File Ref.No.24320/GA - IV - J2/2013/CU

UNIVERSITY OF CALICUT

Abstract

B.Sc in Mathematics-CUCBCSS UG 2014-Scheme and Syllabus-Implemented-w.e.f. 2014 Admissions-Erratum issued.

G & A - IV - J

U.O.No. 7790/2016/Admn Dated, Calicut University.P.O, 22.06.2016

Read:-1. U.O. No. 3797/2013/CU, dated 07.09.2013 (CBCSS UG Modified Regulations)(File.ref.no. 13752/GA IV J SO/2013/CU).

2. U.O. No. 5180/2014/Admn, dated 29.05.2014 (CBCSS UG Revised Regulations)(File.ref.no. 13752/GA IV J SO/2013/CU).

3. Item no. 1 of the minutes of the meeting of the Board of Studies in Mathematics UG held on 03.04.2014.

4. Item no. 19 of the minutes of the meeting of the Faculty of Science held on 27.06.2014.

5. U.O.No. 6841/2014/Admn dtd. 16.07.2014.

6. U.O.No. 3073/2016/Admn dtd. 19.03.2016.

7. U.O.No. 5290/2016/Admn dtd. 26.04.2016.

8. Circular No. No. 13725/GA - IV - J - SO/2013/CU

9. Letter dtd. 03.06.2016 from Chaiman Board of Studies in Mathematics UG.

10. Orders of the VC in the file of even No. dtd. 17.06.2016.

ORDER

The Modified Regulations of Choice Based Credit Semester System for UG Curriculum w.e.f 2014 under the University of Calicut was implemented vide paper read as (1).

The Revised CUCBCSS UG Regulations has been implemented w.e.f 2014 admission, for all UG programmes under CUCBCSS in the University, vide paper read as (2).

The Board of Studies in Mathematics UG resolved to submit the revised syllabus, by including marks instead of weightage as per the new Regulations vide paper read as (3).

The Faculty of Science has also approved the minutes of the Board vide paper read as (4).

Vide paper read as (5), the Scheme and Syllabus of B.Sc in Mathematics under CUCBCSS UG 2014 has been implemented in the University, w.e.f. 2014 Admissions.

An erratum has been issued in the syllabus vide paper read as (6),with the following changes in

the scheme of evaluation:

Total marks 100 for the core papers in the 5th & 6th semesters have been changed to 150 marks,so that the total marks for B.Sc mathematics Programme w.e.f from 2014 admission has been changed to 3600 marks from 3200 marks.

Vide paper read as (7), another erratum has been issued in the Syllabus of B.Sc Mathematics by including the following changes in the pattern of question paper.

In the scheme of evaluation attached to syllabus, Column 4 in Part D under the Title PATTERN OF QUESTION PAPER FOR UNIVERSITY EXAMINATIONS is modified as 2 out of 3 instead of 6 out of 9.

Vide paper read as (8), it has been clarified by Steering Committee on CUCBCSS UG 2014 that as per CUCBCSS UG Regulations 2014, Open Course shall have 2 Credits and shall be allotted 2 hours for teaching.

The Chairman Board Of Studies in Mathematics UG vide paper read as (9), pointed out that in the approved syllabus of B.Sc Mathematics, Open Course syllabus prepared for 3 hrs per week and hence requested to make modifications in the syllabus **reducing the workload for open course to 2 hours per week.**

Vide paper read as (10), permission has been granted by the Hon'ble Vice Chancellor to modify the Syllabus of B.Sc Mathematics as requested by the Chairman.

Sanction has, therefore, been accorded for implementing the modified Scheme and Syllabus of B.Sc in Mathematics under CUCBCSS UG 2014, in the University, w.e.f. 2014 Admissions.

Orders are issued accordingly.

(The syllabus is available in the website: www.universityofcalicut.info)

Anuja Balakrishnan
Deputy Registrar

To

1. All Affiliated Colleges/SDE/Dept.s/Institutions under University of Calicut.
2. The Controller of Examinations, University of Calicut.
3. The Director SDE, University of Calicut.

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

B.Sc. DEGREE PROGRAMME

CHOICE BASED CREDIT SEMESTER SYSTEM (CBCSS UG)

MATHEMATICS (CORE, OPEN& COMPLEMENTARY COURSES)

SYLLABUS

(Effective from 2014 admission onwards)

DETAILS OF CORE COURSES

Sl No.	Code	Name Of The Course	Semester	No. of Contact Hours / Credits		Max. Marks			Duration of University Examinations
						Internal	External	Total	
1	MAT1B01	Foundations of mathematics	I	4	4	20	80	100	3 Hrs
2	MAT2B02	Calculus	II	4	4	20	80	100	3 Hrs
3	MAT3B03	Calculus and analytic geometry	III	5	4	20	80	100	3 Hrs
4	MAT4B04	Theory of equations, matrices and vector calculus	IV	5	4	20	80	100	3 Hrs
5	MAT5B05	Vector calculus	V	5	4	30	120	150	3 Hrs
6	MAT5B06	Abstract algebra		5	5	30	120	150	3 Hrs
7	MAT5B07	Basic mathematical analysis		6	5	30	120	150	3 Hrs
8	MAT5B08	Differential equations		5	4	30	120	150	3 Hrs
9		Open Course (Offered by Other Departments)		2	2	10	40	50	2 Hrs
10		Project/viva		2	---	---	---	---	---
11	MAT6B09	Real analysis	VI	5	5	30	120	150	3 Hrs
12	MAT6B10	Complex analysis		5	5	30	120	150	3 Hrs
13	MAT6B11	Numerical methods		5	4	30	120	150	3 Hrs
14	MAT6B12	Number theory and linear algebra		5	4	30	120	150	3 Hrs
	Elective Course*								
15	MAT6B13(E01)	Graph Theory	VI	3	2	20	80	100	3 Hrs
	MAT6B13(E02)	Linear Programming**							
	MAT6B13(E03)	C Programming For Mathematical Computing***							
	MAT6B13(E04)	Informatics and Mathematical Softwares							
16	MAT6P14(PR)	Project/viva	VI	2	2	10	40	50	---

*In the VIth semester an elective course shall be chosen among the four courses

(Code MAT6B13(E01), MAT6B13(E02), MAT6B13(E03) , MAT6B13(E04)).

**Students who have chosen Mathematical Economics as a Complementary Course in the first 4 semesters shall not choose Linear Programming MM6B13(E02) as the elective course.

*** Students who have chosen Computer Science / Computer Applications as a Complementary Course during the first 4 semesters shall not choose C Programming for Mathematical Computing (MM6B13(E03)) as the electivecourse.

DETAILS OF OPEN COURSES

Sl No.	Code	Name Of The Course	Semester	No. of Contact Hours / Week	Credits	Max. Marks			Duration of University Examinations
						Internal	External	Total	
1	MAT5D01	Mathematics For Physical Sciences	V	2	2	10	40	50	2 Hrs
2	MAT5D02	Mathematics For Natural Sciences							
3	MAT5D03	Mathematics For Social Sciences							

DETAILS OF COMPLEMENTARY COURSES

Sl No.	Code	Name Of The Course	Semester	No. of Contact Hours / Week	Credits	Max. Marks			Duration of University Examinations
						Internal	External	Total	
1	MAT1C01	Mathematics	I	4	3	20	80	100	3 Hrs
2	MAT2C02	Mathematics	II	4	3	20	80	100	3 Hrs
3	MAT3C03	Mathematics	III	5	3	20	80	100	3 Hrs
4	MAT4C04	Mathematics	IV	5	3	20	80	100	3 Hrs

Credit and Mark Distribution of BSc Mathematics Programme

Sl No.	Course		Credits		Marks	
1	English		22		600	
2	Additional Language		16		400	
3	Core Course	12 Courses & 1 Elective	54	56	1700	1750
		Project	2		50	
4	Complementary course - I		12		400	
5	Complementary course - II		12		400	
6	Open Course		2		50	
Total			**120**		**3600**	

SCHEME OF EVALUATION

Theevaluation scheme for each course shall contain two parts: internal evaluation and external evaluation.

Internal Evaluation:

20% of the total marks in each course are for internal evaluation. The colleges shall send only the marks obtained for internal examination to the university.

Components of Internal Evaluation*

Sl No	Components	**Marks** (For Courses with Max. Marks 50)	**Marks** (For Courses with Max. Marks 100)	**Marks** (For Courses with Max. Marks 150)
1	Attendance	2.5	5	7.5
2	Assignment / Seminar/ Viva	2.5	5	7.5
3	Test paper: I	2.5	5	7.5
4	Test paper: II	2.5	5	7.5
Total Marks		**10**	**20**	**30**

***** On Calculation of the Internal Marks, rounding off to the next digit has to be done only on the aggregate sum.

a) Percentage of Attendance in a Semester and Eligible Internal Marks

% of Attendance	**Marks** (For Courses with Max. Marks 50)	**Marks** (For Courses with Max. Marks 100)	**Marks** (For Courses with Max. Marks 150)
90% to 100%	2.5	5	7.5
85% to 89%	2	4	6
80% to 84%	1.5	3	4.5
76% to 79%	1	2	3
75%	0.5	1	1.5

b) Percentage of Marks in a Test Paper and Eligible Internal Marks

% of Marks in Test Paper	**Marks** (For Courses with Max. Marks 50)	**Marks** (For Courses with Max. Marks 100)	**Marks** (For Courses with Max. Marks 150)
90% to 100%	2.5	5	7.5
80% to 89%	2	4	6
65% to 79%	1.5	3	4.5
50% to 64%	1	2	3
35% to 49%	0.5	1	1.5

EVALUATION OF PROJECT

The Internal to External components is to be taken in the ratio 1:4. Assessment of different components may be taken as below.

Internal assessment
(Supervising Teacher will assess the Project and award internal Marks)

Components	**Internal Marks**
Punctuality	2
Use of data	2
Scheme / Organization of Report	3
Viva Voce	3

Total	**10**

External Evaluation
(To be done by the External Examiner appointed by the University)

Components	External Marks
Relevance of Topic, Statement of Objectives, Methodology (Reference / Bibliography)	8
Presentation, Quality of analysis/Use of statistical tools, Findings and recommendations	12
Viva Voce	20
Total	**40**

PATTERN OF QUESTION PAPER FOR UNIVERSITY EXAMINATIONS

	For Courses with Max. Marks 80		**For Courses with Max. Marks 120**		**For Courses with Max. Marks 40**(Open Course)	
Part A	To answer 12 out of 12	12 x 1 = 12	To answer 12 out of 12	12 x 1 = 12	To answer 6 out of 6	6 x 1 = 6
Part B	To answer 9 out of 12	9 x 2 = 18	To answer 10 out of 14	10 x 4 = 40	To answer 5 out of 7	5 x 2 = 10
Part C	To answer 6 out of 9	6 x 5 = 30	To answer 6 out of 9	6 x 7 = 42	To answer 3 out of 5	3 x 4 = 12
Part D	To answer 2 out of 3	2 x 10 = 20	To answer 2 out of 3	2 x 13 = 26	To answer 2 out of 3	2 x 6 = 12
Total		**80**		**120**		**40**

MATHEMATICS (COMPLEMENTARY COURSE)

FIRST SEMESTER

MAT 1C01 : MATHEMATICS

4 hours/week 100marks 3 credits

Text : George B. Thomas Jr. and Ross L. Finney : Calculus, LPE, Ninth edition, Pearson Education.

Module I (20 hrs)

Limits and Continuity: Rules for finding limits. Target values and formal definitions of limits. Extensions of limit concept, Continuity, Tangent lines (Section 1.2, 1.3, 1.4, 1.5 & 1.6 of the Text).

Module II (12 hrs)

Derivatives: The derivative of a function, a quick review of differentiation rules, rate of change. (Section 2.1, 2.2, 2.3 of the Text)

Module III (24 hrs)

Application of derivatives: Extreme values of a function. The mean value theorem, First derivative test, Graphing with y' and y". Limits as x $\pm\infty$.Asymptotes and Dominant terms, Linearization and differentials.(Section 3.1, 3.2, 3.3, 3.4, 3.5, 3.7 of the Text). The L'Hopital's Rule (See section 6.6 of the Text).

Module IV (16hrs)

Integration: Riemann sums and Definite integrals; properties, areas and the Mean value theorem. The Fundamental theorem. (Section 4.5, 4.6, 4.7 of the Text).

Application of Integrals: Areas between curves, Finding Volumes by slicing. (Section 5.1, 5.2 of the Text.)

References

1. S.S. Sastry, Engineering Mathematics, Volume 1, 4th Edition PHI.

2. Muray R Spiegel, Advanced Calculus, Schaum's Outline series.

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MATHEMATICS (COMPLEMENTARY COURSE)

SECOND SEMESTER

MAT2C02 : MATHEMATICS

4 hours/week 100marks 3 credits

Text: George B Thomas, Jr and Ross L Finney: CALCULUS, LPE, Ninth edition, Pearson Education.

Module I: Hyperbolic functions, Application of Integrals and Improper Integrals, (20 hrs)

Hyperbolic Functions- Definitions and Identities, Derivatives and Integrals, Inverse Hyperbolic Functions- Derivatives and Integrals.

Application of Integrals :, Volumes of Solids of Revolution (Disk method only), Lengths of plane curves. Areas of surfaces of revolution

Improper Integrals- Convergence and Divergence, Tests for Convergence and Divergence- Direct Comparison Test and Limit Comparison Test

(Section: 5.3, 5.5, 5.6 , 6.10 & 7.6 of the Text)

ModuleII: Infinite Series (28 hrs)

Limit of Sequences of Number, Theorems for calculating limits of sequences (Excluding Picard's Method), Infinite series, The ratio and root test for series of non negative terms, Alternating series, Absolute and conditional convergence, Power Series, Taylor and Maclaurin Series.

(Sections 8.1, 8.2, 8.3, 8.6, 8.7, 8.8, 8.9 of the Text)

Module III : Polar Coordinates (10 hrs)

Polar coordinates, Graphing in Polar Coordinates, Polar equations for conic sections, Integration in Polar coordinates, Cylindrical and Spherical Coordinates.

(Sections 9.6, 9.7, 9.8, 9.9, 10.7 of the Text)

Module IV : Multivariable Functions and Partial Derivatives (14 hrs)

Functions of Several Variables, Limits and Continuity, Partial Derivatives, differentiability, Chain rule

(Sections 12.1, 12.2, 12.3, 12.4, 12.5 of the Text)

References

1. S.S. Sastry, Engineering Mathematics, Volume I & II, 4th Edition PHI.

2. Murray R. Spiegel, Advanced Calculus, Schaum's Outline Series.

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MATHEMATICS (COMPLEMENTARY COURSE)

THIRD SEMESTER

MAT3C03 : MATHEMATICS

5 hours/week 100marks 3 credits

Text :

1. Erwin Kreyszig : Advanced Engineering Mathematics, Eighth Edition, Wiley, India.
2. Frank Ayres JR : Matrices, Schaum's Outline Series, TMH Edition.

Module I : Ordinary Differential Equations (20 hrs)

Basic concepts and ideas, Geometrical meaning of y' = f(x,y). Direction Fields, Separable Differential Equations. Exact Differential Equations; Integrating Factors, Linear Differential Equations; Bernoulli Equation, Orthogonal Trajectories of Curves.

(Sections 1.1, 1.2, 1.3, 1.5, 1.6, 1.8 of Text 1).

Module II : Matrices (20 hrs)

Rank of a Matrix, Non-Singular and Singular matrices, Elementary Transformations, Inverse of an elementary Transformations, Row Canonical form, Normal form.

Systems of Linear equations: Homogeneous and Non Homogenoeus Equations, Characteristic equation of a matrix; Characteristic roots and characteristic vectors. Cayley-Hamilton Theorem (statement only) and simple applications (relevant sections of Text 2).

Module III : Vector Differential Calculus (25 hrs)

A quick Review of vector algebra, Inner product and vector product in R^2 and R^3.Vector and scalar functions and Fields, Derivatives, Curves, Tangents, Arc Length, Velocity and acceleration, Gradient of a scalar field; Directional Derivative, Divergence of a vector field, Curl of a Vector Field.

(Sections 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.9, 8.10, 8.11 of Text 1).

Module IV : Vector Integral Calculus (25 hrs)

Line Integrals, Independence of path, Green's Theorem in the Plane (without proof), surfaces for Surface Integrals, Surface Integrals, Triple Integrals, Divergence theorem of Gauss and Stoke's theorem (without proofs).

(Sections 9.1, 9.2, 9.4, 9.5, 9.6, 9.7, 9.9, 9.10 of Text 1)

References :

1. S.S. Sastry, Engineering Mathematics, Volume II, 4th ed., PHI.

2. Shanthi Narayanan & P.K. Mittal, A Text Book of Matrices, S. Chand.
3. Harry F. Davis & Arthur David Snider, Introduction to Vector Analysis, 6th ed., Universal Book Stall, New Delhi.
4. Murray R. Spiegel, Vector Analysis, Schaum's Outline Series, Asian Student edition.

B.Sc. DEGREE PROGRAMME

MATHEMATICS (COMPLEMENTARY COURSE)

FOURTH SEMESTER

MAT4C04 : MATHEMATICS

5 hours/week 100marks 3 credits

Texts:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Eighth Edition, Wiley, India.
2. George B. Thomas, Jr. and Ross L. Finney, Calculus, LPE, Ninth Edition, Pearson Education.

Module I: Linear Differential equations of Second and Higher order (20hrs)

Linear Differential equations of Second and Higher order: Differential Operators, Euler-Cauchy Equation, Wronskian, Nonhomogeneous Equations, Solutions by Undetermined Coefficients, Solution by variation of Parameters.

(Sections 2.1, 2.2, 2.3, 2.4, 2.6, 2.7, 2.8, 2.9, 2.10 of Text 1).

Module II: **Laplace Transforms (20 hrs)**

Laplace Transforms: Laplace Transform, Inverse Transform, Linearity, Shifting, Transforms of Derivatives of Integrals, Differential Equations. Unit step Function, Second Shifting Theorem, Dirac Delta Function, Differentiation and integration of Transforms, Convolution, Integral Equations, Partial Fractions, Differential Equations.

(Sections 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 of Text 1 – excluding Proofs).

Module III : Fourier Series ,Partial differential Equations(30 hrs)

Fourier Series : Periodic Functions, Trigonometric Series, Fourier Series, Even and Odd functions, Half-range Expansions.

(Sections 10.1, 10.2, 10.4 of Text 1 – Excluding Proofs).

Partial differential Equations: Basic Concepts, Vibrating String, Wave Equation, Separation of Variables, Use of Fourier Series.

(sections 11.1, 11.2, 11.3 of Text 1).

Module IV:Numerical Methods (20 hrs)

Numerical Methods: Methods of First-order Differential Equations (Section 19.1 of Text 1). Picard's iteration for initial Value Problems.(Section 1.9 of Text 1).

Numerical Integration: Trapezoidal Rule, Simpson's Rule. (Section 4.9 of Text 2).

References:

1.S.S. Sastry, Engineering Mathematics, Vol. II, 4th ed., PHI.

2. Murray R. Spiegel, Advanced Calculus, Schaum's Outline Series.
3. Murray R. Spiegel, Laplace Transforms, Schaum's Outline Series.