

R16

Code No: 132AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year II Semester Examinations, January/February - 2024

MATHEMATICS - II

(Common to EEE, ECE, CSE, EIE, IT)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

1.a) State linearity property of Laplace transform. [2]

b) Find the inverse Laplace transform of $\frac{1}{(s+a)(s+b)}$. [3]

c) If n is a positive integer, then prove that $\Gamma(n+1) = n!$. [2]

d) Prove that $\beta(m, n) = \beta(n, m)$. [3]

e) Evaluate $\int_1^2 \int_1^3 xy^2 dx dy$. [2]

f) Evaluate $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{dx dy}{1+x^2+y^2}$. [3]

g) Define a direction derivative of a scalar point function in the direction of a vector \vec{a} . [2]

h) Define the divergence and curl of a vector point function \vec{F} . [3]

i) State Stoke's theorem. [2]

j) If $\vec{F} = (5xy - 6x^2)\vec{i} + (2y - 4x)\vec{j}$, evaluate $\int_C \vec{F} \cdot d\vec{r}$ along the curve C in xy -plane, $y = x^3$ from the point $(1, 1)$ to $(2, 8)$. [3]

PART - B

(50 Marks)

2.a) Find the Laplace transform of the periodic function $f(t) = \begin{cases} \sin \omega t, & 0 < t < \frac{\pi}{\omega} \\ 0, & \frac{\pi}{\omega} < t < \frac{2\pi}{\omega} \end{cases}$

b) Apply Convolution theorem to evaluate $L^{-1} \left\{ \frac{s^2}{(s^2 + a^2)(s^2 + b^2)} \right\}$. [5+5]

OR

