

# School of Aeronautics (Neemrana)

Paper For Internal Assessment Examination (Theory) - Credit 4

## Instructions For Students / Faculty

### Mid Term I (Total 80 Marks, 2 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 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 12 marks. Total 36 marks.

### Mid Term II & III (Total 120 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 8 marks. Total 40 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 15 marks. Total 60 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 *	Midterm 2	Date of Submission of QP	11/24/2020
Name of Faculty *	Sapana Thakur	Date of Examination *	11/25/2020
Subject *	1FY2-01 Engineering mathematics – I	Course*	B.Tech
Batch	AE & MT	Semester *	1
Email Id of Faculty:*	sapanathakur1990@gmail.com	Phone Number of Faculty*	8823094838

Student Name

Student Reg No.

### **1FY2-01: Engineering Mathematics I (Credit-4)**

#### **COURSE OBJECTIVE**

1. The objective of this course is to familiarize the prospective engineers with techniques in calculus, sequences and series Fourier series, its tools to use the advance mathematics.
2. Multivariable analysis to differentiation and its tools to various segments in engineering mathematics and its application
3. Multivariable analysis to vector calculus and its tools to various segments in engineering mathematics and its application
4. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more
5. Advanced level of mathematics and applications that they would find useful in in their disciplines.

### **1FY2-01: Engineering Mathematics I (Credit-4)**

#### **COURSE OUTCOME**

**Upon completion of the course, Students will be able to**

CO1: To be able to apply the fundamental application in finding out the solution of maxima and minima of engineering problems and the fallouts of Lagrange multipliers.

CO2: To be able deal with functions of several variables essential required in almost all branches of engineering.

CO3: Capable to apply the use of essential tools of multiple integrals and vector calculus in Engineering fields.

CO4: To be able to apply differential and integral calculus to notation of a definite integrals and to improper integrals.

CO5: Understand the applications of Beta and Gamma functions.

CO6: Able to understand the tool of power series and Fourier series for learning advanced Engineering mathematics

PART: A

Question: 1

If  $s = r \sin 2t$  then find  $\frac{\partial^2 s}{\partial t^2}$

Lesson Plan \*

LP1

Topic \*

Partial derivative

Source \*

By H.K.Das

CO \*

Co2

Question: 2\*

How to solve maxima and minima for three variables

Lesson Plan \*

LP3

Topic \*

Max and min

Source \*

By H.K.Das

CO \*

Co1

Question: 3\*

If  $\mathbf{F} = x \mathbf{i} + 2y \mathbf{j} - 3z \mathbf{k}$  then find  $\text{div } \mathbf{F}$

Lesson Plan \*

LP 9

Topic \*

Vector

Source \*

By H.K.Das

CO \*

Co3

Question: 4\*

If  $s = 6xyz$  then find  $\text{grad } s$

Lesson Plan \*

LP 8

Topic \*

Vector

Source \*

By H.K.Das

CO \*

Co3

Question: 5\*

State the Green's theorem

Lesson Plan \*

LP18

Topic \*

Integral calculus

Source \*

By H.K.Das

CO \*

Co4

Question: 6\*

What is the difference between double and surface integral?

Lesson Plan \*

LP 18

Topic \*

Integral calculus

Source \*

By H.K.Das

CO \*

Co4

Question: 7\*

What is the difference between line, surface and volume integration

Lesson Plan \*

LP20

Topic\*

Integral calculus

Source\*

By H.K.Das

CO\*

Co4

Question: 8\*

If  $u = x^3 + y^3 + z^3 + 3xyz$  then find  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$

Lesson Plan \*

LP2

Topic\*

Partial derivative

Source\*

By H.K.Das

CO\*

Co2

Question: 9\*

Define normal vector in ZX - plane

Lesson Plan \*

LP18

Topic\*

Integral calculus

Source\*

By H.K.Das

CO\*

Co4

Question: 10\*

If  $r = 3xy^2 \sin x^2 \log y (\cos \theta)$  then find  $\frac{\partial^2 r}{\partial \theta^2}$

Lesson Plan \*

LP2

Topic\*

Partial derivative

Source\*

By H.K.Das

CO\*

Co2

PART : B

Question: 1\*

If force  $\vec{F} = x^2y \hat{i} + 2y \hat{j}$  in xy-plane from (0,0) to (1,2) along the curve  $y = x$  then find the work done

Lesson Plan \*

LP17

Topic\*

Integral calculus

Source\*

By H.K.Das

CO\*

Co4

Question: 2\*

If  $u = \log\left(\frac{x^4+y^4}{x+y}\right)$  then show that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$

Lesson Plan \*

LP3

Topic\*

Partial derivative

Source\*

By H.K.Das

CO\*

Co2

Question: 3\*

If  $Z(x, y) = x^3 + y^3 - 3xy$  then find max or min of function Z

Lesson Plan \*

LP 4

Topic\*

Max or min

Source\*

By H.K.Das

CO\*

Co1

Question: 4\*

Using by Green's theorem and Evaluate  $\oint F \cdot dr$  where  $\vec{F} = -x^2 \hat{i} + xy \hat{j}$  which is bounded by  $x = \pm 2, y = \pm 2$

Lesson Plan \*

LP18

Topic\*

Integral calculus

Source\*

By H.K.Das

CO\*

Co4

Question: 5\*

Evaluate  $\int_{-1}^1 \int_0^2 \int_0^3 3xyz \, dx dy dz$

Lesson Plan \*

LP 14

Topic\*

Integral calculus

Source\*

By H.K.Das

CO\*

Co4

Question: 6\*

Evaluate  $\int_0^1 \int_0^{\log y} 3e^{x+2y} \, dx dy$

Lesson Plan \*

LP12

Topic\*

Integral calculus

Source\*

By H.K.Das

CO\*

Co4

Question: 7\*

Evaluate  $\iiint 2(x - y - z) dx dy dz$  which is bounded by  $x = \pm 2, y = \pm 4, z = \pm 6$

Lesson Plan \*

LP15

Topic \*

Integral calculus

Source \*

By H.K.Das

CO \*

Co4

PART : C

Question: 1\*

Using by Green's theorem Evaluate  $\oint F \cdot dr$  if  $\vec{F} = 2xy \hat{i} + x^2y \hat{j}$  which is bounded by  $y = x$  and  $y = x^2$

Lesson Plan \*

LP17

Topic \*

Integral calculus

Source \*

By H.K.Das

CO \*

Co4

Question: 2\*

Find  $\oiint F \cdot \vec{N} ds$  where  $\vec{F} = \hat{i} - \hat{j} + \hat{k}$  which is bounded by  $x+y+z=1$  in the first octant

Lesson Plan \*

LP18

Topic \*

Integral calculus

Source \*

By H.K.Das

CO \*

Co4

Question: 3\*

Find the area of  $\int \int_R 2x dx dy$  where  $R$  is bounded by  $x = 0, y = 0, y = x$

Lesson Plan \*

LP13

Topic \*

Integral calculus

Source \*

By H.K.Das

CO \*

Co4

Question: 4\*

Using by change of order solve  $\int_0^2 \int_y^2 \frac{x}{x^2+y^2} dx dy$

Lesson Plan \*

LP16

Topic\*

Integral calculus

Source\*

By H.K.Das

CO\*

Co4

Question: 5\*

Evaluate  $\int_0^1 \int_0^x \int_0^{1-x-y} 3x dx dy dz$

Lesson Plan \*

LP14

Topic\*

Integral calculus

Source\*

By H.K.Das

CO\*

Co4

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

Faculty's Sign SAPANA THAKUR