

INDIAN INSTITUTE OF TECHNOLOGY, PATNA

Mid Semester Examination 2021

Time: 2 hours

Simulation Lab(MC503)

Marks : 30

Instructions

- All questions are compulsory.
- Here, you are not supposed to use any R packages.

1. Using Newton Rapshion method, find all solution of the equation

$$\begin{aligned}x_1^2 + x_1x_2 &= 10 \\x_2 + 3x_1x_2^2 &= 57\end{aligned}$$

with three correct decimals.

[6]

2. Using numerical integration method, solve the following integration,

$$\int_0^1 \alpha \beta x^{-(\beta+1)} \exp[-\alpha(x^{-\beta} - 1)] dx$$

where, $\alpha > 0$, $\beta > 0$.

* Here, you can select any specific value of α and β .

[6]

3. Import **Latest Covid-19 India Status.csv** data and find the following things:

- (a) Find (i) total active cases (ii) total discharge people and (iii) total deaths in India as according to the dataset.
- (b) Which state or UTs has maximum number of (i) total cases (ii) active cases and (iii) number of deaths.
- (c) Find the correlation and covariance between active Cases and number of discharged.
- (d) Select the first 10 states/UTs data and draw a bar chart between state/UTs and deaths.

[10]

4. Draw a scatter plot of the function $y = \sin(x^2) + 4\cos(x)$, $x \in [0, 2\pi]$ and here, type of scatter plot is "h" and also use "red, green, blue and gold" colors for the interval $[0, \pi/2]$, $[\pi/2, \pi]$, $[\pi, 3\pi/2]$ and $[3\pi/2, 2\pi]$ respectively. (consider, step size=0.01)

[8]