Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **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 FILE CONTENTS

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, & III	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)			
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			
11.	Lecture Notes – Unit II & IV			
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)			
13.	Course End Survey (Indirect Assessment) & Consolidation			
14.	**End Term Examination** A. Question Paper & Answer Key B. Sample Answer Scripts (Best, Average, Poor) if required C. Evaluation Sheet			

Year: I

Semester: II

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C: 4

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

Signature of HOD/ Dean **Signature of Faculty**

Date: **Date:**

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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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	12th 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-Hamillton 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 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.

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato **Course Code: MTH11502**

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8. Program : B.Tech **T: 1**

9. Target : 60% **P: 0**

C: 4

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

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — Course Code: MTH11502
7. Course : Engineering Mathematics II — L: 3
8. Program : B.Tech — T: 1
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C: 4

Faculty Individual Time Table

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF Engineering and Technology (SOET)
All DEPARTMENT
Programme: B.Tech
Course Code & Course: MTH11502 & Engineering Mathematics II Faculty Coordinator: Dr. Avik Pradhan (AP) & Dr. Nav Kumar Mahato (NKM)

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	EM II (NKM)			LUNCH				
Tuesday	-							
Wednesday	-	EM II (AP)						
Thursday	-					EM II (AP)		-
Friday	-		EM II (NKM)					

Signature of HOD

Date:

Signature of Class Coordinator

Date: 05.04.2021

Year: I
Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — Course Code: MTH11502
7. Course : Engineering Mathematics II — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

Students Name List

Registration Number	Roll Number	Name of the Student
AU/2020/0005268	UG/02/BTBIOME/2020/006	RIYA PAUL
AU/2020/0005270	UG/02/BTBIOME/2020/007	HRITIKA ADHIKARY
AU/2020/0004488	UG/02/BTBIOME/2020/001	SOUMYADIP SANTRA
AU/2020/0005262	UG/02/BTBIOME/2020/005	MOYURI SEN
AU/2020/0005518	UG/02/BTBIOME/2020/009	ANWESA SARKAR
AU/2020/0004474	UG/02/BTCSE/2020/014	ABHISHEK THAKUR
AU/2020/0004475	UG/02/BTCSE/2020/015	SUBHENDU ROY
AU/2020/0004476	UG/02/BTCSE/2020/016	RHYTHM SEN
AU/2020/0004477	UG/02/BTCSE/2020/017	ASHISH KUMAR SINGH
AU/2020/0004480	UG/02/BTCSE/2020/019	SAGAR GHOSH
AU/2020/0004491	UG/02/BTCSE/2020/021	SWAPNODIP DAS
AU/2020/0004506	UG/02/BTCSE/2020/023	SUBRATA HAZRA
AU/2020/0004584	UG/02/BTCSE/2020/043	ATANU CHOWDHURY
AU/2020/0004586	UG/02/BTCSE/2020/044	SUBHADEEP KAR
AU/2020/0004591	UG/02/BTCSE/2020/045	PRIYESH CHANDA
AU/2020/0004473	UG/02/BTCSE/2020/013	VISHESH MOHANTY
AU/2020/0004512	UG/02/BTCSE/2020/024	ADITYA KUMAR
AU/2020/0005525	UG/02/BTCSE/2020/050	JIT CHATTERJEE
AU/2020/0004532	UG/02/BTCSE/2020/030	PRATHAMA SARKAR
AU/2020/0004537	UG/02/BTCSE/2020/031	BRINTA DEB
AU/2020/0004516	UG/02/BTCSE/2020/025	ANUSHKA KHATUA
AU/2020/0004490	UG/02/BTCSE/2020/020	DEEPTANU SAHA
AU/2020/0004579	UG/02/BTCSE/2020/040	SOUMIK DAS
AU/2020/0004571	UG/02/BTCSE/2020/037	ARPAN MAITY
AU/2020/0004576	UG/02/BTCSE/2020/038	ANIMESH DUTTA
AU/2020/0004577	UG/02/BTCSE/2020/039	ARITRA BISWAS
AU/2020/0004531	UG/02/BTCSE/2020/029	ROHAN SUTRADHAR
AU/2020/0005466	UG/02/BTCSE/2020/048	PRAGATI KEDIA
AU/2020/0004544	UG/02/BTCSEAIML/2020/005	DRON GUIN
AU/2020/0004559	UG/02/BTCSEAIML/2020/007	DEBRUP DEY
AU/2020/0004581	UG/02/BTCSEAIML/2020/014	SAYANIK SUTRADHAR

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato **Course Code: MTH11502**

7. Course : Engineering Mathematics II **L: 3**

8. Program : B.Tech **T: 1**

9. Target : 60% **P: 0**

C: 4

AU/2020/0004518	UG/02/BTCSEAIML/2020/001	SURYA CHAKRABORTY
AU/2020/0004519	UG/02/BTCSEAIML/2020/002	RISHAV GHOSH
AU/2020/0004567	UG/02/BTCSEAIML/2020/010	SRIJITA SAHA
AU/2020/0004538	UG/02/BTCSEAIML/2020/004	PRITOM SAHA
AU/2020/0004574	UG/02/BTCSEAIML/2020/012	MD SAHID ALAM
AU/2020/0004528	UG/02/BTCSEAIML/2020/003	BISWAJIT CHAKRABORTY
AU/2020/0005551	UG/02/BTCSECSF/2020/007	MD DAWOOD KHAN
AU/2020/0004558	UG/02/BTCSECSF/2020/005	NILANJANA ROY
AU/2020/0004554	UG/02/BTCSECSF/2020/004	AYUSH KUMAR SINGH
AU/2020/0004527	UG/02/BTCSECSF/2020/002	MAYANK PAREEK
AU/2020/0004508	UG/02/BTCSECSF/2020/001	SHIBSANKAR SAW
AU/2020/0004487	UG/02/BTECE/2020/003	RISHAV BARDHAN
AU/2020/0004489	UG/02/BTME/2020/003	SOUHARDYA SAHA

Signature of HOD/Dean

Date:

Signature of Class Coordinator

Date: 05.04.2021

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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C: 4

Year: I

Semester: II

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C: 4

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 **Signature of Faculty**

Date: **Date: 05.04.2021**

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato **Course Code: MTH11502**

7. Course : Engineering Mathematics II **L: 3**

8. Program : B.Tech **T: 1**

9. Target : 60% **P: 0**

C: 4

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. C**ell 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 avik.pradhan@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.

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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C: 4

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

Year: I

Semester: II

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9. **Target : 60%** **P: 0**

C: 4

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	PO10	PO11	PO12
CO1	-	3	3	1	2	-	-	-	-	-	-	2
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	2	-	-	-	-	-	-	-
CO4	3	-	3	-	-	-	-	-	-	-	-	-
CO5	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	After Mid Term			
CO1	5	2	10	8	25
CO2	NA	2	NA	8	10
CO3	NA	2	NA	13	15
CO4	NA	7	NA	13	20
CO5	5	7	10	8	30
Total	10	20	20	50	100

Year: I

Semester: II

6.	**Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato**		**Course Code: MTH11502**
7.	**Course**	**: Engineering Mathematics II**	**L: 3**
8.	**Program**	**: B.Tech**	**T: 1**
9.	**Target**	**: 60%**	**P: 0**
			C: 4

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

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — Course Code: MTH11502
7. Course : Engineering Mathematics II — L: 3
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9. Target : 60% — P: 0
C: 4

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	23.06.2021	18				
2.	Vector Calculus & Complex Variables	24.06.2021	30.07.2021	14				
3.	Fourier Series	03.05.2021	11.06.2021	10				
4.	Introduction to Transform Calculus	05.04.2021	30.04.2021	08				
5.	Introduction to Transform Calculus	14.06.2021	16.07.2021	10				

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

Signature of HOD/Dean — **Signature of Faculty**

Date: — **Date: 05.04.2021**

Year: I

Semester: II

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C: 4

SESSION PLAN
UNIT-I

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	07.04.21	Definition of Matrix with examples. Operation on Matrices.	CO1				
2	08.04.21	Matrix transposition, symmetric and Skew symmetric matrix and their properties.	CO1				
3	21.04.21	Orthogonal Matrices and their properties.	CO1				
4	22.04.21	Introduction to complex matrices, Hermitian matrix and their properties.	CO1				
5	28.04.21	Skew Hermitian matrices, Unitary matrices and their properties.	CO1				
6	29.04.21	Elementary row and column operations on a matrix with examples.	CO1				
7	05.05.21	Rank of a matrix and examples.	CO1				
8	06.05.21	Finding inverse of a matrix by elementary row operations.	CO1				

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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C: 4

9	12.05.21	Determinant of a matrix with examples.	CO1				
10	26.05.21	Solution of system of algebraic equation, consistency.	CO1				
11	27.05.21	Introducing eigenvalues and eigen vectors of a square matrix.	CO1				
12	02.06.21	Cayley-Hamilton theorem and finding inverse of a square matrix.	CO1				
13	03.06.21	Algebraic and geometric multiplicity of an eigen value and diagonalization of a square matrix.	CO1				
14	09.06.21	Vector spaces with examples. Linear dependence and independence.	CO1				
15	10.06.21	Basis and dimension of a vector space with examples.	CO1				
16	16.06.21	Linear transformation between two vector spaces, null space and rank of a linear transformation.	CO1				
17	17.06.21	Properties of linear transformations.	CO1				
18	23.06.21	Verification of rank nullity theorem.	CO1				

Remarks:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **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-II

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	24.06.21	Ordinary Integrals of Vectors, Multiple integrals.	CO2				
2	30.06.21	Jacobian, Line, surface integrals.	CO2				
3	01.07.21	Volume integrals of Vector fields, Gauss' divergence theorem with examples.	CO2				
4	07.07.21	Introduction of Green's theorem with examples.	CO2				
5	08.07.21	Introduction of Stokes theorem with examples.	CO2				
6	14.07.21	Introduction to complex functions and limits and analyticity of complex valued functions.	CO3				
7	15.07.21	Introductions to Cauchy-Riemann equations with examples.	CO3				
8	22.07.21	Introduction to line integrals and Cauchy's theorem.	CO3				
9	28.07.21	Cauchy's integral formula with some examples.	CO3				

Year: I

Semester: II

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9. **Target : 60%** **P: 0**
C: 4

10	29.07.21	Introduction to Taylor's series of complex valued functions.	CO3				
11		Introduction to Laurent series of complex valued functions and introduction to pole.	CO3				
12		Introduction to singularities of a complex valued function.	CO3				
13		Introduction to Cauchy's Residue theorem, evaluation of real integrals.	CO3				
14		Some problems related to Cauchy's Residue theorem.	CO3				

Remarks:

Signature of Faculty

Date:

Year: I

Semester: II

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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	03-05-2021	Introduction to periodic functions with examples.	CO4				
2	07-05-2021	Introduction to sine and cosine functions with the integrals.	CO4				
3	10-05-2021	Even and odd functions with examples and introduction to Fourier series.	CO4				
4	14-05-2021	Computation of Fourier coefficients with examples.	CO4				
5	24-05-2021	Discussion of Euler's formula.	CO4				
6	28-05-2021	Discussion of Dirichlet conditions on the convergence of Fourier series.	CO4				
7	31-05-2021	Discussion of change of intervals of the function and related Fourier series.	CO4				
8	04-06-2021	Introduction to Half range Fourier sine series with examples.	CO4				

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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9. **Target : 60%** **P: 0**

C: 4

9	07-06-2021	Introduction to Half range Fourier cosine series with examples.	CO4				
10	11-06-2021	Discussion of problems related to Fourier series.	CO4				

Remarks:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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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.	CO5				
2	09-04-2021	Function of exponential order with examples and introduction to Laplace transform.	CO5				
3	13-04-2021	Discussion of the existence of Laplace transform of a function.	CO5				
4	16-04-2021	Evaluation of Laplace transform of some standard functions.	CO5				
5	19-04-2021	Discussion of properties of Laplace transforms.	CO5				
6	23-04-2021	Discussion of Laplace function of Dirac Delta function and Heaviside function.	CO5				
7	26-04-2021	Introduction of Inverse Laplace transform.	CO5				

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
7. **Course : Engineering Mathematics II** **L: 3**
8. **Program : B.Tech** **T: 1**
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C: 4

8	30-04-2021	Application of Laplace transform with some examples.	CO5				
9	14-06-2021	Definition of Fourier integrals and Fourier sine integrals with some examples.	CO5				
10	18-06-2021	Fourier cosine integrals with some examples.	CO5				
11	21-06-2021	Complex form of Fourier integral.	CO5				
12	25-06-2021	Fourier sine transforms with some examples.	CO5				
13	28-06-2021	Fourier cosine transforms with some examples.	CO5				
14	02-07-2021	Discussion of inverse Fourier transform with some examples.	CO5				
15	05-07-2021	Introduction to Z- Transform and its properties.	CO5				
16	09-07-2021	Inverse Z- Transform with some examples.	CO5				
17	12-07-2021	Inverse Z- transform by partial fraction and residue methods.	CO5				

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6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
7. **Course : Engineering Mathematics II** **L: 3**
8. **Program : B.Tech** **T: 1**
9. **Target : 60%** **P: 0**

C: 4

18	16-07-2021	Some problems discussion on inverse Z- transform.	CO5				

Remarks:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — 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)					
Percentage of Syllabus covered					
Lectures	Planned				
	Taken				
Tutorials	Planned				
	Taken				
Test/Quizzes/ Mid Semester/ End Semester	Planned				
	Taken				
	CO's Addressed				
	CO's Achieved				
Assignments	Planned				
	Taken				
	CO's Addressed				
	CO's Achieved				
Signature of Faculty					
Head of the Department					
OBE Coordinator					

Signature of HOD/ Dean

Date

Signature of Faculty

Date

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — 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	CO1:		
	CO2:		
	CO3:		
	CO4:		
	CO5:		
Quiz/Test etc.	CO1:		
	CO2:		
	CO3:		
	CO4:		
	CO5:		
Mid Semester	CO1:		
	CO2:		
	CO3:		
	CO4:		
	CO5:		
End Semester	CO1:		
	CO2:		
	CO3:		
	CO4:		
	CO5:		
Any Other	CO1:		
	CO2:		
	CO3:		
	CO4:		
	CO5:		

Signature of HOD/ Dean

Date

Signature of Faculty

Date

Year: I
Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **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 — 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:

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 $5\times1 = 5$

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 $A = (0\ 2\ 0\ 4)$, Write A as a sum of a symmetric and skew symmetric matrices.

GROUP –B
(Short Answer Type Questions)

Answer *any three* of the following $3\times5 = 15$

Year: I
Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato **Course Code: MTH11502**
7. Course : Engineering Mathematics II **L: 3**
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9. Target : 60% **P: 0**
C: 4

2. Verify Cayley-Hamilton theorem for $A = (0\ 0\ 1\ 3\ 1\ 0\ -\ 2\ 1\ 4)$.

3. Express $f(x) = \begin{cases} 1 & for\ 0 \le x \le \pi \\ 0 & for \quad x > \pi \end{cases}$ 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 $2\times10 = 20$

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

(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 $f(t) = \frac{e^{-at} - cosbt}{t}$

[5+5]

8. (i) Find Fourier cosine and Fourier sine transform of the following function: [6+4]

$$f(x) = \{x,\ 0 < x < a\ 0,\ otherwise\ ,\quad a\ is\ constant$$

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

$$f(x) = \{1,\quad 0 \le x < 1\ -\ 1,\quad 1 < x < 2\ 0,\quad otherwise$$

Year: I
Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato **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 $-\pi \le x \le \pi$ is $f(x) = a_0 + \sum_{n=1}^{\infty} (a_n \cos cos\, nx + b_n \sin sin\, nx)$. Find the value of a_0.

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

c) A delayed unit step function is defined as $u(t-a) = \begin{cases} 0, & for\ t < a \\ 1, & for\ t \ge a \end{cases}$. Evaluate the Laplace transform of it.

d) If $A = (0\ 2\ 0\ 4)$, 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. Avik Pradhan, Dr. Nav Kumar Mahato **Course Code: MTH11502**
7. Course : Engineering Mathematics II **L: 3**
8. Program : B.Tech **T: 1**
9. Target : 60% **P: 0**
C: 4

GROUP –B
(Short Answer Type Questions)

Answer *any three* of the following 3×5 = 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 $A = (1\ 2\ 0\ 2\ -1\ 0\ 0\ 0\ -1)$

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 2×10 = 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

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

[5+5]

15. (i) Evaluate the integration using Residue theorem $\int_c \frac{Sin\,\pi z^2 + cos\,cos\,\pi z^2}{(z-1)(z-2)} dz$ 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 $f(x) = \{1, \quad |x| < 1\ 0, \quad otherwise$

[3+7]

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

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6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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9. **Target : 60%** **P: 0**

C: 4

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

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7. **Course : Engineering Mathematics II** **L: 3**
8. **Program : B.Tech** **T: 1**
9. **Target : 60%** **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 $A = [1\ 2\ 3\ 0\ 4\ \ -1\ 2\ 4\ 6]$ 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 $T: R^3 \to R$ 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 $A = (0\ 2\ 0\ 4)$, 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 $(\cos\theta\ \ 0\ \ 0\ \ \sin\theta\ \ \cos\theta\ \ 0\ 0\ 0\ K)$ is orthogonal.	**Easy**	**U**	**CO1**

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6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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8. **Program : B.Tech** **T: 1**
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 $A = (0\ 0\ 1\ 3\ 1\ 0\ \ -\ 2\ 1\ 4)$.	**Easy**	**U**	**CO2**
2.	Check whether the function T: $R^2 \to R^2$ 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 $A = (1\ 0\ 0\ 1\ 0\ 1\ 0\ 1\ 0)$ 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 $A = (-\ 1\ 1\ 2\ 3\ \ -\ 1\ 1\ 0\ 3\ 4)$.	**Easy**	**AP**	**CO1**
2.	**Find** the matrix representation of the linear transformation given by, $T(x, y, z) = (x + y + z,\ x - y + 2z)$	**Medium**	**U**	**CO3**

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9. **Target : 60%** **P: 0**
C: 4

	with respect to the bases $B = \{(1,1,0),\ (1,0,1),\ (0,1,1)\},\ B' = \{(1,1),\ (0,1)\}$.			
3.	**Determine** A^{-1} by using Cayley-Hamilton theorem for the matrix $A = (1\ 3\ 2\ 0\ \ -1\ 4\ \ -2\ 1\ 5)$. 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) $a.b = 1$ ii) $a.b = 2$ iii) $a.b = 0$ 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 $div(curl\ F)$? i) 1 ii) 2 iii) -1 iv) 0	**Difficult**	**R**	**CO-4**
	Part B (Definition/Naming Questions) (2 marks each)			
1.	**What** is the dot product of two vectors? Give example.	**Easy**	**R**	**CO-4**

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Semester: II

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C: 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**
3.	**Explain** Cauchy's theorem. Provide examples.	**Difficult**	**U**	**CO-5**
Part C (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 $\varphi(x, y, z) = xy^2z + x^2z$ at $(1, 1, 2)$ in the direction $(2i + j - 2k)$.	**Medium**	**R**	**CO-4**
3.	**Find** the residue of the function $F(z) = \frac{z^2+Sinz}{Cosz-1}$ at its singular points.	**Difficult**	**R**	**CO-5**
Part D (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**
Part E (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**
Part F (Application Based Questions) (5-10 marks each)				

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6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
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9. **Target : 60%** **P: 0**
C: 4

1.	**Find** $\oint_C \frac{e^{3z}dz}{(z-1)^4}$ where C is the circle $\|z\| = 2$.	**Easy**	**R**	**CO-5**
2.	**Show** that the Green's theorem is satisfied in the plane for $\oint_C \{(xy + y^2)dx + x^2dy\}$ 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**
	Part G (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 $f(x) = \sqrt{1-\cos x};\ 0 \le x \le 2\pi$ is represented by a Fourier series as	**Medium**	**R**	**CO6**

Year: I

Semester: II

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9. **Target : 60%** **P: 0**
C: 4

	$f(x)=\frac{a_0}{2}+\sum_{n=1}^{\infty}a_n\cos nx+\sum_{n=1}^{\infty}b_n\sin nx$, then a_0 is (a) $\frac{3}{4}\pi$ (b) $\frac{4\sqrt{2}}{\pi}$ (c) $\frac{\sqrt{2}\pi}{4}$ (d) $\frac{6\sqrt{2}}{\pi}$			
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**
	Part B (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**
	Part C (Short Questions) (3-4 marks each)			
1.	A periodic function of period 2π is defined as $f(x)=\lvert x\rvert, -\pi<x<\pi$, 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**
	Part D (Explanation Based Questions) (5 marks each)			

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato **Course Code: MTH11502**

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9. Target : 60% **P: 0**

C: 4

1.	Find the half range cosine series of the function $f(x)=\begin{cases} 2x; & for\ 0<x<1 \\ 2(2-x); & for\ 1<x<2 \end{cases}$.	**Easy**	**R**	**CO6**
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**
	Part E (Questions Based on Reasoning) (5 marks each)			
1.	Expand the function $f(x)=\begin{cases} x; & for\ 0<x\le 1 \\ 2-x; & for\ 1<x<2 \end{cases}$ 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 $0\le x\le 2\pi$ is $\frac{\pi^2}{12}+\sum_{n=1}^{\infty}\frac{\cos nx}{n^2}$.	**Difficult**	**R**	**CO6**
	Part F (Application Based Questions) (5-10 marks each)			
1.	Obtained the fourier series of the function $f(x)=\begin{cases} 0; & for\ -\pi<x<0 \\ \sin x; & for\ 0<x<\pi \end{cases}$ and hence prove that $\frac{1}{1\cdot 3}-\frac{1}{3\cdot 5}+\frac{1}{5\cdot 7}-\frac{1}{7\cdot 9}+\cdots=\frac{1}{4}(\pi-2)$.	**Easy**	**R**	**CO6**

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato **Course Code: MTH11502**

7. Course : Engineering Mathematics II **L: 3**

8. Program : B.Tech **T: 1**

9. Target : 60% **P: 0**

C: 4

2.	Find the fourier series of the function $f(x)=\begin{cases}-x+1; & for\ -\pi \le x<0\\ x+1; & for\ 0\le x<\pi\end{cases}$ and hence show that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\cdots=\frac{\pi^2}{8}$.	**Medium**	**U**	**CO6**
3.	Expand $f(x)=\lvert x\rvert$ in Fourier series in the interval $-\pi \le x \le \pi$ and hence prove that $1+\frac{1}{3^2}+\frac{1}{5^2}+\frac{1}{7^2}+\frac{1}{9^2}+\cdots=\frac{\pi^2}{8}$.	**Difficult**	**A**	**CO6**
	Part G (Short Notes) (5 marks each)			
1.	NA	**Easy**	**U**	**CO6**
2.	Discuss half rage 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)**
	Part A (Multiple Choice Questions) (1 mark each)			
1.	What is the value of $\left(e^{2t}\right)$? i) $\frac{1}{s+2}$ ii) $\frac{1}{s-2}$ iii) $\frac{1}{s}$ iv) none	**Easy**	**Remembering**	**CO7**

Year: I

Semester: II

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C: 4

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 $e^{-\lvert x\rvert}$? 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**
Part C (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**
Part D (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**
Part E (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**

Year: I

Semester: II

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C: 4

3.	Solve $\int_0^{\infty} \frac{sin^2 ax}{x^2} dx$ applying Parseval's identity for Fourier transform.	**Difficult**	**Applying**	**CO7**
Part F (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: $\frac{d^2y}{dt^2} + \frac{dy}{dt} = \{t^2, \ 0 < t < 1 \ 0, \qquad t > 1 \ , \ y(0) = 0,$	**Difficult**	**Apply**	**CO7**
Part G (Short Notes) (5 marks each)				
1.	NA	**Easy**		
2.	NA	**Medium**		
3.	NA	**Difficult**		

Year: I

Semester: II

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8. **Program : B.Tech** **T: 1**
9. **Target : 60%** **P: 0**

C: 4

Lecture Notes – Sample

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato Course Code: MTH11502
7. Course : Engineering Mathematics II L: 3
8. Program : B.Tech T: 1
9. Target : 60% P: 0
C: 4

Evaluation Sheet – Internal Assessment

Roll Number	Registration Number	Name of the Student	Internal Assessment (30)				
			Assignment	Class Test	Case Study	etc.	Total

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato Course Code: MTH11502
7. Course : Engineering Mathematics II L: 3
8. Program : B.Tech T: 1
9. Target : 60% P: 0
C: 4

Evaluation Sheet – Mid Semester

Roll Number	Registration Number	Name of the Student	Marks (20)

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — 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

Sl. No.	Name of Student	Roll No.	Reg. No.	Mid Sem Marks	Remedial Classes Held							Class test on the basis of Remedial Classes	End Sem Marks	Improvement (Y/N)
					Date									
					Venue									
					Time									
1.														
2.														

Signature of HOD/ Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
7. **Course : Engineering Mathematics II** **L: 3**
8. **Program : B.Tech** **T: 1**
9. **Target : 60%** **P: 0**

C: 4

COURSE END SURVEY

INDIRECT ASSESSMENT

Sample format for Indirect Assessment of Course outcomes:

NAME:
ROLL NO.:
REG. NO..:
COURSE:
PROGRAM:

Please rate the following aspects of course outcomes of

Use the scale 1-5 (Poor – Excellent)

Course Outcomes	Statement	1	2	3	4	5
CO1						
CO2						
CO3						
CO4						
CO5						

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — Course Code: MTH11502
7. Course : Engineering Mathematics II — L: 3
8. Program : B.Tech — 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:

Course Outcome	Students Feed Back (5)	Attainment (100)
CO1		
CO2		
CO3		
CO4		
CO5		
etc.		

Signature of HOD/Dean
Date:

Signature of Faculty
Date:

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — Course Code: MTH11502
7. Course : Engineering Mathematics II — L: 3
8. Program : B.Tech — T: 1
9. Target : 60% — P: 0
C: 4

Evaluation Sheet (End Semester)

Roll Number	Registration Number	Name of the Student	Marks (50)

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato 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 – End Semester

Sl. No.	Name of Student	Roll No.	Reg. No.	End Sem Marks	Remedial Classes Held							Class test on the basis of Remedial Classes	Supple Exam Marks	Improvement (Y/N)
					Date									
					Venue									
					Time									
1.														
2.														

Signature of HOD/ Dean

Date

Signature of Faculty

Date

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato — 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

Roll Number	Registration Number	Name of the Student	Total Marks			
			Mid Semester (20)	Internal Assessment (30)	End Semester (50)	Total (100)

Signature of Dean/HOD

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **Course Code: MTH11502**
7. **Course : Engineering Mathematics II** **L: 3**
8. **Program : B.Tech** **T: 1**
9. **Target : 60%** **P: 0**

C: 4

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato 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

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

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato 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 :	Year & Sem: I & I	Academic Year: 2020-21	Batch:2020-22

Course Code	Course Name	CO-PO	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
		Relationship															
		Mapping Value															
		Attainment															

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. **Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato** **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

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: I

Semester: II

6. Name of the Faculty: Dr. Avik Pradhan, Dr. Nav Kumar Mahato **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 fulfillment 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:**
  - **S. No. 1 to 8 : Before Starting the Course**
  - **S. No. 9 & 10 : After Mid Semester Examination**
  - **S. No. 11 to 18 : Immediately After End Semester Examination**
  - **S. No. 19 to 22 : After Declaration of Result of the Course**