KANNUR UNIVERSITY

(Abstract)

Complementary Elective Course (Mathematics) for the Integrated M.Sc. Computer Science with Specialization in Artificial Intelligence & Machine Learning Programme (CBCSS) w.e.f 2020 admission - Scheme ,Syllabus (1st & 2nd Semesters) and Pattern of Question Paper -implemented - Orders issued.

ACADEMIC C SECTION

Acad/C2/16586/NGCI/2021 (II) Dated: 30.07.2021

Read:-1. U.O Acad/C2/16586/NGCI/2021 dated 31.05.2021

2. Syllabus for Integrated M.Sc. in Computer Science with Specialization in Artificial Intelligence & Machine Learning submitted by the Convenor, Expert Committee

3. U.O No.Acad.C2/13083/2019 Dated 22/06/2019

4. Syllabus of Complementary Elective Courses in Mathematics, submitted by the former Chairperson, BoS in Mathematics (UG) dated 07.07.2021

5. Order of the Vice-Chancellor dated 20.07.2021

ORDER

1. As per paper read (1), sanction was accorded by the Vice Chancellor to implement the Regulations for Integrated M.Sc. in Computer Science with Specialization in Artificial Intelligence & Machine Learning Programme (CBCSS) w.e.f. 2020 admission.
2. As per paper read (2), One of the Complementary Elective Courses offered for the Integrated M.Sc. in Computer Science with Specialization in Artificial Intelligence & Machine Learning programme is, Mathematics.
3. As per paper read (3), the Syllabus of B.Sc. Mathematics, does not provide any Complementary Elective Course for the Integrated M.Sc. in Computer Science with Specialization in Artificial Intelligence & Machine Learning Programme, as the same was revised w.e.f 2019 admission itself.
4. As per the recommendation of the Convenor, Curriculum Syllabus Monitoring Committee, the former Chairperson, Board of Studies in Mathematics (UG), prepared and submitted the Scheme, Syllabus (for 1st & 2nd Semesters) and Pattern of Question Paper of Complementary Elective Courses in Mathematics for New Generation Programme Integrated M.Sc. in Computer Science with Specialization in Artificial Intelligence & Machine Learning Programme (CBCSS) (w.e.f 2020), as per paper read (4).
5. The Vice Chancellor, after considering the matter in detail and in exercise of the powers of the Academic Council conferred under section 11(1), Chapter III of Kannur University Act 1996, accorded sanction to implement Scheme, Syllabus (for 1st & 2nd Semesters) and Pattern of Question Paper of Complementary Elective Courses in Mathematics for the New Generation Programme Integrated M.Sc. in Computer Science with Specialization in Artificial Intelligence & Machine Learning Programme CBCSS (w.e.f 2020), subject to reporting to the Academic Council.

6. The Scheme, Syllabus (1st & 2nd Semesters) of and Pattern of Question Paper of Complementary Elective Courses in Mathematics for the New Generation Programme Integrated M.Sc. in Computer Science with Specialization in Artificial Intelligence & Machine Learning Programme CBCSS (w.e.f 2020) are uploaded in the University website (www.kannuruniversity.ac.in).
7. U.O read (3) above, stands modified to this extent.

Orders are issued accordingly.

Sd/-

BALACHANDRAN V K
DEPUTY REGISTRAR (ACAD)
For REGISTRAR

To: 1.The Principal, NAS College, Kanhangad
2. Former Chairperson, Board of Studies in Mathematics (UG)

Copy To: 1. The Examination Branch (through PA to CE)
2. PS to VC/PA to PVC/ PA to Registrar
3. DR/AR Academic
4. The Computer Programmer (for uploading website)
6. SF/DF/FC

Forwarded / By Order

SECTION OFFICER

Syllabus for the first and second semester of the five-year Integrated M.Sc. in Computer Science with Specialization in Artificial Intelligence and Machine Learning Programme

MATHEMATICS

COMPLEMENTARY ELECTIVE COURSE FOR

Five year Integrated M.Sc. in Computer Science with specialization in Artificial Intelligence and Machine Learning programme

Differential Calculus and Linear Algebra I

Semester	Course Code	Hours per week	Credit	Examination hours	Marks		
					End semester examination	Continuous evaluation	Total
1	1C01MAT-ICS	4	3	3	40	10	50

COURSE OUTCOMES

CO1	**Understanding matrices, their operations, determinants of matrices and matrix inversion**
CO2	**Understand rank of a matrix, elementary transformations of a matrix and normal form.**
CO3	**Understand how to find inverse of a matrix by different methods, solution of linear system of equations, method of determinants – Cramer's rule, matrix inversion method CO4 Understand the concept of consistency of linear system of equations and system of linear homogeneous equations.**
CO3	**Understand rules of differentiation, derivatives and methods of finding derivatives.**
CO4	**Understand higher order derivatives, n^{th} derivatives of various functions, Leibnitz' theorem for n^{th} derivative of product of functions and its applications.**
CO5	**Understand functions of several variables, partial differentiation, Euler's theorem for homogeneous functions, total differentials and implicit functions.**

Differential Calculus and Linear Algebra I

Unit I Matrices and their operations

Text: Higher Engineering Mathematics, B.S. Grewal (41^{st} edition)
Review of basics of matrices, their operations – addition, multiplication, scalar multiplication, transposition, determinants, Matrix inversion.

Relevant portions from sections 2.1 to 2.7

Unit II Elementary transformations and rank of a matrix

Text: Higher Engineering Mathematics, B.S. Grewal (41^{st} edition)

Rank of a matrix, elementary transformations of a matrix, normal form, finding inverse by different methods, solution of linear system of equations, method of determinants – Cramer's rule, matrix inversion method, consistency of linear system of equations, test for consistency of a system of equations, system of linear homogeneous equations.

Relevant portions from sections 2.8 to 2.11

Unit III Differentiation
Text: Differential Calculus, Shanti Narayan and P.K. Mittal
Review of rules of differentiation - constant, sum, difference, the chain rule, the product rule, the quotient rule, methods of differentiation, the derivatives of exponential and logarithmic functions.

Relevant portions from sections 4.3 to 4.10

Text: Higher Engineering Mathematics, B.S. Grewal (41^{st} edition)

Higher order derivatives, nth derivatives of various functions, Leibnitz' theoremfor n^{th} derivative of product of functions and its applications (without proof)

Relevant portions from sections 4.1, 4.2.

Unit IV Partial Differentiation

Text: Higher Engineering Mathematics, B.S. Grewal, 41^{st} edition, Khanna Pub.

Functions of several variables, partial differentiation, Euler's theorem for homogeneous functions (without proof), total differentials, implicit functions.

Relevant portions from sections 5.1 to 5.6

Unit	Marks in end semester examination	Marks
I	12	40
II	22	
III	16	
IV	16	
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

Differential Calculus and Linear Algebra II

Semester	Course Code	Hours per week	Credit	Examination hours	Marks		
					End semester examination	Continuous evaluation	Total
2	2C02MAT-ICS	4	3	3	40	10	50

COURSE OUTCOMES

CO1	**Understand increasing and decreasing functions and maxima and minima of functions.**
CO2	**Understand concavity, constrained optimization and Lagrange multipliers.**
CO3	**Understand mean value theorems, Taylor’s and Maclaurin’s theorems.**
CO3	**Understand expansion of functions using Taylor’s and Maclaurin’s series.**
CO4	**Understand egen values and eigen vectors of a matrix, symmetric and skew symmetric matrices, orthogonal matrices, eigen bases.**
CO5	**Understand diagonalization of a matrix, quadratic forms.**
CO6	**Understand Cayley-Hamilton Theorem and its simple applications.**

Differential Calculus and Linear Algebra II

Unit I Applications of differentiation
Text: Higher Engineering Mathematics, B.S. Grewal, 43rd edition, Khanna Pub

Increasing and decreasing functions, finding maximum and minimum

Relevant portions from sections 4.17, 4.18

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

Concavity, Constrained optimization, Lagrange multipliers

Relevant portions from sections 4.4, 14.7, 14.8

Unit II Mean value theorems and expansions of functions

Text: Higher Engineering Mathematics, B.S. Grewal, 43rd edition, Khanna Pub

Mean value theorems, Taylor's and Maclaurin's theorems, Taylor series, Maclaurin series

Relevant portions from sections 4.3, 4.4

Unit III Eigen values and Cayley-Hamilton theorem

Text: Higher Engineering Mathematics, B.S. Grewal (41st edition)

Eigen values and eigen vectors, symmetric, skew Symmetric and orthogonal matrices, eigen bases, diagonalization,qudratic forms(proofs of all theorems omitted).
Cayley-Hamilton Theorem: Cayley-Hamilton Theorem (statement without proof) and its simple applications (findingsquare, cube etc and inverse of a matrix)

Relevant sections from sections 2.14 to 2.16

Unit IV Vector spaces and linear independence

Text: Linear Algebra and its Applications, Gilbert Strang, Cengage Learning

Vector spaces – definition and examples, subspaces, linear independence and dependence, linear combination of vectors, basis and dimension (proofs of all theorems omitted).
Relevant portions from sections 2.1 and 2.3

Unit	Marks in end semester examination	Marks
I	16	40
II	16	
III	18	
IV	16	
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-	50%	5	**For each course, a**

TEST PAPER			**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	1C01MAT-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