

ADAMAS UNIVERSITY

B.Tech. (Section B)

Course file (Theory)

Course Name & Code: Engineering Mathematics II, MTH11502

Course
Coordinator
Dr. [Name]
Semester: III
Section: B



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

THEORY COURSE FILECONTENTS

Check list Course Outcomes Attainment

S. No.	Contents	Available (Y/N/NA)	Date of Submission	Signature of HOD
1.	Authenticated Syllabus Copy	Y	05.04.2021	
2.	Individual Time Table	Y		
3.	Students' Name List (Approved Copy)	Y		
4.	Course Plan, PO, PSO, COs, CO-PO Mapping, COA Plan, Session Plan and Periodic Monitoring	Y		
5.	Previous Year End Semester Question Papers	Y		
6.	Question Bank (All Units - Part A, Part B & C)	Y		
7.	Dissemination of Syllabus and Course Plan to Students	Y		
8.	Lecture Notes - Unit I & IV	Y		
9.	Sample Documents and Evaluation Sheet for Internal Assessment – Tutorials / Assignments / Class Test / Open Book Test / Quiz / Project / Seminar / Role Play if any (Before Mid Term)	Y	17.05.2021	
10.	Mid Term Examination A. Question Paper / Any Other Assessment Tools Used B. Sample Answer Scripts (Best, Average, Poor) if required C. Evaluation Sheet D. Slow Learners List and Remedial Measures	Y		
11.	Lecture Notes – Unit II&III	Y	09.08.2021	
12.	Sample Documents and Evaluation Sheet for Internal Assessment – Tutorials / Assignments / Class Test / Open Book Test / Quiz / Project / Seminar / Role Play if any (After Mid Term)	Y		
13.	Course End Survey (Indirect Assessment)& Consolidation	Y		
14.	End Term Examination A. Question Paper & Answer Key B. Sample Answer Scripts (Best, Average, Poor) if required C. Evaluation Sheet	Y		



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	D. Slow Learners List and Remedial Measures.			
15.	Content Beyond the Syllabus (Proof)	NA		
16.	Innovative Teaching Tools Used for TLP	Y		
17.	Details of Visiting Faculty Session / Industry Expert/ Guest Lecture / Seminar / Field Visit / Webinars / Flipped Class Room / Blended Learning / Online Resources etc.	N		
18.	Consolidated Mark Statement	Y		
19.	CO Attainment (Mid Term + Internal Assessment + End Term)	Y	04.09.2021	
20.	Gap Analysis & Remedial Measures	N		
21.	CO - PO Attainment	Y		
22.	Class Record (Faculty Logbook)	Y		

Signature of HOD/ Dean

Signature of Faculty

Date:

Date: 04.09.2021



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MTH11502	Engineering Mathematics II	L	T	P	C
Version 1.0	Contact Hours - 60	3	1	0	4
Pre-requisites/Exposure	12 th level Mathematics & Engineering Mathematics I				
Co-requisites	--				

Syllabus Copy

Course Objectives:

1. To help the student to understand the basic concepts of matrix theory with its uses in engineering science.
2. To give emphasis about concepts of Eigen value and Eigen vector, vector space and linear transformation and enable students to apply these topics for analyzing engineering problems.
3. To help the student to understand the use of vector calculus in engineering.
4. To give the students a perspective to learn about functions of complex variables, pole, and residues and their importance in advanced study of engineering science.
5. To enable students to acquire the knowledge of different transformation techniques and their applications in engineering science.

Course Content

Unit- I

[18L]

Linear Algebra: Elementary row and column operations on a matrix, Rank, echelon form, normal form, Inverse of a matrix using elementary operations, solution of system of algebraic equation, consistency, Caley-Hamilton theorem, eigenvalues and eigenvectors, Symmetric and skew-symmetric matrices, orthogonal matrices, complex matrices, Hermitian and skew-Hermitian matrices, algebraic and geometric multiplicity, diagonalization, vector spaces, linear dependence of vectors, basis, linear transformations.

Unit- II

[14L]

Vector Calculus: Ordinary Integrals of Vectors, Multiple integrals, Jacobian, Line, surface and volume integrals of Vector fields, Gauss' divergence theorem, Green's and Stokes Theorems and their applications.

Complex Variables: Limit, continuity, differentiability and analyticity of functions, Cauchy-Riemann equations, line integrals in complex plane, Cauchy's integral theorem, independence of path, existence of indefinite integral, Cauchy's integral formula, derivatives of



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analytic functions, Taylor's series, Laurent's series, zeros and singularities, Residue theorem, evaluation of real integrals.

Unit- III [10L]

Fourier Series: Periodic functions, Definition of Fourier series, Euler's formulae, Dirichlet conditions, Change of interval, Even and odd functions, half range Fourier Sine & Cosine series.

Unit-IV [18L]

Introduction to Transform Calculus: Introduction to Laplace transform and its properties (without proof), Inverse Laplace transform, Definition of Fourier integrals, Fourier Sine & Cosine integrals, complex form of Fourier integral, Fourier sine & cosine transforms, inverse Fourier transform, introduction to Z- Transform and its properties, Inverse Z- Transform, Inverse Z-transform by partial fraction and residue methods.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill
3. David C. Lay, Linear algebra and its application, (Latest edition), Pearson publication, New Delhi
4. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications
5. C B Gupta, S R Singh, and Mukesh Kumar, Engineering Mathematics, Mc Graw Hill Publication
6. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House



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Faculty Individual Time Table

ADAMAS UNIVERSITY, KOLKATA								
SCHOOL OF Engineering and Technology (SOET)								
DEPARTMENT OF MATHEMATICS								
Programme: B.Tech								
Course Code & Course: MTH11502 &Engineering Mathematics II Faculty Coordinator: Dr. Sutapa Santra (SS)&Dr. Sumit Som (SSM)								
Day & Time	09.30 - 10.25	10.30 - 11.25	11.30 - 12.25	12.30 - 13.30	13.30 - 14.25	14.30 - 15.25	15.30 - 16.25	16.30 - 17.25
Monday		Engg. Maths II (SS)		LUNCH		Engg. Maths II (SSM)		
Tuesday	Engg. Maths II (SSM).							
Wednesday	-							
Thursday	Engg. Maths II (SS).							-
Friday	-							

Signature of HOD

Signature of Class Coordinator

Date:

Date: 05.04.2021



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Students Name List

Registration Number	Roll Number	Name of the Student
AU/2020/0004250	UG/02/BTCSE/2020/001	ALOK DUTTA
AU/2020/0004275	UG/02/BTCSE/2020/002	SUNANDA JANA
AU/2020/0004276	UG/02/BTCSE/2020/003	SUPRATIM TARUN NATH
AU/2020/0004451	UG/02/BTCSE/2020/004	ABHIPSIT BHATTACHARJEE
AU/2020/0004452	UG/02/BTCSE/2020/005	TIRUPATI SANYAL
AU/2020/0004462	UG/02/BTCSE/2020/007	SURAJ MAJUMDER
AU/2020/0004463	UG/02/BTCE/2020/002	ROHIT KUMAR SHIT
AU/2020/0004464	UG/02/BTCSE/2020/008	ARKADEEP CHATTERJEE
AU/2020/0004465	UG/02/BTECE/2020/001	ARYA PAUL
AU/2020/0004466	UG/02/BTCSE/2020/009	RITUSHNA ROY
AU/2020/0004467	UG/02/BTCSE/2020/010	NIRVIK SARKAR
AU/2020/0004468	UG/02/BTCSE/2020/011	PRIMA GIRI
AU/2020/0004471	UG/02/BTME/2020/001	SUMAN HAIT
AU/2020/0004472	UG/02/BTCSE/2020/012	SOUGATA DUTT
AU/2020/0004479	UG/02/BTCSE/2020/018	PROTYUSH KR CHATTERJEE
AU/2020/0004481	UG/02/BTEE/2020/001	SAPTARSHI BHATTACHARJEE
AU/2020/0004484	UG/02/BTME/2020/002	KOUSHIK GHOSH
AU/2020/0004486	UG/02/BTECE/2020/002	UTSAB BOSE
AU/2020/0004494	UG/02/BTCSE/2020/022	INDRANIL DAS
AU/2020/0004495	UG/02/BTME/2020/004	RAKESH KUMAR MOZUMDER
AU/2020/0004523	UG/02/BTCSE/2020/026	SAYAN DAS
AU/2020/0004529	UG/02/BTCSE/2020/027	ATANU PRAMANICK
AU/2020/0004530	UG/02/BTCSE/2020/028	AYAN KUMAR DAS
AU/2020/0004536	UG/02/BTCE/2020/003	ARJYA DAS
AU/2020/0004540	UG/02/BTCSE/2020/032	MD ALNAS HOSSAIN
AU/2020/0004549	UG/02/BTCSE/2020/033	VIVEK RAJ
AU/2020/0004555	UG/02/BTME/2020/005	REETAM MONDAL
AU/2020/0004557	UG/02/BTCSEAIML/2020/006	SOUMYADWIP MAITY
AU/2020/0004560	UG/02/BTEE/2020/002	ARKA JYOTI DAS
AU/2020/0004562	UG/02/BTCSE/2020/034	SOYATA SAHA
AU/2020/0004563	UG/02/BTCSEAIML/2020/009	ROHIT KUMAR ROY
AU/2020/0004565	UG/02/BTCSE/2020/035	NIKHIL KUMAR JHA



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AU/2020/0004566	UG/02/BTECE/2020/004	ROHIT RAJ HALDER
AU/2020/0004569	UG/02/BTCSE/2020/036	NANDINI ROY
AU/2020/0004572	UG/02/BTCSEAIML/2020/011	SUBARNA BHOWMIK
AU/2020/0004578	UG/02/BTCSEAIML/2020/013	MD SOHAIL IRFAN
AU/2020/0004580	UG/02/BTCSE/2020/041	RAJA BANIK
AU/2020/0004583	UG/02/BTCSE/2020/042	ARSHAD RAJA
AU/2020/0004587	UG/02/BTCSECSF/2020/006	SABYASACHI PAUL
AU/2020/0004588	UG/02/BTCSEAIML/2020/015	CHANDRACHUR MAJHI
AU/2020/0004593	UG/02/BTCSE/2020/046	HRITIK KUMAR DUTTA
AU/2020/0004596	UG/02/BTCSE/2020/047	SHIULI MAHATA
AU/2020/0004600	UG/02/BTBIOME/2020/002	RAVI LAL
AU/2020/0005281	UG/02/BTBIOME/2020/008	GAURAV GAIN
AU/2020/0005498	UG/02/BTBIOME/2020/003	SOUMYADEEP SAMADDAR
AU/2020/0005499	UG/02/BTBIOME/2020/004	SPANDAN BHATTACHAARYA
AU/2020/0005541	UG/02/BTCSE/2020/051	ANANYA MONDAL
AU/2020/0005542	UG/02/BTCSE/2020/052	ANIRBAN ROY

Signature of HOD/Dean

Signature of Class Coordinator

Date:

Date: 05.04.2021



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COURSE PLAN

Target	60% (marks)
Level-1	50% (population)
Level-2	60% (population)
Level-3	70% (population)

1. Method of Evaluation

UG
Internal Assessment (30%) (Quizzes/Tests, Assignments & Seminars etc.)
Mid Semester Examination (20%)
End Semester Examination (50%)

2. Passing Criteria

Scale	UG
Out of 10 Point Scale	CGPA – “5.00” Min. Individual Course Grade – “C” Passing Minimum – 35

3. Pedagogy

- **Direct Instruction**
- Kinesthetic Learning
- **Flipped Classroom**
- Differentiated Instruction
- Expeditionary Learning
- Inquiry Based Learning
- Game Based Learning
- Personalized Learning

4. Topics introduced for the first time in the program through this course

5. References:

Text Books	Web Resources	Journals	Reference Books
-	-	-	6

Signature of HOD/Dean

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GUIDELINES TO STUDY THE SUBJECT

Instructions to Students:

1. Go through the 'Syllabus' in the LMS in order to find out the Reading List.
2. Get your schedule and try to pace your studies as close to the timeline as possible.
3. Get your on-line lecture notes (Content, videos) at Lecture Notes section. These are our lecture notes. Make sure you use them during this course.
4. check your LMS regularly
5. go through study material
6. check mails and announcements on blackboard
7. keep updated with the posts, assignments and examinations which shall be conducted on the blackboard
8. Be regular, so that you do not suffer in any way
9. **Cell Phones and other Electronic Communication Devices:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.
10. **E-Mail and online learning tool:** Each student in the class should have an e-mail id and a pass word to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.
11. **Attendance:** Students are required to have minimum attendance of 75% in each subject. Students with less than said percentage shall NOT be allowed to appear in the end semester examination.

This much should be enough to get you organized and on your way to having a great semester! If you need us for anything, send your feedback through e-mail sutapa.santra@adamasuniversity.ac.in Please use an appropriate subject line to indicate your message details.

There will no doubt be many more activities in the coming weeks. So, to keep up to date with all the latest developments, please keep visiting this website regularly.



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RELATED OUTCOMES

1. The expected outcomes of the Program are:

PO1	Engineering Knowledge
PO2	Problem analysis
PO3	Design/development of solutions
PO4	Conduct investigations of complex problems
PO5	Modern tool usage
PO6	The engineer and society
PO7	Environment and sustainability
PO8	Ethics
PO9	Individual and team work
PO10	Communication
PO11	Project management and finance
PO12	Life-long Learning

2. The expected outcomes of the Course are: (minimum 4 and maximum 6)

CO1	Apply the knowledge of linear algebra for solving related engineering problems
CO2	Build the knowledge of vector calculus and apply it for solving related problems
CO3	Develop the concept of complex variable and its application
CO4	Outline the Fourier series representation of a function
CO5	Make use of appropriate transformation technique for solving differential equation or difference equation



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3. Co-Relationship Matrix

Indicate the relationships by 1- Slight (Low) 2- Moderate (Medium) 3-Substantial (High)

Program Outcomes Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
C01	-	3	3	1	2	-	-	-	-	-	-	2
C02	3	3	-	-	-	-	-	-	-	-	-	-
C03	-	3	-	-	2	-	-	-	-	-	-	-
C04	3	-	3	-	-	-	-	-	-	-	-	-
C05	3	-	3	-	-	-	-	-	-	-	-	2
Average	3	3	3	1	2	-	-	-	-	-	-	2

4. Course Outcomes Assessment Plan (COA):

Course Outcomes	Internal Assessment* (30 Marks)		Mid Term Exam (20 Marks)	End Term Exam (50 Marks)	Total (100 Marks)
	Before Mid Term	AfterMid Term			
C01	5	2	12	8	25
C02	NA	2	NA	8	10
C03	NA	2	NA	13	15
C04	NA	7	NA	13	20
C05	5	7	8	8	30
Total	10	20	20	50	100



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* Internal Assessment – Tools Used: Assignment and Class Test.



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OVERVIEW OF COURSE PLAN OF COURSE COVERAGE

Course Activities:

S. No.	Description	Planned			Actual			Remarks
		From	To	No. of Session	From	TO	No. of Session	
1.	Linear Algebra	05.04.2021	08.06.2021	18	05.04.2021	08.06.2021	18	Completed As per Plan
2.	Vector Calculus & Complex Variables	14.06.2021	27.07.2021	14	14.06.2021	30.07.2021	14	Completed As per Plan
3.	Fourier Series	17.06.2021	19.07.2021	10	07.05.2021	18.06.2021	10	Completed As per Plan
4.	Introduction to Transform Calculus	07.04.2021	06.05.2021	08	07.04.2021	06.05.2021	08	Completed As per Plan
	Introduction to Transform Calculus	21.06.2021	23.07.2021	10	21.06.2021	23.07.2021	10	Completed As per Plan

Total No. of Instructional periods available for the course: 60 Sessions

Signature of HOD/Dean

Signature of Faculty

Date:

Date: 05.04.2021



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SESSION PLAN

UNIT-I

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	05.04.2021	Definition of Matrix with examples. Operation on Matrices.	C01	1	05.04.2021	Definition of Matrix with examples. Operation on Matrices.	C01
2	06.04.2021	Matrix transposition, symmetric and Skew symmetric matrix and their properties.	C01	1	06.04.2021	Matrix transposition, symmetric and Skew symmetric matrix and their properties.	C01
3	12.04.2021	Orthogonal Matrices and their properties.	C01	1	12.04.2021	Orthogonal Matrices and their properties.	C01
4	13.04.2021	Introduction to complex matrices, Hermitian matrix and their properties.	C01	1	13.04.2021	Introduction to complex matrices, Hermitian matrix and their properties.	C01
5	19.04.2021	Skew Hermitian matrices, Unitary matrices and their properties.	C01	1	19.04.2021	Skew Hermitian matrices, Unitary matrices and their properties.	C01
6	20.04.2021	Elementary row and column operations on a matrix with examples.	C01	1	20.04.2021	Elementary row and column operations on a matrix with examples.	C01
7	26.04.2021	Rank of a matrix and examples.	C01	1	26.04.2021	Rank of a matrix and examples.	C01
8	27.04.2021	Finding inverse of a matrix by elementary row operations.	C01	1	27.04.2021	Finding inverse of a matrix by elementary row operations.	C01
9	03.05.2021	Determinant of a matrix with examples.	C01	1	03.05.2021	Determinant of a matrix with examples.	C01



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10	04.05.2021	solution of system of algebraic equation, consistency.	CO1	1	04.05.2021	solution of system of algebraic equation, consistency.	CO1
11	10.05.2021	Introducing eigenvalues and eigen vectors of a square matrix.	CO1	1	10.05.2021	Introducing eigenvalues and eigen vectors of a square matrix.	CO1
12	11.05.2021	Cayley-Hamilton theorem and finding inverse of a square matrix.	CO1	1	11.05.2021	Cayley-Hamilton theorem and finding inverse of a square matrix.	CO1
13	24.05.2021	Algebraic and geometric multiplicity of an eigen value and diagonalization of a square matrix.	CO1	1	24.05.2021	Algebraic and geometric multiplicity of an eigen value and diagonalization of a square matrix.	CO1
14	25.05.2021	Vector spaces with examples. Linear dependence and independence.	CO1	1	25.05.2021	Vector spaces with examples. Linear dependence and independence.	CO1
15	31.05.2021	Basis and dimension of a vector space with examples.	CO1	1	31.05.2021	Basis and dimension of a vector space with examples.	CO1
16	01.06.2021	Linear transformation between two vector spaces, null space and rank of a linear transformation.	CO1	1	01.06.2021	Linear transformation between two vector spaces, null space and rank of a linear transformation.	CO1
17	07.06.2021	Properties of linear transformations.	CO1	1	07.06.2021	Properties of linear transformations.	CO1
18	08.06.2021	Verification of rank nullity theorem.	CO1	1	08.06.2021	Verification of rank nullity theorem.	CO1

Remarks:

Signature of Faculty

Date: 08.06.2021



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SESSION PLAN

UNIT-II

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	14.06.2021	Ordinary Integrals of Vectors, Multiple integrals.	CO2	1	14.06.2021	Ordinary Integrals of Vectors, Multiple integrals.	CO2
2	15.06.2021	Jacobian, Line, surface integrals.	CO2	1	15.06.2021	Jacobian, Line, surface integrals.	CO2
3	21.06.2021	volume integrals of Vector fields, Gauss' divergence theorem with examples.	CO2	1	21.06.2021	Volume integrals of Vector fields, Gauss' divergence theorem with examples.	CO2
4	22.06.2021	Introduction of Green's theorem with examples.	CO2	1	22.06.2021	Introduction of Green's theorem with examples.	CO2
5	28.06.2021	Introduction of Stokes theorem with examples.	CO2	1	28.06.2021	Introduction of Stokes theorem with examples.	CO2
6	29.06.2021	Introduction to complex functions and limits and analyticity of complex valued functions.	CO3	1	29.06.2021	Introduction to complex functions and limits and analyticity of complex valued functions.	CO3
7	05.07.2021	Introductions to Cauchy-Riemann equations with examples.	CO3	1	05.07.2021	Introductions to Cauchy-Riemann equations with examples.	CO3
8	06.07.2021	Introduction to line integrals and Cauchy's theorem.	CO3	1	06.07.2021	Introduction to line integrals and Cauchy's theorem.	CO3
9	12.07.2021 1	Cauchy's integral formula with some examples.	CO3	1	12.07.2021	Cauchy's integral formula with some examples.	CO3



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10	13.07.2021	Introduction to Taylor's series of complex valued functions.	CO3	1	13.07.2021	Introduction to Taylor's series of complex valued functions.	CO3
11	19.07.2021	Introduction to Laurent series of complex valued functions and introduction to pole.	CO3	1	19.07.2021	Introduction to Laurent series of complex valued functions and introduction to pole.	CO3
12	20.07.2021	Introduction to singularities of a complex valued function.	CO3	1	20.07.2021	Introduction to singularities of a complex valued function.	CO3
13	26.07.2021	Introduction to Cauchy's Residue theorem, evaluation of real integrals.	CO3	1	26.07.2021	Introduction to Cauchy's Residue theorem, evaluation of real integrals.	CO3
14	27.07.2021	Some problems related to Cauchy's Residue theorem.	CO3	1	27.07.2021	Some problems related to Cauchy's Residue theorem.	CO3

Remarks:

Signature of Faculty

Date: 27.07.2021



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

SESSION PLAN

UNIT-III

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	17.06.2021	Introduction to periodic functions with examples.	CO4	1	17.06.2021	Introduction to periodic functions with examples.	CO4
2	21.06.2021	Introduction to sine and cosine functions with the integrals.	CO4	1	21.06.2021	Introduction to sine and cosine functions with the integrals.	CO4
3	24.06.2021	Even and odd functions with examples and introduction to Fourier series.	CO4	1	24.06.2021	Even and odd functions with examples and introduction to Fourier series.	CO4
4	28.06.2021	Computation of Fourier coefficients with examples.	CO4	1	28.06.2021	Computation of Fourier coefficients with examples.	CO4
5	01.07.2021	Discussion of Euler's formula.	CO4	1	01.07.2021	Discussion of Euler's formula.	CO4
6	05.07.2021	Discussion of Dirichlet conditions on the convergence of Fourier series.	CO4	1	05.07.2021	Discussion of Dirichlet conditions on the convergence of Fourier series.	CO4
7	08.07.2021	Discussion of change of intervals of the function and related Fourier series.	CO4	1	08.07.2021	Discussion of change of intervals of the function and related Fourier series.	CO4
8	12.07.2021	Introduction to Half range Fourier sine series with examples.	CO4	1	12.07.2021	Introduction to Half range Fourier sine series with examples.	CO4



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

9	15.07.2021	Introduction to Half range Fourier cosine series with examples.	C04	1	15.07.2021	Introduction to Half range Fourier cosine series with examples.	C04
10	19.07.2021	Discussion of problems related to Fourier series.	C04	1	19.07.2021	Discussion of problems related to Fourier series.	C04

Remarks:

Signature of Faculty

Date: 19.07.2021



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

SESSION PLAN

UNIT-IV

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	05.04.2021	Discussion on piecewise continuous function and example of step function.	C05	1	05.04.2021	Discussion on piecewise continuous function and example of step function.	C05
2	08.04.2021	Function of exponential order with examples and introduction to Laplace transform.	C05	1	08.04.2021	Function of exponential order with examples and introduction to Laplace transform.	C05
3	12.04.2021	Discussion of the existence of Laplace transform of a function.	C05	1	12.04.2021	Discussion of the existence of Laplace transform of a function.	C05
4	19.04.2021	Evaluation of Laplace transform of some standard functions.	C05	1	19.04.2021	Evaluation of Laplace transform of some standard functions.	C05
5	22.04.2021	Discussion of properties of Laplace transforms.	C05	1	22.04.2021	Discussion of properties of Laplace transforms.	C05
6	26.04.2021	Discussion of Laplace function of Dirac Delta function and Heaviside function.	C05	1	26.04.2021	Discussion of Laplace function of Dirac Delta function and Heaviside function.	C05
7	29.04.2021	Introduction of Inverse Laplace transform.	C05	1	29.04.2021	Introduction of Inverse Laplace transform.	C05



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

8	03.05.2021	Definition of Fourier integrals with some examples.	C05	1	03.05.2021	Application of Laplace transform and some examples	C05
9	06.05.2021	Fourier sine integrals with some examples.	C05	1	06.05.2021	Definition of Fourier integrals and Fourier sine integrals with some examples.	C05
10	10.05.2021	Fourier cosine integrals with some examples.	C05	1	10.05.2021	Fourier cosine integrals with some examples.	C05
11	13.05.2021	Complex form of Fourier integral.	C05	1	13.05.2021	Complex form of Fourier integral.	C05
12	24.05.2021	Fourier sine transforms with some examples.	C05	1	24.05.2021	Fourier sine transforms with some examples.	C05
13	27.05.2021	Fourier cosine transforms with some examples.	C05	1	27.05.2021	Fourier cosine transforms with some examples.	C05
14	31.05.2021	Discussion of inverse Fourier transform with some examples.	C05	1	31.05.2021	Discussion of inverse Fourier transform with some examples.	C05
15	03.06.2021	Introduction to Z- Transform and its properties.	C05	1	03.06.2021	Introduction to Z- Transform and its properties.	C05
16	07.06.2021	Inverse Z- Transform with some examples.	C05	1	07.06.2021	Inverse Z- Transform with some examples.	C05
17	10.06.2021	Inverse Z- transform by partial fraction and residue methods.	C05	1	10.06.2021	Inverse Z- transform by partial fraction and residue methods.	C05



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

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T: 1

9. Target : 60%

P: 0

C: 4

18	14.06.2021	Some problems discussion on inverse Z- transform.	C05	1	14.06.2021	Some problems discussion on inverse Z- transform.	C05

Remarks:

Signature of Faculty

Date: 14.06.2021



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

PERIODIC MONITORING

Actual date of completion and remarks, if any

Components		From	To	From	To
Duration (Mention from and to Dates)		05.04.2021	21.05.2021	24.05.2021	30.07.2021
Percentage of Syllabus covered		35%		65%	
Lectures	Planned	1	22	23	60
	Taken	1	22	23	60
Tutorials	Planned	NA			
	Taken				
Test/Quizzes/ Mid Semester/ End Semester	Planned	1(Mid)		1(End)	1(Class Test)
	Taken	1		1	1
	CO's Addressed	CO1, CO4		CO1, CO2, CO3, CO4, CO5	CO1, CO2, CO4
	CO's Achieved	CO1, CO4		CO1, CO2, CO3, CO4, CO5	CO1, CO2, CO4
Assignments	Planned	1			
	Taken	1			
	CO's Addressed	CO1, CO2, CO3, CO4, CO5			
	CO's Achieved	CO1, CO2, CO3, CO4, CO5			
Signature of Faculty					
Head of the Department					
OBE Coordinator					

Signature of HOD/ Dean

Signature of Faculty

Date

Date: 04.09.2021



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

PERIODIC MONITORING

Attainment of the Course (Learning) Outcomes:

Components	Attainment level	Action Plan	Remarks
Assignment	C01:	Submission Target 02.08.2021	Covered most of the syllabus
	C02:		
	C03:		
	C04:		
	C05:		
	C06:		
Quiz/Test etc.	C01:	Conducted on 14.07.2021	Covered C01, C02, C04
	C02:		
	C03:		
	C04:		
	C05:		
	C06:		
Mid Semester	C01:	Scheduled on 17.05.2021	Model Question paper is provided to give an idea about the examination pattern
	C02:		
	C03:		
	C04:		
	C05:		
	C06:		
End Semester	C01:	Scheduled on 09.08.2021	Model Question paper is provided to give an idea about the examination pattern
	C02:		
	C03:		
	C04:		
	C05:		
	C06:		
Any Other	C01:	NA	
	C02:		
	C03:		
	C04:		
	C05:		
	C06:		

Signature of HOD/ Dean

Signature of Faculty

Date

Date



Year: I
Semester: II

6. Name of the Faculty:	Dr. Sutapa Santra, Dr. Sumit Som	Course Code: MTH11502
7. Course	:Engineering Mathematics II	L: 3
8. Program	: B.Tech	T: 1
9. Target	: 60%	P: 0
		C: 4

Previous Year Question Papers – Set 1



ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech
Stream: CSE/ECE/EE/ME/CE/Biotech
PAPER TITLE: Engineering Mathematics-II
SMA41102
Maximum Marks: 40
hours
Total No of questions: 08
02

Semester: II
PAPER CODE:
Time duration: 3
Total No of Pages:

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
 2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
 3. Assumptions made if any, should be stated clearly at the beginning of your answer.
-

Answer all the Groups

Group A

Answer all the questions of the following

5×1 = 5

1.
 - a) Calculate the inverse z-transform of the function $F(z) = \frac{1}{z-2}$.
 - b) Find the polar form of $-1 + i$.
 - c) What is the Laplace transform of $f(t) = t^2 e^{-at}$?
 - d) Write down the Fourier series representation for an odd function $f(x)$ in the interval $-\pi \leq x \leq \pi$.
 - e) If $A = \begin{pmatrix} 0 & 2 & 0 & 4 \end{pmatrix}$, Write A as a sum of a symmetric and skew symmetric matrices.

GROUP -B

(Short Answer Type Questions)

Answer any three of the following 3×5 = 15



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som
7. Course :Engineering Mathematics II
8. Program : B.Tech
9. Target : 60%

Course Code: MTH11502
L: 3
T: 1
P: 0
C: 4

2. Verify Cayley-Hamilton theorem for $A = \begin{pmatrix} 0 & 0 & 1 & 3 & 1 & 0 \\ -2 & 1 & 4 \end{pmatrix}$.

3. Express $f(x) = \begin{cases} 1 & \text{for } 0 \leq x \leq \pi \\ 0 & \text{for } x > \pi \end{cases}$ as a Fourier sine integral and hence evaluate

$$\int_0^\infty \frac{1 - \cos \pi \lambda}{\lambda} \sin \lambda x \, d\lambda$$

4. Define Harmonic function. Prove that $H(x, y) = e^{-y} \sin x$ is a harmonic function. [2+3]

5. Find the inverse Z-transform of $F(z) = \frac{(3z^2 - z)}{(z-2)(z-3)(z-4)}$, using partial fraction method.

GROUP -C

(Long Answer Type Questions)

Answer any two of the following $2 \times 10 = 20$

6. (i) Determine the analytic function $f(z) = u + iv$, if $u = e^x (x \cos y - y \sin y)$.

- (ii) Evaluate the line integral $\int_i^{2-i} (3xy + iy^2) dz$ along the line $x + y = 1$

[5+5]

7. (i) Evaluate the integration using Residue theorem $\int_c \frac{dz}{(z-1)(z-2)(z-3)}$ where $c: |z| = \frac{5}{2}$

- (ii) Compute the Laplace transform of the following function $f(t) = \frac{e^{-at} - \cos bt}{t}$

[5+5]

8. (i) Find Fourier cosine and Fourier sine transform of the following function:

[6+4]

$$f(x) = \begin{cases} x, & 0 < x < a \\ 0, & \text{otherwise} \end{cases}, \quad a \text{ is constant}$$

- (ii) Construct the Fourier cosine series expansion of the function

$$f(x) = \begin{cases} 1, & 0 \leq x < 1 \\ -1, & 1 < x < 2 \\ 0, & \text{otherwise} \end{cases}$$



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

Previous Year Question Papers – Set 2



ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech

Semester: II

Stream: CSE/ECE/EE/ME/CE/Biotech

PAPER TITLE: Engineering Mathematics-II

PAPER CODE:

SMA41102

Maximum Marks: 40

Time duration: 3

hours

Total No of questions: 08

Total No of Pages:

02

Instruction for the Candidate:

4. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
5. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
6. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups

Group A

Answer all the questions of the following

5×1 = 5

9. a) Fourier series representation of the function $f(x) = x^2$ in the interval $-\pi \leq x \leq \pi$ is

$$f(x) = a_0 + \sum_{n=1}^{\infty} (a_n \cos nx + b_n \sin nx). \text{ Find the value of } a_0.$$

- b) Find the polar form of $1 - i$.

- c) A delayed unit step function is defined as

$$u(t-a) = \begin{cases} 0, & \text{for } t < a \\ 1, & \text{for } t \geq a \end{cases}. \text{ Evaluate the Laplace transform of it.}$$

- d) If $A = \begin{pmatrix} 0 & 2 & 0 & 4 \end{pmatrix}$, Find eigen values of the matrix A.

- e) Compute the Z-transform of $f(n) = na^n$.



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som
7. Course :Engineering Mathematics II
8. Program : B.Tech
9. Target : 60%

Course Code: MTH11502
L: 3
T: 1
P: 0
C: 4

GROUP –B
(Short Answer Type Questions)

Answer any three of the following $3 \times 5 = 15$

10. Define Analytic function. Prove that the function $f(z) = 2xy + i(x^2 - y^2)$ is nowhere analytic.
[2+3]
11. Use partial fraction method to evaluate inverse Laplace transform of
$$f(s) = \frac{s+4}{s(s-1)(s^2+4)}$$
12. Using Cayley-Hamilton theorem find A^{-1} where $A = \begin{pmatrix} 1 & 2 & 0 & 2 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$
13. Find $Z^{-1} \left[\frac{3z^2 - 18z + 26}{(z-2)^2(z-1)} \right]$, using residue method.

GROUP –C
(Long Answer Type Questions)

Answer any two of the following $2 \times 10 = 20$

14. (i) Determine the analytic function $f(z) = u + iv$, if
 $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 2x + 1$.
(ii) Let c be a closed contour, described in positive sense in the z - plane, and write

$$g(w) = \int_c \frac{z^3 + 2z}{(z-w)^3} dz. \text{ Show that, } g(w) = 6\pi iw, \text{ when } w \text{ lies inside } c. [5+5]$$

15. (i) Evaluate the integration using Residue theorem $\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$ where

$$c: |z| = 3$$

- (ii) Find the Half range Cosine Series for $f(x) = (x-1)^2$, $0 < x < 1$
[6+4]

16. (i) Compute the Fourier transform of $f(x) = \begin{cases} 1, & |x| < 1 \\ 0, & \text{otherwise} \end{cases}$
[3+7]

- (ii) Find Fourier integral representation of $f(x) = \begin{cases} e^{-x}, & x > 0 \\ 0, & x < 0 \end{cases}$. Hence, show that,

$$\int_0^\infty \frac{\cos \omega x + \omega \sin \omega x}{1 + \omega^2} d\omega = \begin{cases} 0, & \text{if } x < 0 \\ \frac{\pi}{2}, & \text{if } x = 0 \\ \pi e^{-x}, & \text{if } x > 0 \end{cases}$$



Year: I
Semester: II

- 6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som**
- 7. Course :Engineering Mathematics II**
- 8. Program : B.Tech**
- 9. Target : 60%**

Course Code: MTH11502

L: 3

T: 1

P: 0

C: 4

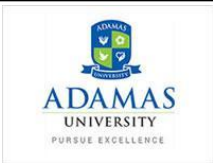


Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som
7. Course :Engineering Mathematics II
8. Program : B.Tech
9. Target : 60%

Course Code: MTH11502
L: 3
T: 1
P: 0
C: 4

Question Bank Sample

				
School: SOET & SOLB		Department: All Engineering Branch		
Course Code: MTH11502		Course Name: Engineering Mathematics II		
Program: B. Tech.		Semester: II		
Unit Number: I		Unit Name: Linear Algebra		
Sl.No.	Question	Level of Difficulty	Knowledge Level	Course Outcome (CO)
Part A (Multiple Choice Questions) (1 mark each)				
1.	Rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 0 & 4 \\ -1 & 2 & 4 & 6 \end{bmatrix}$ is (a) 0 (b) 1 (c) 2 (d) 3	Easy	U	CO1
2.	Let 2 and -3 be eigen values of a non-singular matrix A , then eigen values of A^{-1} are (a) 2, -3 (b) -2 , 3 (c) $\frac{1}{2}$, $-\frac{1}{3}$ (d) $-\frac{1}{2}$, $\frac{1}{3}$	Medium	U	CO2
3.	For the linear transformation $T: R^3 \rightarrow R$ defined by $T(x, y, z) = 0$, the nullity and rank of the transformation are respectively (a) 0, 2 (b) 3, 0 (c) 1, 2 (d) None of these	Difficult	U	CO3
Part B (Definition/Naming Questions) (2 marks each)				
1.	Let $A = \begin{pmatrix} 0 & 2 & 0 & 4 \end{pmatrix}$, using the definition of symmetric and skew-symmetric matrix, show that A can be represent as a sum of a symmetric and skew symmetric matrices.	Easy	R	CO1
2.	Define basis and dimension of a vector space.	Medium	R	CO3
3.	Define algebraic multiplicity and geometric multiplicity of an eigen value.	Difficult	R	CO2
Part C (Short Questions) (3-4 marks each)				
1.	Find the value of K , such that $\begin{pmatrix} \cos \theta & \sin \theta & 0 & 0 \\ \sin \theta & \cos \theta & 0 & 0 \\ 0 & 0 & 0 & K \end{pmatrix}$ is orthogonal.	Easy	U	CO1



Year: I
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9. Target : 60%

P: 0

C: 4

2.	Find whether $S = \{(1, 2, 3), (2, 3, 1), (3, 2, 1)\}$ is a basis for R^3 .	Medium	U	CO3
3.	Show that eigenvalues of a skew Hermitian matrix are purely imaginary or zero.	Difficult	U	CO2
Part D (Explanation Based Questions) (5 marks each)				
1.	Verify Cayley-Hamilton theorem for $A = \begin{pmatrix} 0 & 0 & 1 & 3 & 1 & 0 \\ -2 & 1 & 4 \end{pmatrix}$.	Easy	U	CO2
2.	Check whether the function $T: R^2 \rightarrow R^2$ as defined below are linear transformations or not, explain the reasons: i) $T(x, y) = (x + 2y, 2x - 3y)$ ii) $T(x, y) = (x + y, \sin \sin xy)$	Medium	U	CO3
3.	If $A = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \end{pmatrix}$ then show that, $A^n = A^{n-2} + A^2 - I$, for $n \geq 3$.	Difficult	U	CO1 & CO2
Part E (Questions Based on Reasoning) (5 marks each)				
1.	Summarize reasons for which the system $x + y + z = 1$ $x + 2y - z = k$ $5x + 7y + az = k^2$ Admits (i) No solution (ii) Only one solution (iii) Infinitely many solution.	Easy	U	CO1
2.	State why the following set is not vector space under the associated operations: $V = R^2$ and operations are defined as $(x_1, y_1) + (x_2, y_2) = (x_1 + x_2 + 1, x_2 + y_2 + 1)$ and $k(x, y) = (kx, ky)$.	Medium	U	CO3
3.	Let A be a real matrix such that $(I + A)$ is non-singular, I is identity matrix. Prove that the matrix $(I + A)^{-1}(I - A)$ is orthogonal if and only if A is skew-symmetric.	Difficult	U	CO1 & CO2
Part F (Application Based Questions) (5-10 marks each)				
1.	Apply elementary row operations for finding the inverse of the matrix $A = \begin{pmatrix} -1 & 1 & 2 & 3 \\ -1 & 1 & 0 & 3 & 4 \end{pmatrix}$.	Easy	AP	CO1
2.	Find the matrix representation of the linear transformation given by, $T(x, y, z) = (x + y + z, x - y + 2z)$ with respect to the bases $B = \{(1, 1, 0), (1, 0, 1), (0, 1, 1)\}$, $B' = \{(1, 1), (0, 1)\}$.	Medium	U	CO3



Year: I
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6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

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P: 0

C: 4

3.	Determine A^{-1} by using Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} 1 & 3 & 2 & 0 \\ -1 & 4 & -2 & 1 & 5 \end{pmatrix}.$ Hence find the matrix represented by $A^8 - 5A^7 - A^6 + 37A^5 + A^4 - 5A^3 - 3A^2 + 41A + 3I.$	Difficult	AP	CO2
Part G (Short Notes) (5 marks each)				
1.	Define subspace of a vector space with an example. Also, show that the intersection of subspaces of a vector space is a subspace of the vector space.	Easy	U	CO3
2.	Write a short note on the diagonalization process of a matrix.	Medium	U	CO2
3.	Define the inverse of a matrix and show that matrix inverse is unique.	Difficult	U	CO1
Unit Number: II		Unit Name: Vector Calculus & Complex Variables		
Sl. No.	Question	Level of Difficulty (Easy/ Medium/ Difficult)	Knowledge Level (Bloom's Taxonomy)	Course Outcome (CO)
Part A (Multiple Choice Questions) (1 mark each)				
1.	What is the condition of two non-null vectors to be perpendicular? i) $a \cdot b = 1$ ii) $a \cdot b = 2$ iii) $a \cdot b = 0$ iv) $b = \frac{1}{2}$.	Easy	R	CO-4
2.	What can be said about Cauchy-Riemann equations for the analyticity of a complex valued function? It is i) necessary condition ii) sufficient condition iii) necessary and sufficient condition iv) None of these.	Medium	R	CO-5
3.	Let $F(x, y, z)$ be a vector point function. What is $\text{div}(\text{curl } F)$? i) 1 ii) 2 iii) -1 iv) 0	Difficult	R	CO-4
PartB (Definition/Naming Questions) (2 marks each)				
1.	What is the dot product of two vectors? Give example.	Easy	R	CO-4
2.	What is poles of a complex valued function? How can one decide the existence of poles for a complex valued function by Laurent expansion?	Medium	R	CO-5



Year: I
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P: 0

C: 4

3.	Explain Cauchy's theorem. Provide examples.	Difficult	U	CO-5
PartC (Short Questions) (3-4 marks each)				
1.	Explain some properties of gradient of a scalar point function.	Easy	U	CO-4
2.	Find the directional derivative of $\phi(x, y, z) = xy^2z + x^2z$ at $(1, 1, 2)$ in the direction $(2i + j - 2k)$.	Medium	R	CO-4
3.	Find the residue of the function $F(z) = \frac{z^2 + \sin z}{\cos z - 1}$ at its singular points.	Difficult	R	CO-5
PartD (Explanation Based Questions) (5 marks each)				
1.	Find the constants a and b such that the surface $ax^2 - byz = (a + 2)x$ will be orthogonal to the surface $4x^2y + z^3 = 4$ at the point $(1 - i, 2)$.	Easy	R	CO-4
2.	Show that a function which is analytic everywhere including the point at infinity is constant.	Medium	U	CO-5
3.	Explain the basic difference between real valued function and complex valued function.	Difficult	U	CO-5
PartE (Questions Based on Reasoning) (5 marks each)				
1.	Find the angle between the surfaces $x^3 + y^3 + z^3 - 3xyz = 5$ and $x^2y + y^2z + z^2x - 5xyz = 8$ at the point $(1, 0, 1)$.	Easy	R	CO-4
2.	Find Laurent series for the function $f(z) = \frac{e^z}{(z-1)^3}$ at $z = 1$.	Medium	R	CO-5
3.	Find the value of $\oint_C \frac{dz}{z-a}$ if (i) a lies inside C , (ii) a lies outside C .	Difficult	R	CO-5
PartF (Application Based Questions) (5-10 marks each)				
1.	Find $\oint_C \frac{e^{3z} dz}{(z-1)^4}$ where C is the circle $ z = 2$.	Easy	R	CO-5



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6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

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L: 3

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T: 1

9. Target : 60%

P: 0

C: 4

2.	Show that the Green's theorem is satisfied in the plane for $\oint_C \{ (xy + y^2)dx + x^2 dy \}$ where C is the closed curve of the region bounded by $y = x$ and $y = x^2$.	Medium	U	CO-4
3.	Apply Stoke's theorem to find $\oint_C (ydx + zdy + xdz)$ where C is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$.	Difficult	A	CO-4
PartG (Short Notes) (5 marks each)				
1.	Explain Gauss divergence theorem with an example.	Easy	U	CO-4
2.	Explain the concept of Laurent series. Provide examples.	Medium	U	CO-5
3.	Explain Cauchy's integral formula with an example.	Difficult	U	CO-5
Unit Number: III		Unit Name: Fourier Series		
Sl. No.	Question	Level of Difficulty (Easy/ Medium/ Difficult)	Knowledge Level (Bloom's Taxonomy)	Course Outcome (CO)
Part A (Multiple Choice Questions) (1 mark each)				
1.	The period of the function $f(x) = \sin 2x $ is (a) $\frac{\pi}{2}$ (b) π (c) 2π (d) $\frac{3\pi}{2}$	Easy	R	CO6
2.	The function $f(x) = \sqrt{1 - \cos x}$; $0 \leq x \leq 2\pi$ is represented by a Fourier series as $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$, then a_0 is	Medium	R	CO6



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	$\frac{3}{4}\pi$ (a) $\frac{4\sqrt{2}}{\pi}$ (b) $\frac{\sqrt{2}\pi}{4}$ (c) $\frac{6\sqrt{2}}{\pi}$ (d)			
3.	The function $f(x) = \begin{cases} -k, & -a < x < 0 \\ k, & 0 < x < a \end{cases}$, $f(x+2a) = f(x)$ will generate (a) Saw-tooth waveform (b) Square wave form (c) Triangular wave form (d) none of these	Difficult	R	CO6
PartB (Definition/Naming Questions) (2 marks each)				
1.	Write the Dirichlet's condition for convergence of Fourier series.	Easy	R	CO6
2.	Define Half-range Fourier Series.	Medium	R	CO6
3.	What is Parseval's theorem in Fourier series?	Difficult	U	CO6
PartC (Short Questions) (3-4 marks each)				
1.	A periodic function of period 2π is defined as $f(x) = x $, $-\pi < x < \pi$, find its Fourier series expansion.	Easy	U	CO6
2.	Obtain the Fourier series expansion of $f(x) = x^2$, $-\pi < x < \pi$ and prove that $\sum_{n=1}^{\infty} \frac{1}{n^4} = \frac{\pi^4}{90}$ using Parseval's theorem.	Medium	R	CO6
3.	Find the Fourier series representation of the function $f(x) = \frac{1}{4}(\pi - x)^2$, $0 < x < 2\pi$.	Difficult	R	CO6
PartD (Explanation Based Questions) (5 marks each)				
1.	Find the half range cosine series of the function $f(x) = \begin{cases} 2x; & \text{for } 0 < x < 1 \\ 2(2-x); & \text{for } 1 < x < 2 \end{cases}$.	Easy	R	CO6



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2.	Obtain the half range sine series for $f(x) = e^x$ in $0 < x < 1$.	Medium	U	CO6
3.	Find the half range cosine series of the function $f(x) = (x-1)$ in $(0, 1)$.	Difficult	U	CO6
PartE (Questions Based on Reasoning) (5 marks each)				
1.	Expand the function $f(x) = \begin{cases} x; & \text{for } 0 < x \leq 1 \\ 2-x; & \text{for } 1 < x < 2 \end{cases}$ in the interval $(0, 2)$ as a series of cosines.	Easy	R	CO6
2.	Find the half range sine series of the function $f(x) = x - x^2$ for $0 < x < 1$.	Medium	R	CO6
3.	Show that the Fourier series expansion of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in $0 \leq x \leq 2\pi$ is $\frac{\pi^2}{12} + \sum_{n=1}^{\infty} \frac{\cos nx}{n^2}$.	Difficult	R	CO6
PartF (Application Based Questions) (5-10 marks each)				
1.	Obtained the fourier series of the function $f(x) = \begin{cases} 0; & \text{for } -\pi < x < 0 \\ \sin x; & \text{for } 0 < x < \pi \end{cases}$ and hence prove that $\frac{1}{1 \cdot 3} - \frac{1}{3 \cdot 5} + \frac{1}{5 \cdot 7} - \frac{1}{7 \cdot 9} + \dots = \frac{1}{4}(\pi - 2)$.	Easy	R	CO6



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2.	Find the fourier series of the function $f(x) = \begin{cases} -x+1; & \text{for } -\pi \leq x < 0 \\ x+1; & \text{for } 0 \leq x < \pi \end{cases}$ and hence show that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$	Medium	U	CO6
3.	Expand $f(x) = x $ in Fourier series in the interval $-\pi \leq x \leq \pi$ and hence prove that $1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \frac{1}{9^2} + \dots = \frac{\pi^2}{8}$	Difficult	A	CO6

PartG (Short Notes) (5 marks each)

1.	NA	Easy	U	CO6
2.	Discuss half range Fourier series. Express the function $f(x) = \sin \frac{\pi x}{l}$ in half range cosine series in range $0 < x < l$	Medium	U	CO6
3.	Discuss point of discontinuity in Fourier series.	Difficult	U	CO6

Unit Number: IV

Unit Name: Introduction to Transform Calculus

Sl. No.	Question	Level of Difficulty (Easy/Medium/Difficult)	Knowledge Level (Bloom's Taxonomy)	Course Outcome (CO)
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Part A (Multiple Choice Questions) (1 mark each)

1.	What is the value of (e^{2t}) ? i) $\frac{1}{s+2}$ ii) $\frac{1}{s-2}$ iii) $\frac{1}{s}$ iv) none	Easy	Remembering	CO7
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2.	Find Z-transform of $\frac{1}{n!}$ i) e ii) $\frac{1}{e}$ iii) e^z iv) $e^{\frac{1}{z}}$	Medium	Remembering	CO7
3.	What is Fourier Sine transform of $e^{- x }$? i) $\frac{1}{1-s^2}$ ii) $\frac{1}{1+s^2}$ iii) $\frac{s}{1-s^2}$ iv) $\frac{s}{1+s^2}$	Difficult	Remembering	CO7
Part B (Definition/Naming Questions) (2 marks each)				
1.	Define damping rule of Z-transform.	Easy	Remembering	CO7
2.	Using definition, find the Laplace transform of $f(t) = te^{-at}$.	Medium	Remembering	CO7
3.	Find the Z-transform of $f(n) = n a^n$.	Difficult	Remembering	CO7
PartC (Short Questions) (3-4 marks each)				
1.	Find Z-transform of $\sin(3n + 5)$.	Easy	Remembering	CO7
2.	Find Fourier Sine transform of $f(x) = 2x, 0 < x < 4$	Medium	Remembering	CO7
3.	Explain existence condition and advantages of Laplace transform.	Difficult	Understanding	CO7
PartD (Explanation Based Questions) (5 marks each)				
1.	Explain convolution theorem for $f(x) = g(x) = e^{-x^2}$	Easy	Understanding	CO7
2.	Find the function whose Fourier sine transform is $f_s(s) = \frac{e^{-as}}{s}$	Medium	Remember	CO7
3.	Show that $\int_0^\infty \frac{dx}{(x^2+a^2)(x^2+b^2)} = \frac{\pi}{2ab(a+b)}$ applying Parseval's identity for Fourier transform.	Difficult	Understanding	CO7
PartE (Questions Based on Reasoning) (5 marks each)				
1.	Find Z-transform of unit impulse sequence.	Easy	Remember	CO7
2.	Find the function whose Fourier transform is $(s) = \frac{1}{s^2+is+2}$.	Medium	Remember	CO7



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3.	Solve $\int_0^{\infty} \frac{\sin^2 ax}{x^2} dx$ applying Parseval's identity for Fourier transform.	Difficult	Applying	CO7
----	--	-----------	----------	-----

PartF (Application Based Questions) (5-10 marks each)

1.	Find u_2 and u_3 where $U(z) = \frac{2z^2+5z+14}{(z-1)^4}$.	Easy	Remember	CO7
2.	Find the temperature distribution in semi-infinite bar with its end point and lateral surface insulated and with initial temperature distribution in the bar is prescribed by $f(x)$. Deduce the solution when $f(x) = e^{-ax}$	Medium	Understanding	CO7
3.	Apply Laplace transform technique for solving the following differential equation: $\frac{d^2y}{dt^2} + \frac{dy}{dt} = \{t^2, 0 < t < 1, 0, t > 1, y(0) = 0, y$	Difficult	Apply	CO7

PartG (Short Notes) (5 marks each)

1.	NA	Easy		
2.	NA	Medium		
3.	NA	Difficult		



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Lecture Notes – Sample

..\SS\MTH11502\Study Materials

..\Lecture notes



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P: 0

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	ADAMAS UNIVERSITY CLASS TEST (Academic Session: 2020 – 21)		
Name of the Program:	B. Tech.	Semester:	II
Paper Title:	Engineering Mathematics II	Paper Code:	MTH11502
Maximum Marks:	30	Time Duration:	2 Hrs
Total No. of Questions:	4	Total No of Pages:	1
At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.			

Group A Answer All the Questions (7 x 2 = 14)			
1	Find eigen values and eigen vectors of $A = \begin{pmatrix} 1 & 3 & 2 & 0 \\ -1 & 1 & 0 & 1 & 0 \end{pmatrix}$. 7	U	CO1
2	For what value(s) of k , do the following system of equations have solutions? Solve the system of equations completely in each case(s). $2x + y + z = 2$ $2x + y + 4z = k$ $3x + y + 7z = k^2$	AP	CO1
Group B Answer All the Questions (8 x 2 = 16)			
3	Show that $L\left\{\frac{t}{\tau}\right\} = \frac{1}{4} \log \log \left(\frac{s^2+4}{s^2}\right)$	U	CO4
4	Find Laplace transform of $f(t) = \begin{cases} t + 1, & 0 \leq t \leq 3 \\ 3, & t > 3 \end{cases}$. Also determine $L\{f(t)\}$.	R	CO4

Assignment on Engineering Mathematics II

Last date of submission: 14/06/2021

- Find Laplace transform of following the functions using definition:



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- (a) $F(t) = e^{-3t}$ (b) $F(t) = t^3$ (c) $F(t) = te^{2t}$ (d) $F(t) = e^t \sin 3t$
2. Find the Laplace transform of the following functions:
(a) $F(t) = t \cos 2t$ (b) $F(t) = \sin 2t \cos 3t$ (c) $F(t) = e^{-2t} (3 \cos 4t - 2 \sin 5t)$
3. Find $L\{F(t)\}$ where $F(t) = \begin{cases} (t-1)^3; & t > 1 \\ 0; & t < 1 \end{cases}$.
4. Find $L\{F(t)\}$ where $F(t) = \begin{cases} t^2; & 0 < t < 2 \\ t-1; & 2 < t < 3 \\ 7; & t > 3 \end{cases}$
5. Using Laplace transform evaluate $\int_0^{\infty} e^{-4t} \cosh^3 t dt$.
6. Use partial Fraction method to evaluate the following:
(a) $L^{-1} \left\{ \frac{2s^2 - 1}{(s^2 + 1)(s^2 + 4)} \right\}$ (b) $L^{-1} \left\{ \frac{s+2}{(s+1)^3(s+3)} \right\}$ (c) $L^{-1} \left\{ \frac{2s^2 - 1}{(s^2 + 1)(s^2 + 4)} \right\}$
(d) $L^{-1} \left\{ \frac{s^2 + 2s - 3}{s(s-3)(s+2)} \right\}$ (e) $L^{-1} \left\{ \frac{s}{(s-2)^2(s^2 + 9)} \right\}$
7. Use Laplace transform to solve following ordinary differential equations:
(a) $\frac{d^2 y}{dt^2} - 4 \frac{dy}{dt} + 4y = 64 \sin 2t; y(0) = 0, y'(0) = 1$.
(b) $\frac{d^2 y}{dt^2} + 25y = 10 \cos 5t; y(0) = 2, y'(0) = 0$
(c) $2 \frac{d^2 y}{dt^2} + 5 \frac{dy}{dt} + 2y = e^{-2t}; y(0) = 1, y'(0) = 1$
(d) $\frac{d^2 y}{dt^2} + 9y = 9u(t-3); y(0) = y'(0) = 0$, where $u(t-3)$ is the unit step function.

Sample Assessment Answer Script

..\SS\MTH11502\Assessment



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T: 1

P: 0

C: 4

Evaluation Sheet – Internal Assessment

Student Name	Student Roll Number	Student Registration Number	Internal Assessment (30)		
			Assignme nt	Class Test	Total
Ravi lal	UG/02/BTBIOME/2020/002	AU/2020/0004600			19
Soumyadeep Samaddar	UG/02/BTBIOME/2020/003	AU/2020/0005498			24
SPANDAN BHATTACHAARYA	UG/02/BTBIOME/2020/004	AU/2020/0005499			22
Gaurav gain	UG/02/BTBIOME/2020/008	AU/2020/0005281			27
Rohit Kumar Shit	UG/02/BTCE/2020/002	AU/2020/0004463			23
Arjya Das	UG/02/BTCE/2020/003	AU/2020/0004536			27
ALOK DUTTA	UG/02/BTCSE/2020/001	AU/2020/0004250			23
SUNANDA JANA	UG/02/BTCSE/2020/002	AU/2020/0004275			23
SUPRATIM TARUN NATH	UG/02/BTCSE/2020/003	AU/2020/0004276			23
SURAJ MAJUMDER	UG/02/BTCSE/2020/007	AU/2020/0004462			22
Arkadeep Chatterjee	UG/02/BTCSE/2020/008	AU/2020/0004464			23
Ritushna roy	UG/02/BTCSE/2020/009	AU/2020/0004466			22
Prima Giri	UG/02/BTCSE/2020/011	AU/2020/0004468			23



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SOUGATA DUTT	UG/02/BTCSE/2020/012	AU/2020/0004472			23
Protyush Kr Chatterjee	UG/02/BTCSE/2020/018	AU/2020/0004479			23
Indranil Das	UG/02/BTCSE/2020/022	AU/2020/0004494			23
Atanu Pramanick	UG/02/BTCSE/2020/027	AU/2020/0004529			23
Ayan Kumar Das	UG/02/BTCSE/2020/028	AU/2020/0004530			23
Md Alnas Hossain	UG/02/BTCSE/2020/032	AU/2020/0004540			24
Vivek Raj	UG/02/BTCSE/2020/033	AU/2020/0004549			24
Soyata Saha	UG/02/BTCSE/2020/034	AU/2020/0004562			25
Nikhil Kumar Jha	UG/02/BTCSE/2020/035	AU/2020/0004565			16
nandini roy	UG/02/BTCSE/2020/036	AU/2020/0004569			24
RAJA BANIK	UG/02/BTCSE/2020/041	AU/2020/0004580			24
Arshad Raja	UG/02/BTCSE/2020/042	AU/2020/0004583			19
Hritik Kumar Dutta	UG/02/BTCSE/2020/046	AU/2020/0004593			22
SHIULI MAHATA	UG/02/BTCSE/2020/047	AU/2020/0004596			22
ANIRBAN ROY	UG/02/BTCSE/2020/052	AU/2020/0005542			24
SOUMYADWIP MAITY	UG/02/BTCSEAIML/2020/006	AU/2020/0004557			16
Rohit kumar Roy	UG/02/BTCSEAIML/2020/009	AU/2020/0004563			16
SUBARNA BHOWMIK	UG/02/BTCSEAIML/2020/011	AU/2020/0004572			23.5
Md Sohail Irfan	UG/02/BTCSEAIML/2020/013	AU/2020/0004578			23



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Chandrachur Majhi	UG/02/BTCSEAIML/2020/015	AU/2020/0004588			20
Sabyasachi Paul	UG/02/BTCSECSF/2020/006	AU/2020/0004587			23
Arya Paul	UG/02/BTECE/2020/001	AU/2020/0004465			23
Utsab Bose	UG/02/BTECE/2020/002	AU/2020/0004486			20
ROHIT RAJ HALDER	UG/02/BTECE/2020/004	AU/2020/0004566			16
Saptarshi Bhattacharjee	UG/02/BTEE/2020/001	AU/2020/0004481			24
Arka Jyoti Das	UG/02/BTEE/2020/002	AU/2020/0004560			23
Suman Hait	UG/02/BTME/2020/001	AU/2020/0004471			16
Koushik Ghosh	UG/02/BTME/2020/002	AU/2020/0004484			24
Rakesh Kumar Mozumder	UG/02/BTME/2020/004	AU/2020/0004495			17
Reetam Mondal	UG/02/BTME/2020/005	AU/2020/0004555			23

Signature of HOD/Dean

Signature of Faculty

Date:

Date: 04.09.2021

		ADAMAS UNIVERSITY MID-SEMESTER EXAMINATION (Academic Session: 2020 – 21)	
Name of the Program:	B. Tech.	Semester:	II
Paper Title:	Engineering Mathematics II	Paper Code:	MTH11502



Year: I
Semester: II

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Maximum Marks:	20	Time Duration:	2 Hrs
Total No. of Questions:	8	Total No of Pages:	2
(Any other information for the student may be mentioned here)	7. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. 8. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. 9. Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A			
Answer All the Questions (5 x 1 = 5)			
1	What is a Hermitian matrix? Give an example.	R	CO1
2	What is a row reduced echelon matrix? Give an example of a row reduced echelon matrix.	R	CO1
3	Define minor and cofactor with an example.	R	CO1
4	What is the value of the integral $\int_0^{\infty} \frac{\sin t}{t} dt$?	R	CO4
5	What is Laplace transform of a constant term c .	R	CO4
Group B			
Answer All the Questions (3 x 5 = 15)			
6 a)	i) Let H be a skew-Hermitian matrix of order n. Show that the diagonal elements of H are either zero or purely imaginary number. ii) Find the rank of the matrix $A = [1 \ 3 \ 2 \ 4 \ 1 \ 0 \ 0 \ 2 \ 2 \ 0 \ 2 \ 6 \ 2 \ 6 \ 2 \ 3 \ 9 \ 1 \ 10 \ 6]$ (1.5+3.5)	R & Ap	CO1
(OR)			
6 b)	i) Write the following matrices as sum of a Hermitian and a skew-Hermitian matrix: $(4 + 2i \ 7 \ 3 - i \ 0 \ 3i - 2 \ 5 + 3i - 7 + i \ 9 + 6i)$ ii) Let A be an orthogonal matrix of order n. Will A be singular? Justify. (4+1)	U	CO1
7 a)	Define unit step function. Express the following function in terms of unit step function and find its Laplace transform $F(t) = \{0, 0 < t < 0 \ t - 1, 1 \leq t < 2 \ 1, t \geq 2\}$ (1+1+3)	U	CO4



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(OR)			
7 b)	Find $L^{-1}\left\{\frac{s^2-2s+3}{(s+1)(s-1)^2}\right\}$	R	CO4
8 a)	Use elementary row operations to find the inverse of the matrix $A = \begin{bmatrix} 1 & 3 & 3 & 1 & 4 & 3 & 1 & 3 & 4 \end{bmatrix}$.	Ap	CO1
(OR)			
8 b)	Apply Laplace transform to find the value of the integral $\int_0^{\infty} te^{-2t} \cos t dt$	AP	CO4

Sample Answer Script

Mid Term

Evaluation Sheet – Mid Semester

Name	Roll Number	Registration number	Marks (20)
Ravi lal	UG/02/BTBIOME/2020/002	AU/2020/0004600	15
Soumyadeep Samaddar	UG/02/BTBIOME/2020/003	AU/2020/0005498	17
SPANDAN BHATTACHAARYA	UG/02/BTBIOME/2020/004	AU/2020/0005499	16
Gaurav gain	UG/02/BTBIOME/2020/008	AU/2020/0005281	14
Rohit Kumar Shit	UG/02/BTCE/2020/002	AU/2020/0004463	17
Arjya Das	UG/02/BTCE/2020/003	AU/2020/0004536	18
ALOK DUTTA	UG/02/BTCSE/2020/001	AU/2020/0004250	15
SUNANDA JANA	UG/02/BTCSE/2020/002	AU/2020/0004275	13
SUPRATIM TARUN NATH	UG/02/BTCSE/2020/003	AU/2020/0004276	17
SURAJ MAJUMDER	UG/02/BTCSE/2020/007	AU/2020/0004462	17
Arkadeep Chatterjee	UG/02/BTCSE/2020/008	AU/2020/0004464	15
Ritushna roy	UG/02/BTCSE/2020/009	AU/2020/0004466	14
Prima Giri	UG/02/BTCSE/2020/011	AU/2020/0004468	17
SOUGATA DUTT	UG/02/BTCSE/2020/012	AU/2020/0004472	15
Protyush Kr Chatterjee	UG/02/BTCSE/2020/018	AU/2020/0004479	18
Indranil Das	UG/02/BTCSE/2020/022	AU/2020/0004494	18
Atanu Pramanick	UG/02/BTCSE/2020/027	AU/2020/0004529	16
Ayan Kumar Das	UG/02/BTCSE/2020/028	AU/2020/0004530	17
Md Alnas Hossain	UG/02/BTCSE/2020/032	AU/2020/0004540	17



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Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

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8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

Vivek Raj	UG/02/BTCSE/2020/033	AU/2020/0004549	16
Soyata Saha	UG/02/BTCSE/2020/034	AU/2020/0004562	16
Nikhil Kumar Jha	UG/02/BTCSE/2020/035	AU/2020/0004565	16
nandini roy	UG/02/BTCSE/2020/036	AU/2020/0004569	17
RAJA BANIK	UG/02/BTCSE/2020/041	AU/2020/0004580	16
Arshad Raja	UG/02/BTCSE/2020/042	AU/2020/0004583	17
Hritik Kumar Dutta	UG/02/BTCSE/2020/046	AU/2020/0004593	11
SHIULI MAHATA	UG/02/BTCSE/2020/047	AU/2020/0004596	14
ANIRBAN ROY	UG/02/BTCSE/2020/052	AU/2020/0005542	16
SOUMYADWIP MAITY	UG/02/BTCSEAIML/2020/006	AU/2020/0004557	11
Rohit kumar Roy	UG/02/BTCSEAIML/2020/009	AU/2020/0004563	15
SUBARNA BHOWMIK	UG/02/BTCSEAIML/2020/011	AU/2020/0004572	18
Md Sohail Irfan	UG/02/BTCSEAIML/2020/013	AU/2020/0004578	18
Chandrachur Majhi	UG/02/BTCSEAIML/2020/015	AU/2020/0004588	17
Sabyasachi Paul	UG/02/BTCSECSF/2020/006	AU/2020/0004587	13
Arya Paul	UG/02/BTECE/2020/001	AU/2020/0004465	13
Utsab Bose	UG/02/BTECE/2020/002	AU/2020/0004486	20
ROHIT RAJ HALDER	UG/02/BTECE/2020/004	AU/2020/0004566	15
Saptarshi Bhattacharjee	UG/02/BTEE/2020/001	AU/2020/0004481	17
Arka Jyoti Das	UG/02/BTEE/2020/002	AU/2020/0004560	16
Suman Hait	UG/02/BTME/2020/001	AU/2020/0004471	10
Koushik Ghosh	UG/02/BTME/2020/002	AU/2020/0004484	17
Rakesh Kumar Mozumder	UG/02/BTME/2020/004	AU/2020/0004495	5
Reetam Mondal	UG/02/BTME/2020/005	AU/2020/0004555	18

Signature of HOD/Dean

Signature of Faculty

Date:

Date: 04.09.2021



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

Planning for Remedial Classes – Mid Semester- NA **COURSE END SURVEY**

INDIRECT ASSESSMENT

Sample format for Indirect Assessment of Course outcomes:

NAME:
ROLL NO.:
REG. NO.:
COURSE: Engineering Mathematics II (MTH11502)
PROGRAM: B.Tech

Please rate the following aspects of course outcomes of **Engineering Mathematics II**

Use the scale 1-5 (Poor – Excellent)

Course Outcomes	Statement	1	2	3	4	5
CO1	Apply the knowledge of linear algebra for solving related engineering problems				4	
CO2	Build the knowledge of vector calculus and apply it for solving related problems				4	
CO3	Develop the concept of complex variable and its application				4	
CO4	Outline the Fourier series representation of a function				4	
CO5	Make use of appropriate transformation technique for solving differential equation or difference equation				4	



Year: I
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T: 1

9. Target : 60%

P: 0

C: 4

INDIRECT ASSESSMENT CONSOLIDATION

ADAMAS UNIVERSITY, KOLKATA SCHOOL OF DEPARTMENT OF CO Indirect Assessment		
Programme:		Academic Year:2020-21 Batch: 2020-22
Course Code & Name:	MTH11502 &Engineering Mathematics II	
Course Outcome	Students Feed Back (5)	Attainment (100)
CO1	4.1	82
CO2	4.48	89.6
CO3	4.48	89.6
CO4	4	80
CO5	4.29	85.8
Signature of HOD/Dean Date:		Signature of Faculty Date:

End-Semester Question Paper Set I

	ADAMAS UNIVERSITY END SEMESTER EXAMINATION (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech	Semester:	II



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som
7. Course :Engineering Mathematics II
8. Program : B.Tech
9. Target : 60%

Course Code: MTH11502
L: 3
T: 1
P: 0
C: 4

Paper Title:	Engineering mathematics II	Paper Code:	MTH11502
Maximum Marks:	50	Time Duration:	3 Hrs
Total No. of Questions:	17	Total No of Pages:	

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A			
Answer All the Questions (5 x 1 = 5)			
1	What is Cayley-Hamilton theorem.	R	CO1
2	Define basis of a vector space.	R	CO2
3	Define analytic function.	R	CO3
4	Define periodic function with an example.	R	CO4
5	Find the Z-transform of $f(n) = n a^n$.	R	CO5
Group B			
Answer All the Questions (5 x 2 = 10)			
6 a)	What is the value of a for which the following system of equations has unique solution? $x + y + z = 1$ $x + 2y - z = 2$ $5x + 7y + az = 4$	R	CO1
(OR)			
6 b)	Find whether the following two matrices are similar or not: $A = \begin{pmatrix} 1 & 0 & 0 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 1 & 0 & 1 \end{pmatrix}$	R	CO1
7 a)	Show that the following vectors are linearly independent: $(1, 2, 0)$, $(2, 3, 4)$ and $(1, 5, -2)$	U	CO2
(OR)			
7 b)	Let the vector addition in $R^2 = \{(x, y) x, y \in R\}$ be defined by $(x_1, y_1) + (x_2, y_2) = (x_1 + x_2, y_1 + y_2)$. Show that the first five conditions of the vector space related to vector addition are satisfied.	U	CO2
8 a)	Find the singularity of the complex valued function $f(z) = \frac{e^z}{(z-2)^2}$ at $z = 2$.	R	CO3
(OR)			



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som
7. Course :Engineering Mathematics II
8. Program : B.Tech
9. Target : 60%

Course Code: MTH11502
L: 3
T: 1
P: 0
C: 4

8 b)	Find the value of the integral $\oint_C \frac{z^2 - z + 1}{z - 1} dz$ where C is the circle $ z = \frac{1}{2}$.	R	CO3
9 a)	Explain convergence of Fourier Series.	U	CO4
(OR)			
9 b)	Construct half-range Cosine series of a function $f(x)$ defined in an interval $(0, T)$	AP	CO4
10 a)	Find the Fourier sine transforms of $f(x) = 5e^{-3x} - 7e^{-4x}$.	R	CO5
(OR)			
10 b)	Find the function whose Fourier sine transform is $f_s(s) = \frac{e^{-as}}{s}$	R	CO5
Group C Answer All the Questions (7 x 5 = 35)			
11 a)	Find the eigen values and eigen vectors of the following matrix: $A = \begin{pmatrix} 1 & 1 & 1 & -1 & -1 & -1 & 0 & 0 & 1 \end{pmatrix}$	R	CO1
(OR)			
11 b)	Use Cayley-Hamilton theorem to find inverse of the following matrix (if exist): $A = \begin{pmatrix} 1 & 0 & 0 & 1 & 2 & 1 & 2 & 3 & 2 \end{pmatrix}$	R	CO1
12 a)	Express $(4, 3, 10)$ as linear combination of the vectors $(1, 2, 0)$, $(2, 3, 4)$ and $(1, 5, -2)$.	R	CO2
(OR)			
12 b)	Show that the following set of vectors constitute a basis for the vector space R^3 with usual vector addition and scalar multiplication: $S = \{(1, 1, 0), (1, 0, 1), (0, 1, 1)\}$	U	CO2
13 a)	Show that the complex valued function $f(z) = z ^2$ is analytic only at $z = 0$.	R	CO3
(OR)			



Year: I
Semester: II

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T: 1

9. Target : 60%

P: 0

C: 4

13 b)	Show that the complex valued function $f(z) = \sqrt{ xy }$ is not differentiable at $z = 0$ but the Cauchy-Riemann equation is satisfied there.	R	CO3
14 a)	Find Fourier Series for $ x $ in the interval $[-\pi, \pi]$.	R	CO4
(OR)			
14 b)	Find half range sine series of $\pi x - x^2$ in $(0, \pi)$ upto first three terms.	R	CO4
15 a)	Use Laplace transform to find the solution of following ordinary differential equation: $2\frac{d^2y}{dt^2} + 5\frac{dy}{dt} + 2y = e^{-2t}; y(0) = 1, y'(0) = 1$	R	CO5
(OR)			
15 b)	Find the Z-transform and region of convergence of the sequence $f[n] = a^n u[n]$, where $u[n]$ is the unit step sequence. (3+2)	R	CO5
16 a)	Find the value of $\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$ where C is the circle $ z = 3$ by Cauchy's integral formula.	R	CO3
(OR)			
16 b)	Find the value of $\oint_C \frac{3z^2 + z}{z^2 - 1} dz$ where C is the circle $ z - 1 = 1$ by Cauchy's integral formula.	R	CO3
17 a)	Show that Fourier series expansion of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ is $\frac{\pi^2}{12} + \sum_{n=1}^{\infty} \frac{\cos \cos nx}{n^2}$.	U	CO4
(OR)			
17 b)	Obtain Fourier series of the function $f(x) = \{0, -\pi < x < 0 \sin \sin x, 0 < x < \pi$ Hence show that $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \dots = \frac{1}{4}(\pi - 2)$. (3+2)	U	CO4



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

End-Semester Question Paper Set II

	ADAMAS UNIVERSITY END SEMESTER EXAMINATION (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech	Semester:	II
Paper Title:	Engineering mathematics II	Paper Code:	MTH11502
Maximum Marks:	50	Time Duration:	3 Hrs
Total No. of Questions:	17	Total No of Pages:	
4. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. 5. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. 6. Assumptions made if any, should be stated clearly at the beginning of your answer.			

Group A

Answer All the Questions (5 x 1 = 5)

1	Let A be a 3×3 order matrix over real numbers such that 0 is an eigen value of A . What is your conclusion about the existence of A^{-1} ? Justify.	R	CO1
2	Consider the vector space R^3 over the set of all real numbers R . When a set of vectors in R^3 is said to be linearly independent? Also, give an example of a linearly independent set of vectors in R^3 .	R	CO2
3	Define pole of a complex valued function with an example.	R	CO3
4	Define even and odd function with an example.	R	CO4
5	Define damping rule of Z-transform.	R	CO5

Group B

Answer All the Questions (5 x 2 = 10)

6 a)	Solve the following system of homogeneous equations $x + y + 3z = 0$ $2x + y + z = 0$ $3x + 2y + 4z = 0$	Ap	CO1
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(OR)



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

6 b)	Find the eigen values of the matrix $(1 \ 0 \ 1 \ 2 \ 2 \ 3 \ 0 \ 0 \ 0)$.	R	CO1
7 a)	Show that following set of vectors is linearly independent: $(1, 0, 0)$, $(1, 0, 1)$ and $(1, 1, 1)$.	U	CO2
(OR)			
7 b)	Let the scalar multiplication in $R^2 = \{(x, y) x, y \in R\}$ be defined by $\alpha \cdot (x_1, y_1) = (\alpha x_1, \alpha y_1)$. Show that the last four conditions of the vector space related to scalar multiplication are satisfied.	U	CO2
8 a)	Find the singularity of the complex valued function $f(z) = \frac{e^z}{(z-3)^3}$ at $z = 3$.	R	CO3
(OR)			
8 b)	Find the value of the integral $\oint_C \frac{z^2 - z + 1}{z - 1} dz$ where C is the circle $ z = \frac{1}{5}$.	R	CO3
9 a)	Explain Dirichlet's Condition.	U	CO4
(OR)			
9 b)	Construct half-range Sine series of a function $f(x)$ defined in an interval $(0, T)$	AP	CO4
10 a)	Find the Fourier cosine transforms of $f(x) = 5e^{-3x} - 7e^{-4x}$.	R	CO5
(OR)			
10 b)	Find the function whose Fourier transform is $(s) = \frac{1}{s^2 + is + 2}$.	R	CO5
Group C			
Answer All the Questions (7 x 5 = 35)			
11 a)	i) When two matrices are said to be similar? ii) Show that if two matrices A and B of order n are similar to each other then they have the same eigen values. (2+3)	R U	CO1
(OR)			



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

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T: 1

9. Target : 60%

P: 0

C: 4

11 b)	Use Cayley-Hamilton theorem to find inverse of the following matrix (if exist): $A = \begin{pmatrix} 1 & 1 & 0 & 1 & 0 & 2 & 2 & 3 & 2 \end{pmatrix}$	R	CO1
12 a)	Express (1, 3, 0) as linear combination of the vectors (1, 2, 0), (2, 3, 4) and (1, 5, - 2).	R	CO2
(OR)			
12 b)	Show that the following set of vectors constitute a basis for the vector space R^3 with usual vector addition and scalar multiplication: $S = \{(2, 1, 1), (1, 2, 1), (1, 1, 2)\}$.	U	CO2
13 a)	Show that the complex valued function $f: C \rightarrow C$ defined by $f(z) = \bar{z}$ is not analytic at any point $z \in C$. Here C denotes the set of all complex numbers.	U	CO3
(OR)			
13 b)	When a function $u(x, y)$ is said to be a harmonic function? Show that if a complex valued function $f(z) = u(x, y) + iv(x, y)$ is analytic then $u(x, y)$ and $v(x, y)$ are harmonic functions. 1+4	U	CO3
14 a)	Find Fourier Series for e^x in the interval $[-\pi, \pi]$.	R	CO4
(OR)			
14 b)	Find half range cosine series for $f(x) = \begin{cases} 2x, & 0 < x < 1 \\ 2(2 - x), & 1 < x < 2 \end{cases}$	R	CO4
15 a)	Use Laplace transform to find the solution of the following ordinary differential equation: $\frac{d^2 y}{dt^2} + 9y = 9u(t - 3); y(0) = y'(0) = 0$	R	CO5
(OR)			
15 b)	Find inverse Z-transform of the function $F(z) = \frac{z}{(z-1)(z-2)}$; using Residue method.	R	CO5
16 a)	Find the value of $\oint_C \frac{z}{(z^2-9)(z+i)} dz$ where C is the circle $ z = 2$ by Cauchy's integral formula.	R	CO3



Year: I
Semester: II

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Course Code: MTH11502

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8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

(OR)			
16 b)	Find the value of $\oint_C \frac{3z^2+z+1}{z^2-1} dz$ where C is the circle $ z - 1 = 1$ by Cauchy's integral formula.	R	CO3
17 a)	Obtain Fourier series of the function $f(x) = \{1 - x, -\pi \leq x < 0; 1 + x, 0 \leq x < \pi\}$ Hence show that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$. (3+2)	U	CO4
(OR)			
17 b)	Show that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$ obtained from Fourier Series for $ x $ in the interval $[-\pi, \pi]$.	U	CO4

[Sample Answer Script](#)
[End Term](#)

Evaluation Sheet (End Semester)

Name	Roll number	Registration number	Marks (50)
Ravi Lal	UG/02/BTBIOME/2020/002	AU/2020/0004600	32



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

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7. Course :Engineering Mathematics II

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P: 0

C: 4

Soumyadeep Samaddar	UG/02/BTBIOME/2020/003	AU/2020/0005498	35
SPANDAN BHATTACHAARYA	UG/02/BTBIOME/2020/004	AU/2020/0005499	33
Gaurav gain	UG/02/BTBIOME/2020/008	AU/2020/0005281	33
Rohit Kumar Shit	UG/02/BTCE/2020/002	AU/2020/0004463	40
Arjya Das	UG/02/BTCE/2020/003	AU/2020/0004536	37
ALOK DUTTA	UG/02/BTCSE/2020/001	AU/2020/0004250	39
SUNANDA JANA	UG/02/BTCSE/2020/002	AU/2020/0004275	39
SUPRATIM TARUN NATH	UG/02/BTCSE/2020/003	AU/2020/0004276	34
SURAJ MAJUMDER	UG/02/BTCSE/2020/007	AU/2020/0004462	28
Arkadeep Chatterjee	UG/02/BTCSE/2020/008	AU/2020/0004464	34
Ritushna roy	UG/02/BTCSE/2020/009	AU/2020/0004466	35
Prima Giri	UG/02/BTCSE/2020/011	AU/2020/0004468	40
SOUGATA DUTT	UG/02/BTCSE/2020/012	AU/2020/0004472	39
Protyush Kr Chatterjee	UG/02/BTCSE/2020/018	AU/2020/0004479	34
Indranil Das	UG/02/BTCSE/2020/022	AU/2020/0004494	21
Atanu Pramanick	UG/02/BTCSE/2020/027	AU/2020/0004529	33
Ayan Kumar Das	UG/02/BTCSE/2020/028	AU/2020/0004530	34
Md Alnas Hossain	UG/02/BTCSE/2020/032	AU/2020/0004540	43
Vivek Raj	UG/02/BTCSE/2020/033	AU/2020/0004549	31
Soyata Saha	UG/02/BTCSE/2020/034	AU/2020/0004562	26
Nikhil Kumar Jha	UG/02/BTCSE/2020/035	AU/2020/0004565	24
nandini roy	UG/02/BTCSE/2020/036	AU/2020/0004569	40
RAJA BANIK	UG/02/BTCSE/2020/041	AU/2020/0004580	36
Arshad Raja	UG/02/BTCSE/2020/042	AU/2020/0004583	32
Hritik Kumar Dutta	UG/02/BTCSE/2020/046	AU/2020/0004593	27
SHIULI MAHATA	UG/02/BTCSE/2020/047	AU/2020/0004596	33
ANIRBAN ROY	UG/02/BTCSE/2020/052	AU/2020/0005542	40
SOUMYADWIP MAITY	UG/02/BTCSEAIML/2020/006	AU/2020/0004557	31
Rohit kumar Roy	UG/02/BTCSEAIML/2020/009	AU/2020/0004563	AB
SUBARNA BHOWMIK	UG/02/BTCSEAIML/2020/011	AU/2020/0004572	36
Md Sohail Irfan	UG/02/BTCSEAIML/2020/013	AU/2020/0004578	35
Chandrachur Majhi	UG/02/BTCSEAIML/2020/015	AU/2020/0004588	34
Sabyasachi Paul	UG/02/BTCSECSF/2020/006	AU/2020/0004587	40



Year: I
Semester: II

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Arya Paul	UG/02/BTECE/2020/001	AU/2020/0004465	41
Utsab Bose	UG/02/BTECE/2020/002	AU/2020/0004486	45
ROHIT RAJ HALDER	UG/02/BTECE/2020/004	AU/2020/0004566	21
Saptarshi Bhattacharjee	UG/02/BTEE/2020/001	AU/2020/0004481	40
Arka Jyoti Das	UG/02/BTEE/2020/002	AU/2020/0004560	36
Suman Hait	UG/02/BTME/2020/001	AU/2020/0004471	32
Koushik Ghosh	UG/02/BTME/2020/002	AU/2020/0004484	40
Rakesh Kumar Mozumder	UG/02/BTME/2020/004	AU/2020/0004495	19
Reetam Mondal	UG/02/BTME/2020/005	AU/2020/0004555	30

Signature of HOD/Dean

Signature of Faculty

Date:

Date: 04.09.2021

Planning for Remedial Classes – End Semester-NA



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

Consolidated Mark Statement

Name	Roll Number	Registration number	Total Marks			
			Mid Semester (20)	Internal Assessment (30)	End Semester (50)	Total (100)
Ravi lal			15	19	32	66
Soumyadeep Samaddar			17	24	35	76
SPANDAN BHATTACHAARYA			16	22	33	71
Gaurav gain			14	27	33	74
Rohit Kumar Shit			17	23	40	80
Arjya Das			18	27	37	82
ALOK DUTTA			15	23	39	77
SUNANDA JANA			13	23	39	75
SUPRATIM TARUN NATH			17	23	34	74
SURAJ MAJUMDER			17	22	28	67
Arkadeep Chatterjee			15	23	34	72
Ritushna roy			14	22	35	71
Prima Giri			17	23	40	80
SOUGATA DUTT			15	23	39	77
Protyush Kr Chatterjee			18	23	34	75
Indranil Das			18	23	21	62
Atanu Pramanick			16	23	33	72
Ayan Kumar Das			17	23	34	74
Md Alnas Hossain			17	24	43	84
Vivek Raj			16	24	31	71
Soyata Saha			16	25	26	67
Nikhil Kumar Jha			16	16	24	56



Year: I
Semester: II

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7. Course :Engineering Mathematics II

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9. Target : 60%

P: 0

C: 4

nandini roy			17	24	40	81
RAJA BANIK			16	24	36	76
Arshad Raja			17	19	32	68
Hritik Kumar Dutta			11	22	27	60
SHIULI MAHATA			14	22	33	69
ANIRBAN ROY			16	24	40	80
SOUMYADWIP MAITY			11	16	31	58
Rohit kumar Roy			15	16	AB	AB
SUBARNA BHOWMIK			18	24	36	78
Md Sohail Irfan			18	23	35	76
Chandrachur Majhi			17	20	34	71
Sabyasachi Paul			13	23	40	76
Arya Paul			13	23	41	77
Utsab Bose			20	20	45	85
ROHIT RAJ HALDER			15	16	21	52
Saptarshi Bhattacharjee			17	24	40	81
Arka Jyoti Das			16	23	36	75
Suman Hait			10	16	32	58
Koushik Ghosh			17	24	40	81
Rakesh Kumar Mozumder			5	17	19	41
Reetam Mondal			18	23	30	71

Signature of Dean/HOD

Signature of Faculty

Date:

Date: 04.09.2021



Year: I
Semester: II

- 6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som**
- 7. Course :Engineering Mathematics II**
- 8. Program : B.Tech**
- 9. Target : 60%**

Course Code: MTH11502

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Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som
Course Code: MTH11502
7. Course :Engineering Mathematics II L: 3
8. Program : B.Tech T: 1
9. Target : 60% P: 0
C: 4

CO ATTAINMENT – GAP ANALYSIS & REMEDIAL MEASURES NA

ADAMAS UNIVERSITY, KOLKATA SCHOOL OF DEPARTMENT OF CO ATTAINMENT - GAP ANALYSIS & REMEDIAL MEASURES							
Batch :	2020-22					Academic Year: 2020-21	
Course Code & Name			Name of the Coordinator			Year & Semester	
						I & I	
CO	Direct Assessment	Indirect Assessment	CO Attainment	Target	CO Attainment Gaps	Action for Bridge the Gap	Target Modification
CO1							
CO2							
CO3							
CO4							
CO5							

Signature of HOD/Dean

Signature of Faculty

Date:

Date:



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

T: 1

9. Target : 60%

P: 0

C: 4

CO-PO ATTAINMENT

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF
DEPARTMENT OF
CO-PO ATTAINMENT

Programme : B.Tech		I & Year &Sem: I		Academic 2020-21			Batch:2020-22										
Course Code	Course Name	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO8	PO 9	PO 10	P O 11	PO 12	PS O 1	PSO 2	PS O 3
MTH11502	ENGINEERING MATHEMATICS II	Relationship	CO2 CO4 CO5	CO1 CO2 CO3	CO1 CO4 CO5	CO1	CO1 CO3							CO1 CO5			
		Mapping Value	3	3	3	1	2							2			
		Attainment	2.56	2.56	2.56	0.85	1.71							1.71			

Signature of HOD/Dean

Signature of Faculty

Date:

Date: 04.09.2021



Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

Course Code: MTH11502

7. Course :Engineering Mathematics II

L: 3

8. Program : B.Tech

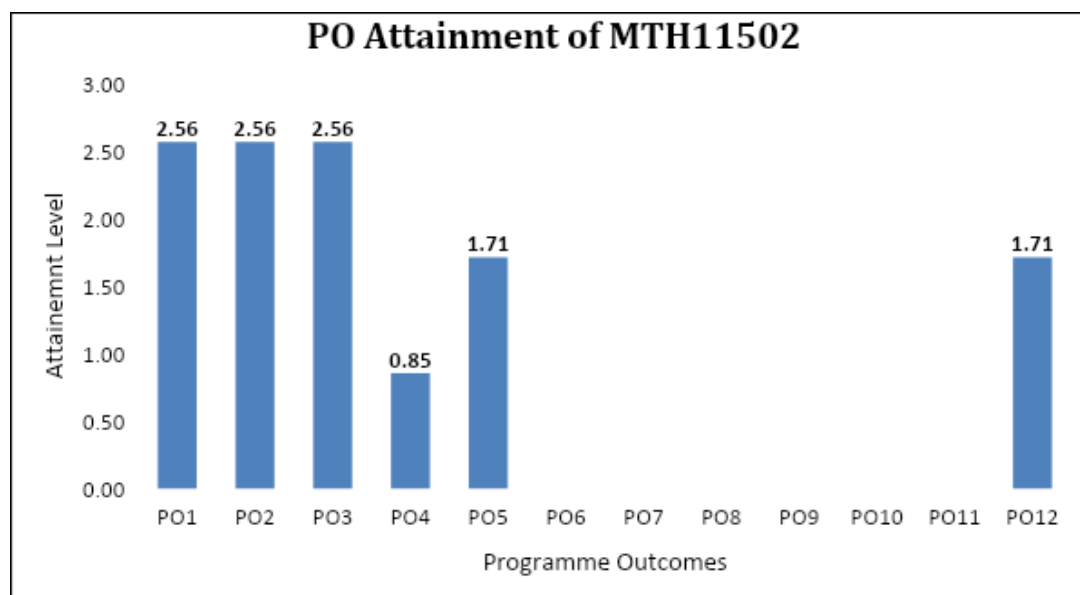
T: 1

9. Target : 60%

P: 0

C: 4

PO ATTAINMENT OF THE COURSE





Year: I
Semester: II

6. Name of the Faculty: Dr. Sutapa Santra, Dr. Sumit Som

7. Course :Engineering Mathematics II

8. Program : B.Tech

9. Target : 60%

Course Code: MTH11502

L: 3

T: 1

P: 0

C: 4

Signature of HOD/Dean

Date:

Signature of Faculty

Date:



Year: I
Semester: II

6. Name of the Faculty:	Dr. Sutapa Santra, Dr. Sumit Som	Course Code: MTH11502
7. Course	:Engineering Mathematics II	L: 3
8. Program	: B.Tech	T: 1
9. Target	: 60%	P: 0
		C: 4

INSTRUCTIONS FOR FACULTY

Instructions for Faculty

- Faculty should keep track of the students with low attendance and counsel them regularly.
- Course coordinator will arrange to communicate the short attendance (as per University policy) cases to the students and their parents monthly.
- Topics covered in each class should be recorded in the table of RECORD OF CLASS TEACHING (Suggested Format).
- Internal assessment marks should be communicated to the students twice in a semester.
- The file will be audited by respective Academic Monitoring and Review Committee (AMRC) members for theory as well as for lab as per AMRC schedule.
- The faculty is required to maintain these files for a period of at least three years.
- This register should be handed over to the head of department, whenever the faculty member goes on long leave or leaves the Colleges/University.
- For labs, continuous evaluation format (break-up given in the guidelines for result preparation in the same file) should be followed.
- Department should monitor the actual execution of the components of continuous lab evaluation regularly.
- Instructor should maintain record of experiments conducted by the students in the lab weekly.
- Instructor should promote students for self-study and to make concept diary, due weightage in the internal should be given under faculty assessment for the same.
- Course outcome assessment: To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfilment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.
- **Submission Targets of Course Contents:**
 - o S. No. 1 to 8 : Before Starting the Course
 - o S. No. 9 & 10 : After Mid Semester Examination
 - o S. No. 11 to 18 : Immediately After End Semester Examination
 - o S. No. 19 to 22 :After Declaration of Result of the Course