KANNUR UNIVERSITY

(Abstract)

Complementary Elective Course (Mathematics) for the Integrated M.Sc in Computer Science with Specialization in Artificial Intelligence & Machine Learning Programme (CBCSS) - Scheme & Syllabus of 3rd & 4th Semesters and Pattern of Question Papers w.e.f 2020 admission- implemented -Orders issued

ACADEMIC C SECTION

Acad/C2/16586/NGCI/2021 Dated: 11.08.2021

Read:-1. U.O Acad/C2/16586/NGCI/2021(II) dated 30.07.20212

2. Syllabus of 3rd & 4th Semester Complementary Elective Course & Pattern of Question Papers submitted by the Convener CSMC on 31.07.2021

ORDER

1. As per paper read (1) above, the syllabus of 1st and 2nd Semester Core Course and Pattern of Question Papers of the Complementary Elective Course in Mathematics for Integrated M.Sc.in Computer Science with Specialization in Artificial Intelligence and Machine Learning Programme (CBCSS) w.e.f 2020 admission, offered at Nehru Arts & Science College Kanhangad, was implemented.
2. As per the recommendation of the Convener, Curriculum Syllabus Monitoring Committee, the former Chairperson, Board of Studies in Mathematics (UG), prepared and submitted the Scheme, Syllabus of 3rd & 4th Semesters and Pattern of Question Paper of Complementary Elective Course in Mathematics for Integrated M.Sc.in Computer Science with Specialization in Artificial Intelligence and Machine Learning Programme (CBCSS) w.e.f 2020, as per paper read (2)
3. The Vice-Chancellor, after considering matter in detail and in exercise of the power of Academic Council conferred under section 11(1) Chapter III of the Kannur University Act 1996, accorded sanction to implement Scheme, Syllabus of 3rd & 4th Semesters and Pattern of Question Papers of the Complementary Elective Course in Mathematics for Integrated M.Sc.in Computer Science with Specialization in Artificial Intelligence and Machine Learning Programme (CBCSS) w.e.f 2020, subject to reporting to the Academic Council.
4. The Scheme, Syllabus of 3rd & 4th Semesters and Pattern of Question Papers of the Complementary Elective Course in Mathematics for Integrated M.Sc.in Computer Science with Specialization in Artificial Intelligence and Machine Learning Programme (CBCSS) w.e.f 2020, are uploaded in the university website (www.kannuruniversity.ac.in).
5. Orders are issued accordingly.

Sd/-
BALACHANDRAN V K
DEPUTY REGISTRAR (ACAD)
For REGISTRAR

To: The Principal
Nehru Arts & Science College, Kanhangad

Copy To: 1.The Examination Branch (PA to CE)
2. PS to VC/PA to PVC/PA to Registrar
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KANNUR UNIVERSITY CIVIL STATION P.O. KANNUR Pin-670 002 THAVAKKARA

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SECTION OFFICER

MATHEMATICS COMPLEMENTARY ELECTIVE COURSE FOR

five year Integrated Course in Computer Science with specialization in Artificial Intelligence and Machine Learning programme

Foundation Mathematics for Machine Learning I

Semester	Course Code	Hours per week	Credit	Examination hours	Marks		
					End semester examination	Continuous evaluation	Total
3	3C03MAT-ICS	5	3	3	40	10	50

COURSE OUTCOMES

CO1	**Understanding the concept of a graph**
CO2	**Understanding the concepts of subgraphs, paths and cycles**
CO3	**Understanding the matrix representation of graph**
CO4	**Understanding the concept of trees**
CO5	**Understanding the concept of connectivity in graphs**
CO6	**Understanding the concepts of Euler and Hamiltonian graphs**
CO7	**Understanding the Chinese Postman Problem**
CO8	**Understanding vector differentiation and the differential operator del**
CO9	**Understanding the concepts of gradient, divergence and curl**
CO10	**Understanding linear transformations, their null space and range**
CO11`	**Understanding the method of obtaining matrix related to a linear transformation**
CO12	**Understanding the changes in the matrices on composition of linear transformations**

Foundation Mathematics for Machine Learning I

Unit I (25 hours) Basics of Graphs

Text: A First Look at Graph Theory, John Clark and Derek Allan Holton,

Allied Pub.

The definition of a graph, graphs as models, More definitions (problems on isomorphism excluded), vertex degrees, subgraphs, paths and cycles, matrix representation of graphs, trees and connectivity – definition and simple properties (Proofs of all theorems excluded)

Sections 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 2.1

Unit II (20 hours) Graph Connectivity and Applications of Graphs

Text: A First Look at Graph Theory, John Clark and Derek Allan Holton,

Allied Pub.

Bridges, spanning trees, cut vertices and connectivity, Euler tours (Excluding Fleury's algorithm), The Chinese Postman Problem, Hamiltonian Graphs. (Proofs of all theorems excluded)

Sections 1.6, 2.1, 2.2, 2.3, 2.6, 3.1, 3.2, 3.3

Unit III (20 hours) Vector Calculus

Text: Advanced Engineering Mathematics, E. Kreyszig (10th edition), Wiley

Vector and scalar functions and their fields. Vector Calculus: Derivatives, Gradient of a scalar field, directional derivative, divergence of a vector field, curl of a vector field.

Sections 9.4, 9.7, 9.8, 9.9

Unit IV (25 hours)

Text: Linear Algebra, Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Pearson (2016).

Linear transformations, null Spaces, and ranges, the matrix representation of a linear Transformation, composition of linear transformations and matrix multiplication (Proofs of all theorems are omitted)

Sections 2.1, 2.2 and 2.3 except applications

Reference

1. Graph Theory with Applications to Engineering and Computer Science, Narsingh Deo, Prentice Hall

2. Introduction to Graph Theory, F. Harary, Narosa Pub.

3. Higher Engineering Mathematics (41st edition), B.S. Grewal, Khanna Pub.

4. Thomas' Calculus (14th edition), G.B, Thomas Jr., M.D. Weir and J.R. Hass, Pearson Education

5. Textbook of Matrices, Shanti Narayan and P.K. Mittal, S. Chand & Co.

6. 3000 Solved Problems in Linear Algebra, Seymour Lipschutz, Schaum Outline series, McGraw Hill

Units	Marks in end semester examination	Marks

I	18	40
II	16	
III	14	
IV	18	
Total	66	

Pattern of Question Paper

Part A - Short answer (5 questions x Mark 1each = 5)

• ***Answer any 4 questions*** (4 *questions x Mark 1each = 4*)

Part B - Short Essay (11 questions x Marks 2 each = 22)

• ***Answer any 7 questions*** *(7 questions x Marks 2 each=14)*

Part C - Essay (7 questions x Marks 3 each = 28)

• ***Answer any 4 questions*** *(4 questions x Marks 3 each=12)*

Part D - Long Essay (4 questions x Marks 5 each = 20)

• ***Answer any 2 questions*** *(2 questions x Marks 5 each=10).*

MATHEMATICS COMPLEMENTARY ELECTIVE COURSE FOR

five year Integrated Course in Computer Science with specialization in Artificial Intelligence and Machine Learning programme

Foundation Mathematics for Machine Learning II

Semester	Course	Hours	Credit	Examination	Marks

	Code	per week		hours	End semester examination	Continuous evaluation	Total
4	4C04MAT-ICS	5	3	3	40	10	50

COURSE OUTCOMES

CO1	**Understanding the concept of inner product and inner product space**
CO2	**Understanding the concept of orthogonality and its geometrical significance**
CO3	**Understanding the concept of orthonormal basis**
CO4	**Understanding the concept of logical equivalence and algebra of propositions**
CO5	**Understanding arguments, propositional functions and quantifiers**
CO6	**Understanding the basics of Boolean Algebra**
CO7	**Understanding the concepts of Fourier series and half range series**
CO8	**Understanding the concept of Fourier transforms**

Foundation Mathematics for Machine Learning II

Unit I (25 hours) Inner Product Spaces and Orthogonality

Text: Linear Algebra – a Geometric Approach, S. Kumaresan, Prentice Hall of India

Inner product spaces – the Euclidean plane and the dot product, general inner product spaces orthogonality, some geometric applications, orthogonal projection onto a line, orthonormal basis, orthogonal complements and projections.

Sections 5.1, 5.2, 5.3, 5.4, 5.5, 5.6

Unit II Logic and Propositional Calculus (20 hours)

Text: Set Theory and Related Topics 2nd edition, S. Lipschitz, Schaum's Series

Quick review of propositions, conjunction, disjunction, negation, truth table and tautology

Sections 10.1 to 10.5 (Questions should not be asked for end semester examination from these sections)

Logical equivalence, algebra of propositions, conditional and biconditional statements, Arguments, Logical implications, Propositional functions, Quantifiers, Negation of quantified statements.

Sections 10.6 to 10.12

Unit III Boolean Algebra (20 hours)

Boolean Algebra - Introduction, basic definition, duality, basic theorems

Sections 11.1, 11.2, 11.3, 11.4

Unit IV Fourier Transforms (25 hours)

Text: Advanced Engineering Mathematics (10th edition), E. Kreyszig,

Wiley

Fourier series, arbitrary period, even and odd functions, half-range

expansions, Fourier integral, Fourier cosine and sine transform (discrete only),

inverse transform (Proofs of all theorems are excluded)

Sections 11.1, 11.2, 11.7, 11.8, 11.9. Convolution is excluded.

References

1. Textbook of Matrices, Shanti Narayan and P.K. Mittal, S. Chand & Co.

2. 3000 Solved Problems in Linear Algebra, Seymour Lipschutz, Schaum Outline series, McGraw Hill

3. Higher Engineering Mathematics (41st edition), B.S. Grewal, Khanna Pub.

Units	Marks in end semester examination	Marks
I	22	40
II	12	
III	12	
IV	20	
Total	66	

Pattern of Question Paper

Part A - Short answer (5 questions x Mark 1each = 5)

• ***Answer any 4 questions*** (4 *questions x Mark 1each = 4*)

Part B - Short Essay (11 questions x Marks 2 each = 22)

• ***Answer any 7 questions*** *(7 questions x Marks 2 each=14)*

Part C - Essay (7 questions x Marks 3 each = 28)

• ***Answer any 4 questions*** *(4 questions x Marks 3 each=12)*

Part D - Long Essay (4 questions x Marks 5 each = 20)

• ***Answer any 2 questions*** *(2 questions x Marks 5 each=10).*

EVALUATION

EVALUATION	**ASSESSMENT WEIGHTAGE**
EXTERNAL	4
INTERNAL	1

CONTINUOUS INTERNAL ASSESSMENT

COMPONENT	**WEIGHTAGE**	**MARKS**	**REMARKS**
COMPONENT1- ASSIGNMENT / SEMINAR / VIVA-VOCE	50%	5	**For each course, a student has to submit one assignment/ attend one seminar/ attend one viva-voce**
COMPONENT 2- TEST PAPER	50%	5	**For each course, a student has to appear for at least two written tests. Average mark of best two tests is to**

			be considered for internal **mark.**
TOTAL	100%	10	

*** Use of Scientific Calculators below 100 functions (that is, upto fx 99)**

shall be permitted for all the above courses.

SEMESTER	**COURSE CODE**	**HOURS PER WEEK**	**CREDIT**	**EXAMINATION HOURS**	**MARKS**		
					END SEMESTER EXAMINATION	**CONTINUOUS EVALUATION**	**TOTAL**
I	IC01MAT-ICS	4	3	3	40	10	50
II	2C02MAT-ICS	4	3	3	40	10	50
III	3C03MAT-ICS	5	3	3	40	10	50
IV	4C04MAT-ICS	5	3	3	40	10	50