MA 473: Computational Finance

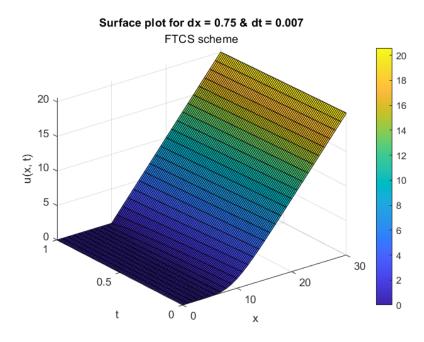
<u>Lab – 3</u>

Name - Vishisht Priyadarshi Roll No - 180123053

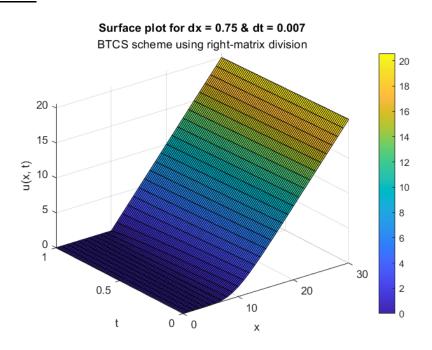
QUESTION - 1:

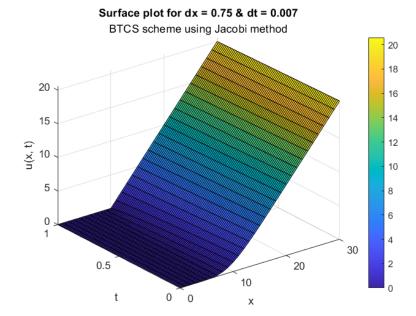
The surface plots for the solution of the Black Scholes PDE for European Call using different schemes are:

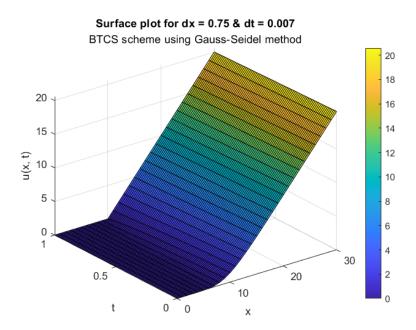
FTCS scheme i.

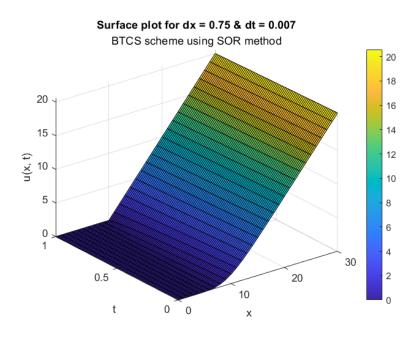


BTCS scheme: ii.

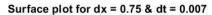


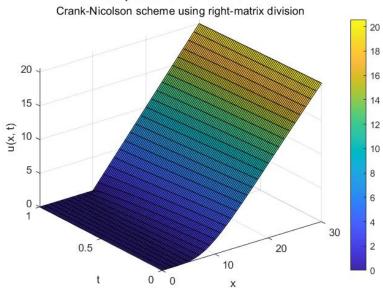




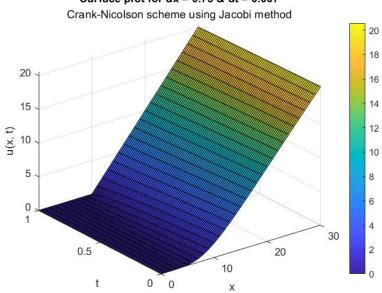


iii. Crank Nicolson scheme:

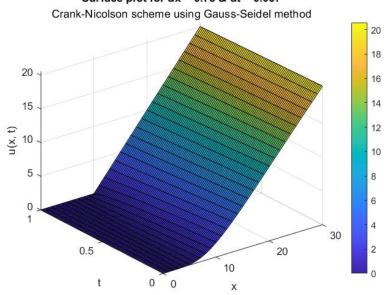


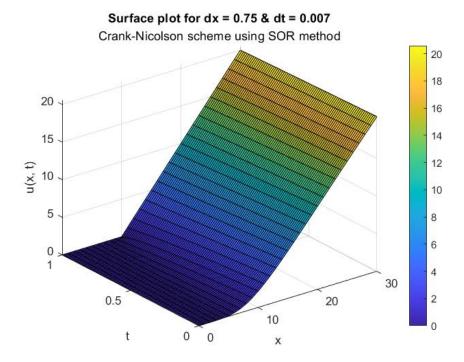


Surface plot for dx = 0.75 & dt = 0.007



Surface plot for dx = 0.75 & dt = 0.007





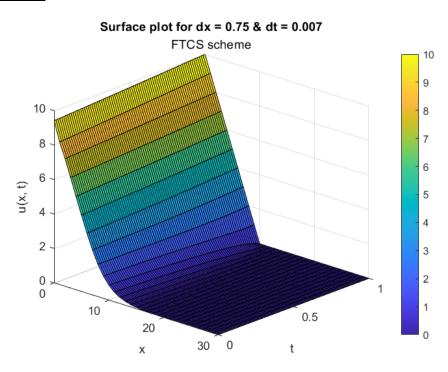
Observations:

We can observe that the price of the European call increases as S (denoted by x) increases, and so the surface formed is within the theoretical expectations.

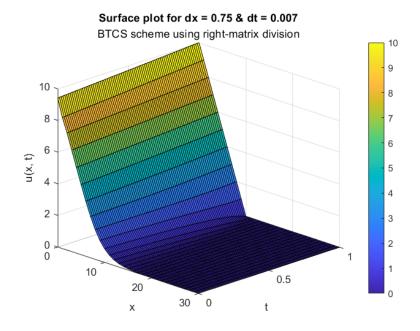
2 QUESTION - 2:

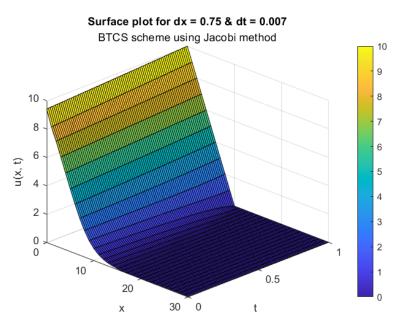
The surface plots for the solution of the Black Scholes PDE for European Put using different schemes are:

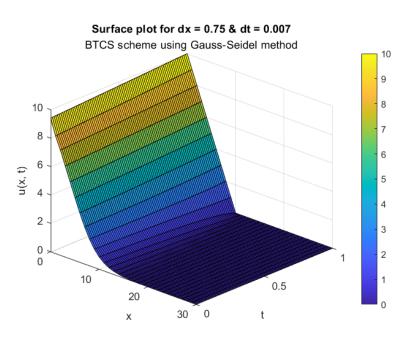
i. FTCS scheme:

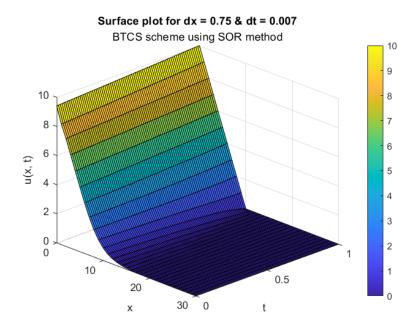


ii. BTCS scheme:

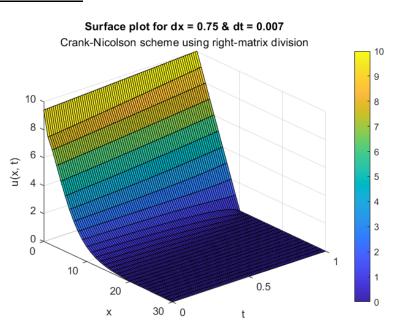


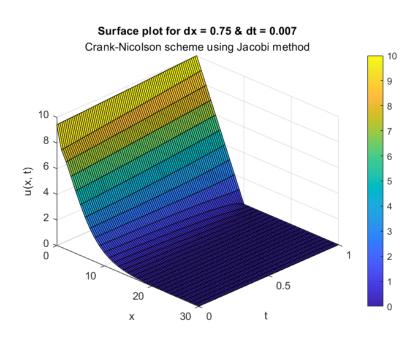


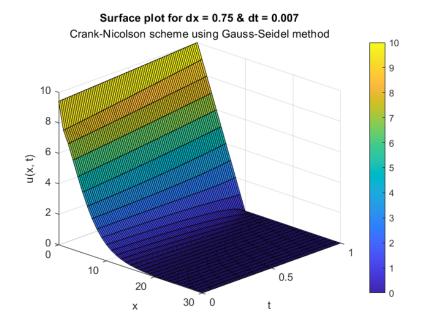


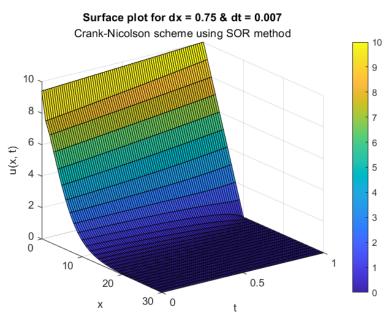


iii. Crank Nicolson scheme:









Observations:

- We can observe that the price of the European put decreases as S (denoted by x) increases, and so the surface formed is within the theoretical expectations.
- Along with this, iterative methods are also used to solve the system of linear equations, Ax = b and relevant plots are created (in BTCS and Crank Nicolson schemes).
- Following iterative methods are utilised:
 - i. Jacobi Iteration method
 - ii. Gauss-Seidel Iteration method
 - iii. SOR (Successive Over Relaxation) method