals of panel of examiners.

In this regard, we circulation the latter No.KU:MATHS:219 -2019-20, date 1st January-2020 with panel of examiners for the academic year 2020-21 and get approval from all the members of the board on 7th January-2020. Further, list of examiners was send to examination center.

MEMBERS

1. Prof. S.K.NARASIMHAMURTHY	CHAIRMAN
2. Dr. B.J.GIREESHA	MEMBER
3. Prof. ANITHA V	MEMBER
4. Prof. HARSHAVARDHANA C.N	MEMBER
5. Prof. V.LOKESH	MEMBER
6. Prof. AVIL BERNAD DISOUZA	MEMBER

Date:-07-01-2020
Place: SHANKARAGHATTA

Chaiman
UG BOS in Mathematics
CHAIRMAN- BOARD OF STUDIES
Department of P.G. Studies in Mathematics
Kuvempu University, Jnana Sahyadri
Shankaraghatta-577 451,
Shivamogga, Karnataka, INDIA

KUVEMPU UNIVERSITY

DEPARTMENT OF P.G. STUDIES & RESEARCH IN MATHEMATICS

JNANASAHYADRI, SHANKARGHATTA-577451

PROCEEDINGS OF P.G. B.O.S. MEETING IN MATHEMATICS

The meeting of the **Board of Studies in Mathematics (P.G)** held on 06-January-2020 (Monday) at 10.30 A.M. in the Department of P.G. Studies & Research in Mathematics, JnanaSahyadri, Shankaraghatta.

MEMBERS PRESENT:

1. Dr. B.J.GIREESHA (CHAIRMAN)
2. Prof. S.K. NARASIMHA MURTHY (MEMBER)
3. Dr. VENKATESHA (MEMBER)
4. Prof. RAMANE H S (MEMBER)
5. Prof. CHALUVARAJU B (MEMBER)
6. Prof. VISHWANATHA B AWATI (MEMBER)

The Chairman welcomes all the members of the committee and takes up the following agenda:

1. Approval of Doctoral committee Proceedings.
2. Approval of Final Synopsis.-
3. Approval of Panel of Examiners of Adjudication of PhD thesis.
4. Approval of list of examiners for P.G. Examination-2020-21
5. Discussion regarding PG syllabus (Regular) & Modifications
6. Question paper modification for distance Education.
7. Ph. D course work syllabus

The Board resolved the following:

1. The board approved the **proceedings of the Doctoral Committee meeting** held on 20-11-2019

2. The board approved the PhD **Final Synopsis** and **Panel of examiners** to adjudicate the PhD thesis of the following candidate:

Sl.No.	Name of the Candidate	Topic	Name of the Guide
01	Vanithalakshmi S M	The Study on Curvature of Complex Finsler Spaces	Prof. S. K. Narashimhamurthy
03.	Natesh.N	A Study on Vector Fields of Finsler Spaces	
05	Umeshaiah M	A numerical approach to study flow and heat transfer of non-Newtonian fluid with suspended particles	Dr. B.J. Gireesha

3. The board approved **the proposed research work** of the following candidate for PhD registration:

Sl.No	Name	Topic	Name of the Guide
01	Felicita Almeida	Study on Influence of Non-Newtonian Fluids in the Enhancement of Heat Transfer in Microchannels.	Dr. Venkatesh P
02	Manohar Rachappa Gombi	Heat Transfer Analysis Through Fins and in Microchannels using Integral Transforms and Numerical Methods.	
03	Soumya D O	Study on Flow and Heat Transfer Analysis of Different Fluids in Microchannels.	

4. The board approved the **progress** of the following research scholars:

Sl.No.	Name of the Candidate	Topic	Name of the Guide
01	Vanithalakshmi S M	The Study on Curvature of Complex Finsler Spaces	Prof. S. K. Narashimhamurthy
03.	Natesh.N	A Study on Vector Fields of Finsler Spaces	
05	Umeshaiah M	A numerical approach to study flow and heat transfer of non-Newtonian fluid with suspended particles	Dr. B.J. Gireesha

5. The board prepared and approved the panel of Examiners of PG Examination-2020-21

6. Board prepared and introduced one new paper for M. Sc IV semester

7. Board modified the M.Sc., Mathematics Distance Education Question paper pattern.

8. Board prepared and introduced one new specialization in Ph. D course work syllabus.

Finally, the Chairman proposed the vote of thanks to all the members present at the BOS meeting

DATE: 06-01-2020

PLACE: JNANA SAHYADRI

(B J Gireesha)

P.G. BOS Chairman

CHAIRMAN- BOARD OF STUDIES
Department of P.G. Studies in Mathematics
Kuvempu University, Jnana Sahyadri
Shankaraghatta-577 451.
Shivamogga, Karnataka. INDIA

KUVEMPU UNIVERSITY

M. Sc. , MATHEMATICS

SYLLABUS

With Effect From :2020-21

DEPARTMENT OF MATHEMATICS

SHANKARAGHATTA,

SHIMOGA-577 451

III[nd]Revised : 2016-17

With Effective From A/Y: 2020-21

SEMESTER – IV :

	PAPER CODE	SUBJECT	MARKS ALLOTMENT			TOTAL	CREDIT
			EXAM	IA	LAB		
Hard Core	MSM 4.1	FUNCTIONAL ANALYSIS	75	25	--	100	04
	MSM 4.2	TOPOLOGY-II	75	25	--	100	04
Soft Core	MSM 4.3	NUMERICAL ANALYSIS-II	75	25	--	100	03
	MSM4.4	TENSOR ANALYSIS AND RELATIVITY THEORY	75	25	--	100	03
	MSM 4.5A MSM 4.5B MSM 4.5C MSM 4.5D (Any one)	FINSLER GEOMETRY CONTACT GEOMETRY MAGNETOHYDRODYNAMICS GRAPH THEORY	75	25	--	100	03
PRACTICAL	MSM 4.6	**LAB**-NUMERICAL METHODS			50	50	02
	MSM 4.7	PROJECT WORK	75	25 (viva)	--	100	04
TOTAL						**650**	**23**

M.Sc., MATHEMATICS FOURTH SEMESTER (Hard Core Paper)
Paper- MSM 4.4: TENSOR ANALYSIS AND RELATIVITY THEORY
(with effective from A/Y: 2020-21)

UNIT – 1: Vectors and Tensors

Einstein summation convention, Transformations of co-ordinates, Dummy indices, Free indices, Contravariant vectors, Scalar invariants, Covariant vectors, Tensors of the second order, Tensors of any order, Symmetric and skew symmetric tensors, Addition and multiplication of tensors, Contraction.

UNIT – 2: Connection and Curvature

Riemannian metric, Parallel transport and Geodesic, Christoffel symbols, Covariant differentiation of contravariant and covariant vectors, Covariant differentiation of tensors, Gradient of a scalar, Divergence of a vector, Curl of a vector.

UNIT-3: Riemann curvature

Riemann curvature tensor, Properties of curvature tensor, Bianchi identities, Ricci tensor, Scalar curvature, Einstein tensor, Conformal curvature tensor, Conformal invariance, Exterior derivatives, Lie derivatives, Isometries and killing vector fields.

UNIT – 4: Space-Time

Inertial and non-inertial frames, Inertial and gravitational mass, Special theory of relativity, Minkowski space, The interval between events, Lorentz geometry, General theory of relativity, Principle of equivalence, Principle of general covariance, Need for the Riemannian geometry, Weak field and Newtonian limit, Flat and curved space-time, Static and Stationary space-times, Energy-Momentum tensor.

UNIT – 5: Einstein's Field Equations

Gravity as space-time curvature, Geodesics, Einstein's field equations, Vacuum field equation, Heuristic approach to derive field equations, Solutions of Einstein equations, The Schwarzschild solution, Birkhoff's theorem, Interior Schwarzschild solution, Singularities in Schwarzschild line element, Einstein's field equations with a cosmological constant, Schwarzschild-de Sitter solution, Reissner-Nordstrom solution, Vaidya metric, The Kerr solution.

UNIT – 6: Symmetric Spaces

Homogeneous and isotropic spaces, Maximally symmetric spaces, Tensors in a maximally symmetric space, Spherically symmetric space, Spherically symmetric space-time, Spherically symmetric homogeneous space-time.

References:

1. *Differential Geometry and Relativity Theory, An Introduction* : Richard L. Faber
2. *Gravitation and Cosmology: Principles and Applications of the General Theory of Relativity* : Steven Weinberg
3. *The Classical Theory of Fields* : L. D. Landau and E. M. Lifshitz
4. *Space-time, Geometry and Gravitation* : Pankaj Sharan
5. *Tensor Calculus (2nd Edition)* : U. C. De, and A. A. Shaikh

KUVEMPU UNIVERSITY

Ph.D . Course Work

SYLLABUS

With Effect From :2020-21

DEPARTMENT OF MATHEMATICS

SHANKARAGHATTA,

SHIMOGA-577 451

I[ST] Revised : 2009-10

With Effective From A/Y: 2020-21

Ph.D . Course Work

	PAPER CODE	SUBJECT	MARKS ALLOTMENT			TOTAL
			EXAM	IA	LAB	
Hard Core	MCW-1	RESEARCH METHODOLOGY	75	25	--	100
	MCW-2	RESEARCH METHODS IN MATHEMATICS	75	25	--	100
Soft Core	MCW-3A	CONTACT MANIFOLDS	75	25	--	100
	MCW-3B	FINSLER MANIFOLDS				
	MCW-3C	ADVANCED FLUID DYNAMICS				
	MCW-3D	GRAPH THEORY				
TOTAL						300

Paper-MCW-3D: GRAPH THEORY (Field of Specialization)

(Max marks: 100=75+25)

UNIT-1: Introduction to Graph: Basic concept, Different types of graphs, walks and connectedness. Degree sequences, directed graphs, distances and self-complementary graphs.

UNIT-2: Factorization: 1-factorization, 2-factorization, decomposition and labeling of graphs,

UNIT-3: Coverings: Vertex covering, edge covering, independence number and matchings and matching polynomials.

UNIT-4: Planarity: Planar graphs, outer planar graphs, Kuratowaski criterion for planarity and Eulers polyhedron formula.

UNIT-5: Graph valued functions: Line graphs, subdivision graph and total graphs.

UNIT-6: Colourings: Chromatic numbers and chromatic polynomials.

UNIT-7: Spectra of Graphs: Adjacency matrix, incidence matrix, characteristic polynomials, Eigen values, graph parameters, strongly regular graphs and Friendship Theorem.

UNIT-8: Groups and Graphs: Automorphism group of a graph, operations on permutation graphs, the group of a composite graph.

References:

1. *Graphs and Digraphs* :M. Bejzad, G. Charatrand and L. Leniak-foster.
2. *Graph Theory* :F. Harary.
3. *Graph Theory and Applications*: J. A. Bonday and V. S.R. Murthy.
4. *Graph Theory* :Diestel.
5. *Graph Theory* :R Gould.
6. *Graph Theory with Applications to Engineering and Computer Science* :NaraisingDeo.
7. *Distance in Graphs* : F. Buckley and F. Harary.
8. *Theory of Graphs* : O.Ore
9. *Spectra in Graphs* :D. Cvetkovic.
10. *Spectra of Graphs* :A.E. Brouwer, W.H. Haemers