School of Aeronautics (Neemrana)

Paper For Internal Assessment Examination (Theory) - Credit 3

Instructions For Students / Faculty
Mid Term I (Total 60 Marks, 2hrs.)

- Part A: Total number of questions to be given are five, each carrying 3 marks and are compulsory to attend. There is no choice. They are short answer type questions **(Not More Than 25 Words For Both Question & Answer)**, no objective type or fill in the blanks. Total 15 marks.
- Part B: Total number of questions to be given are six, out of which student has to answer any four. They are long answer type (**Not More Than 50 Words For Question)**, each carrying 6 marks. Total 24 marks.
- Part C: Total number of questions to be given are four, out of which student has to answer any three. They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)***, each carrying 7 marks. Total 21 marks.

Mid Term II & III (Total 90 Marks, 2.5 hrs.)

- Part A: Total number of questions to be given are ten, each carrying 2 marks and are compulsory to attend. There is no choice. They are short answer type questions **(Not More Than 25 Words For Both Question & Answer)**, no objective type or fill in the blanks. Total 20 marks
- Part B: Total number of questions to be given are seven, out of which student has to answer any five. They are long answer type (**Not More Than 50 Words For Question)**, each carrying 6 marks. Total 30 marks.
- Part C: Total number of questions to be given are five, out of which student has to answer any four. They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)***, each carrying 10 marks. Total 40 marks.

*** LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: Communication Skills, Human Values, Technical Communication, Managerial Economics and Financial, Aircraft Materials and Processes, Aircraft Systems, Aircraft Maintenance Practices, Avionics-I, Aircraft Rules and Regulation, Wind Tunnel Techniques, Maintenance of Airframe and System, Helicopter Theory, Avionics-II, Maintenance of Power Plant and System, Unmanned Aerial Vehicles & Systems (UAV), Space Mission Design & Optimization, CAD, Airlines and Airport Management.

FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' OF QUESTION PAPER

Question Paper & Student Details

Mid Term *	Mid term 3	Date of Submission of QP	9/26/2020
Name of Faculty *	Sapana Thakur	Date of Examination *	9/28/2020
Subject *	Advanced Eng . Mathematics	Course*	B.TECH.
Batch	AE -19,18,2 AND MT-5	Semester *	3
Email Id of Faculty:*	sapanathakur1990@gmail.com	Phone Number of Faculty*	8823094838

Student Name _____ **Student Reg No.** _____

3AN2-01: Advanced Engineering Mathematics (Credit-3)

COURSE OBJECTIVE

1. To introduce the basic concepts of solving algebraic, transcendental equations and numerical techniques of interpolation in various intervals in real life.
2. To acquaint the student with understanding of numerical techniques of differentiation and integration this plays an important role in engineering and technology disciplines.
3. To make the students appreciate the purpose of using Laplace transforms to create a new domain in which it is easier to handle the problem that is being investigated.
4. To acquire knowledge on Fourier transform techniques used in wide variety of situations in which the functions used are not periodic;
5. To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

3AN2-01: Advanced Engineering Mathematics (Credit-3)

COURSE OUTCOME

Upon completion of the course, Students will be able to

CO1: Understand the basic concepts and techniques of solving algebraic and transcendental equations.

CO2: Apply the numerical techniques of differentiation and integration for engineering problems.

CO3: Appreciate Laplace transform methods for solving linear and differential equations.

CO4: Obtain Fourier transforms for the functions which are needed for solving application problems.

CO5: Manipulate discrete data sequences using Z transform techniques.

PART : A

Question: 1

Define Fourier sine and cosine transformation

Lesson Plan *	Topic *	Source *	CO *
LP41	Fourier transform	By H.K.Das	Co4

Question: 2*

What is Laplace and Fourier transformation

Lesson Plan *	Topic *	Source *	CO *
LP40	Fourier transform	By H.K.Das	Co4

Question: 3*

Established the relation between Laplace and Fourier transform

Lesson Plan *	Topic *	Source *	CO *
LP 44	Fourier transform	By H.K.Das	Co4

Question: 4*

Prove that First shifting theorem

Lesson Plan *	Topic *	Source *	CO *
LP 31	Laplace transform	By H.K.Das	Co3

Question: 5*

What is the relation between Δ, ∇, E and $\Delta, \mathrm{D}\ and\ E$

Lesson Plan *	Topic *	Source *	CO *
LP2	Numerical analysis	By B.S Grewal	Co1

Question: 6*

Find $\mathrm{L}\{2t^2\ e^{4t}\}$

Lesson Plan *	Topic *	Source *	CO *
LP 33	Laplace transform	By H.K.Das	Co3

Question: 7*

What is the difference between Trapezoidal rule, Simpson rule 1/3 and Simpson 3/8 rule

Lesson Plan *	Topic *	Source *	CO *
LP6	Numerical analysis	By B.S Grewal	Co2

Question: 8*

Find Z transform of 2^k

Lesson Plan *	Topic *	Source *	CO *
LP 43	Z Transform	By H.K.Das	Co5

Question: 9*

Find L{ $e^{3t}\cos t$ }

Lesson Plan *	Topic *	Source *	CO *
LP 31	Laplace transform	By H.K.Das	Co3

Question: 10*

What is the difference between Newton forward and Newton backward method

Lesson Plan *	Topic *	Source *	CO *
LP3	Numerical analysis	By B.S Grewal	Co1

PART : B

Question: 1*

Find Fourier transformation of $e^{-a|x|}$

Lesson Plan *	Topic *	Source *	CO *
LP41	Fourier transform	By H.K.Das	Co 4

Question: 2*

Find F.T. of f(x) = $\begin{cases}(1-x^2) & |x| \le 1 \\ 0 & |x| \ge 1\end{cases}$

Lesson Plan *	Topic *	Source *	CO *
LP40	Fourier transform	By H.K.Das	Co4

Question: 3*

Find the roots of $xe^x = 2$ *correct to three decimal place by* $Regula - falsi$ *method*

Lesson Plan *	Topic *	Source *	CO *
LP 25	Numerical analysis	By B.S Grewal	Co1

Question: 4*

Prove that $e^x = \left(\frac{\Delta^2}{E}\right) e^x \left(\frac{Ee^x}{\Delta^2 e^x}\right)$

Lesson Plan *	Topic *	Source *	CO *
LP2	Numerical analysis	By B.S Grewal	Co1

Question: 5*

By using Gauss forward formula find the polynomial from the given data

(x)	1	2	3	4	5
(y)	1	-1	1	-1	1

Lesson Plan *	Topic *	Source *	CO *
LP 5	Numerical analysis	By B.S Grewal	Co1

Question: 6*

A curve is drawn to pass through the points given by following table

X	1	1.5	2	2.5	3	3.5	4
y	2	2.4	2.7	2.8	3	2.6	2.1

Estimate the area bounded by the curve , x- axis and the lines x= 1 and x= 4

Lesson Plan *	Topic *	Source *	CO *
LP6	Numerical analysis	By B.S Grewal	Co2

Question: 7*

Apply the Runge-kutta fourth order method to find the value of y(0.1)and y(0.2) given that

$$\frac{dy}{dx} = x^2 - y \; and \; y(0) = 1$$

Lesson Plan * LP29 | Topic * Numerical analysis | Source * By B.S Grewal | CO * Co2

PART : C

Question: 1*

Given that

x	3	7	9	10
Output y	160	120	72	63

Find f(6) using by Newton divided difference formula .

Lesson Plan * LP 7 | Topic * Numerical analysis | Source * By B.S Grewal | CO * Co1

Question: 2*

Apply the Euler's modified method to find the value of y when x= 0.1, 0.2, 0.3 given that $\frac{dy}{dx} = 1 - y and \; y = 0 \; when \; x = 0$

Lesson Plan * LP23 | Topic * Numerical analysis | Source * By B.S Grewal | CO * Co2

Question 3 :

Using by convolution theorem solve $L^{-1}[\frac{1}{(S^2+ a^2)(s^2+b^2)}]$

Lesson Plan * LP39 | Topic * Fourier transform | Source * By H.K.Das | CO * Co 3

Question: 4*

Using Adam's – Bashforth method to find $y(0.8)$

$$given\ \frac{dy}{dx} = x - y^2$$

$$given\ y(0) = 0, y(0.2) = 0.02\ , y(0.4) = 0.0795, y(0.6) = 0.1762$$

Lesson Plan *	Topic*	Source*	CO*
LP 27	Numerical analysis	By B.S Grewal	Co2

Question: 5*

Find $\frac{dy}{dx}\ and \frac{d^2y}{dx^2}\ \ at\ x = 0.4$

(x)	0.1	0.2	0.3	0.4
(y)	1.105	1.221	1.349	1.491

Lesson Plan *	Topic*	Source*	CO*
LP 9	Numerical analysis	By B.S Grewal	Co2

I have scrutinized the question paper.
There is no spelling mistake of any type
or irrelevant question.

Faculty's Sign Sapana Thakur