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 *	MID TERM 1	Date of Submission of QP	10/26/2020
Name of Faculty *	SAPANA THAKUR	Date of Examination *	27/10/2020
Subject *	1FY2-01 : Engineering Mathematics I	Course*	B.Tech
Batch	AE and MT	Semester *	3
Email Id of Faculty:*	Sapanathakur1990@gmail.com	Phone Number of Faculty*	8823094838

Student Name

Student Reg No.

1FY2-01 : Engineering Mathematics (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 (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
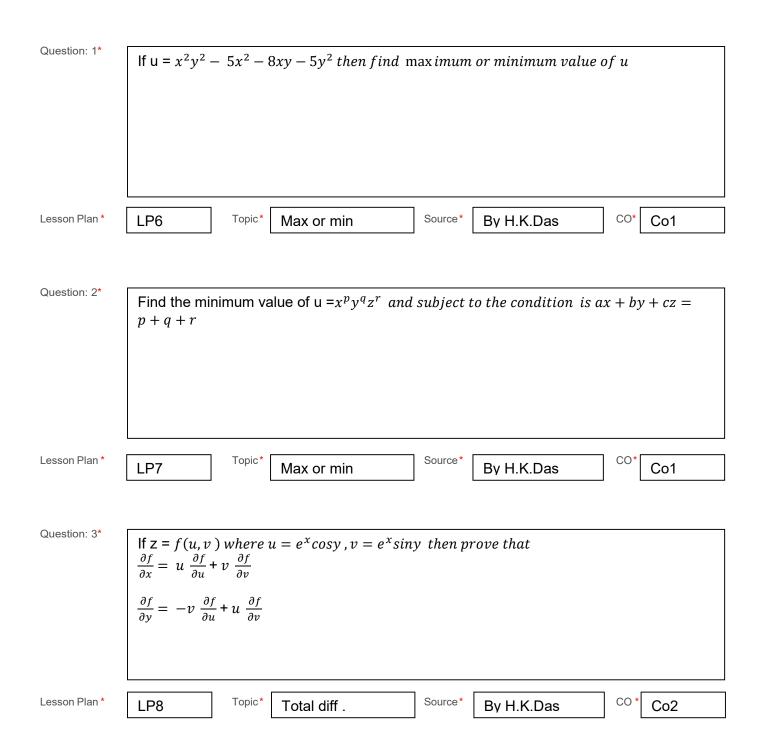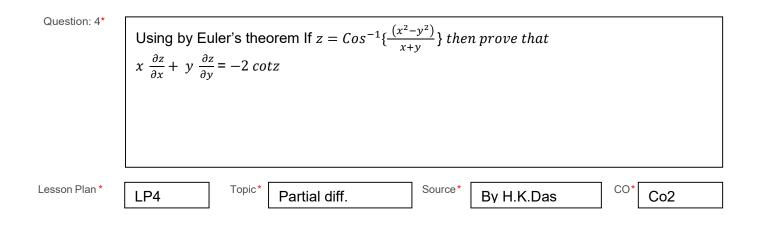
PART : A

Question: 1

Why we use the gradient and divergence and curl for the problems of vectors

| Lesson Plan * | LP10 | Topic * | Vectors | Source * | By H.K.Das | CO * | Co3 |

Question: 2*

What is the difference between limit of function and continuity of function

| Lesson Plan * | LP1 | Topic * | Limit & continuity | Source * | By H.K.Das | CO * | Co2 |

Question: 3*

What is unit vector and directional derivative

| Lesson Plan * | LP9 | Topic * | Vectors | Source * | By H.K.Das | CO * | Co3 |

Question: 4*

What are the condition for irrotational vector and solenoidal vector

| Lesson Plan * | L10 | Topic * | Vectors | Source * | By H.K.Das | CO * | Co3 |

Question: 5*

What is the difference between partial and total differentiation

| Lesson Plan * | LP3 | Topic * | Partial diff. | Source * | By H.K.Das | CO * | Co2 |

Question: 6*

What is the necessary condition for Euler's theorem

| Lesson Plan * | LP5 | Topic * | Partial diff. | Source * | By H.K.Das | CO * | Co2 |

Question: 7*

What is the necessary condition for maxima and minima

Lesson Plan * | LP6   Topic* | Max or min   Source* | By H.K.Das   CO* | Co1

Question: 8*

What is the difference between stationary and saddle point

Lesson Plan * | LP6   Topic* | Max or min   Source* | By H.K.Das   CO* | Co1

Question: 9*

Find $\lim_{\substack{x \to 2 \\ y \to 3}} \left\{ \frac{2x+3}{x^3 - 4y^3} \right\}$

Lesson Plan * | LP1   Topic* | Limit   Source* | By H.K.Das   CO* | Co2

Question: 10*

Test the continuity for

$$f(x,y) = \begin{cases} \frac{xy}{2x^2+3y^2} & when\ x = 0\ and\ y \neq 0 \\ 0 & when\ x = 0\ and\ y = 0 \end{cases}$$

Lesson Plan * | LP2   Topic* | Continuity   Source* | By H.K.Das   CO* | Co2

PART : B

Question: 1*

if $z = x^2 \tan^{-1} \frac{y}{x} - y^2 \tan^{-1} \frac{x}{y}$ then prove that $\frac{\partial^2 z}{\partial y \partial x} = \frac{x^2 - y^2}{x^2 + y^2}$

Lesson Plan * | LP3   Topic* | Partial derivative   Source* | By H.K.Das   CO* | Co2

Question: 2*

Find the directional derivative of f(x,y,z) = $2yz + 3x^2z$ at $(-1,0,1)$ in the direction of $12\hat{\imath} + 5\hat{\jmath} + 54\hat{k}$

Lesson Plan * LP9   **Topic*** Vectors   **Source*** By H.K.Das   **CO*** Co3

Question: 3*

If $y = f(x + sint) + g(x - 2t)$ then find $\frac{\partial^2 y}{\partial t^2}$ and $\frac{\partial^2 y}{\partial x^2}$

Lesson Plan * LP3   **Topic*** Partial derivative   **Source*** By H.K.Das   **CO*** Co2

Question: 4*

Find the equation of tangent and normal line to the surface xyz= 6 at (1,2,3)

Lesson Plan * LP8   **Topic*** Tangent eq.   **Source*** By H.K.Das   **CO*** Co2

Question: 5*

If u = $x^3 + y^3$ where $x = a\,cost^2$, $y = b\,\sin^3 2\,t$ then find $\frac{du}{dt}$

Lesson Plan * LP8   **Topic*** Total diff.   **Source*** By H.K.Das   **CO*** Co2

Question: 6*

Prove that vector F = $(2x-y^2)$ i+$(y^2 +z)$j+(z-2x)k is solenoidal or not

Lesson Plan * LP10   **Topic*** Vectors   **Source*** By H.K.Das   **CO*** Co3

PART : C

Question: 1*

If u = $x^2y^2 - 5x^2 - 8xy - 5y^2$ then find maximum or minimum value of u

Lesson Plan * | LP6 | **Topic*** Max or min | **Source*** By H.K.Das | **CO*** Co1

Question: 2*

Find the minimum value of u = $x^p y^q z^r$ and subject to the condition is $ax + by + cz = p + q + r$

Lesson Plan * | LP7 | **Topic*** Max or min | **Source*** By H.K.Das | **CO*** Co1

Question: 3*

If z = $f(u, v)$ where $u = e^x \cos y$, $v = e^x \sin y$ then prove that

$$\frac{\partial f}{\partial x} = u \frac{\partial f}{\partial u} + v \frac{\partial f}{\partial v}$$

$$\frac{\partial f}{\partial y} = -v \frac{\partial f}{\partial u} + u \frac{\partial f}{\partial v}$$

Lesson Plan * | LP8 | **Topic*** Total diff . | **Source*** By H.K.Das | **CO *** Co2

Question: 4*

Using by Euler's theorem If $z = Cos^{-1}\{\frac{(x^2-y^2)}{x+y}\}$ $then$ $prove$ $that$

$x\ \frac{\partial z}{\partial x} + y\ \frac{\partial z}{\partial y} = -2\ cotz$

Lesson Plan * | LP4

Topic * | Partial diff.

Source * | By H.K.Das

CO* | Co2

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

Faculty's Sign Sapana thakur