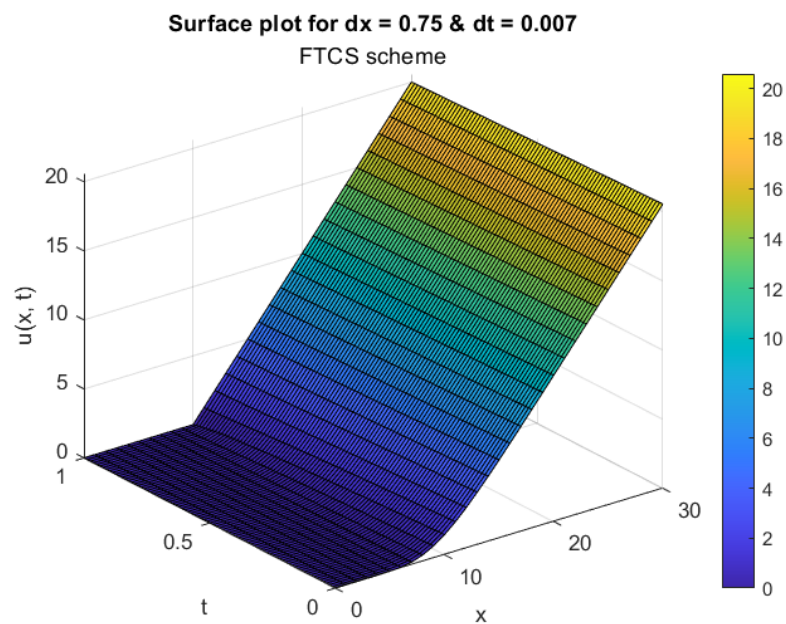


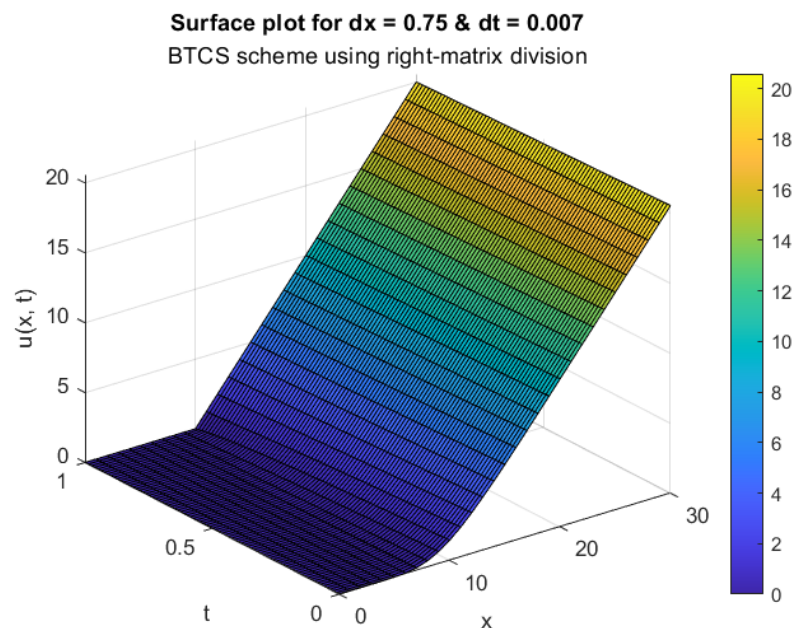
### 1 QUESTION - 1:

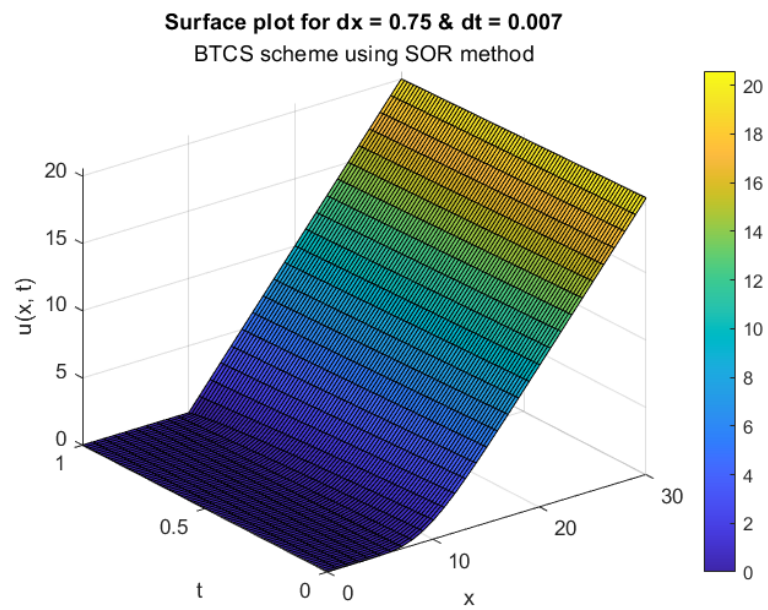
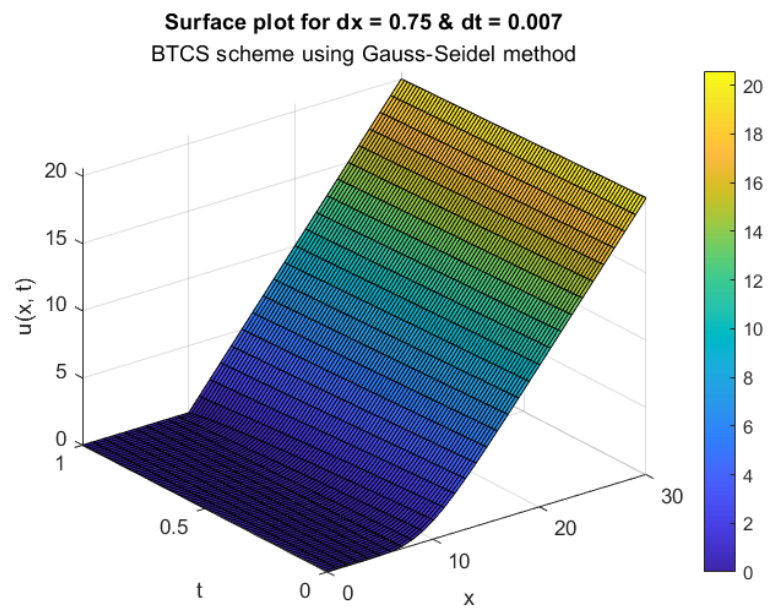
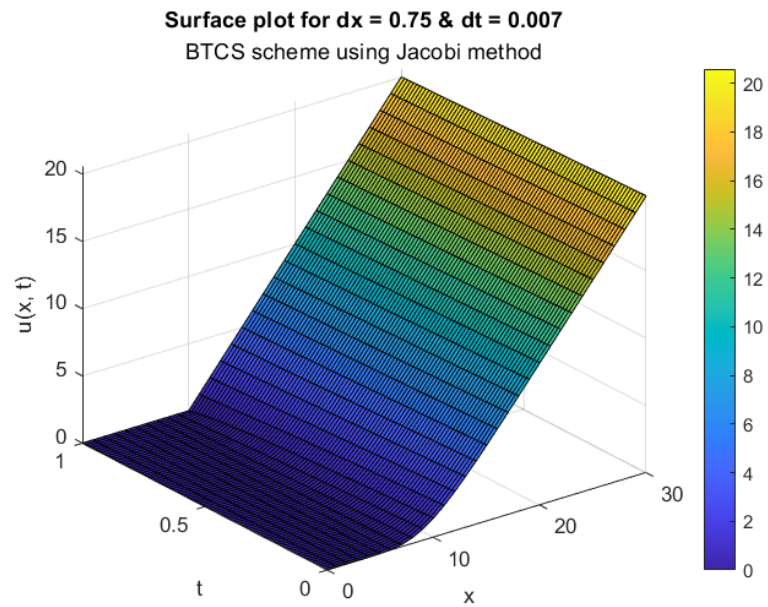
The surface plots for the solution of the Black Scholes PDE for European Call using different schemes are:

i. FTCS scheme

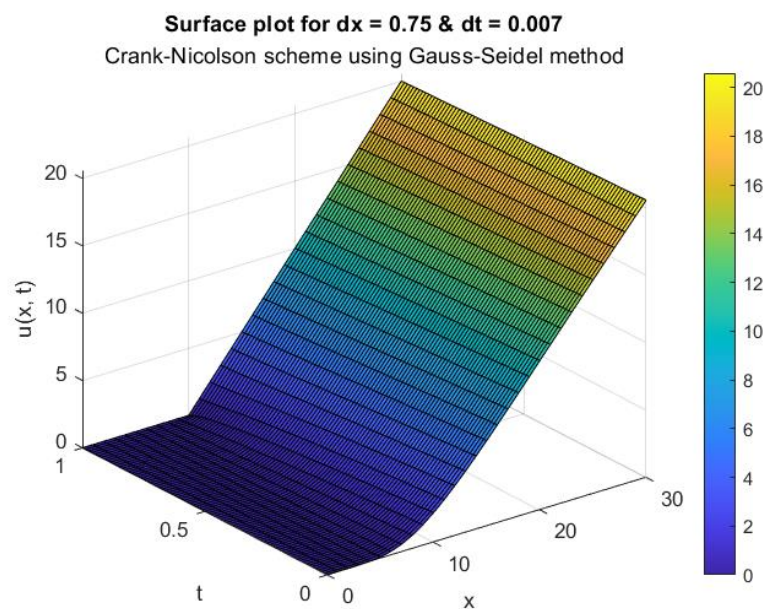
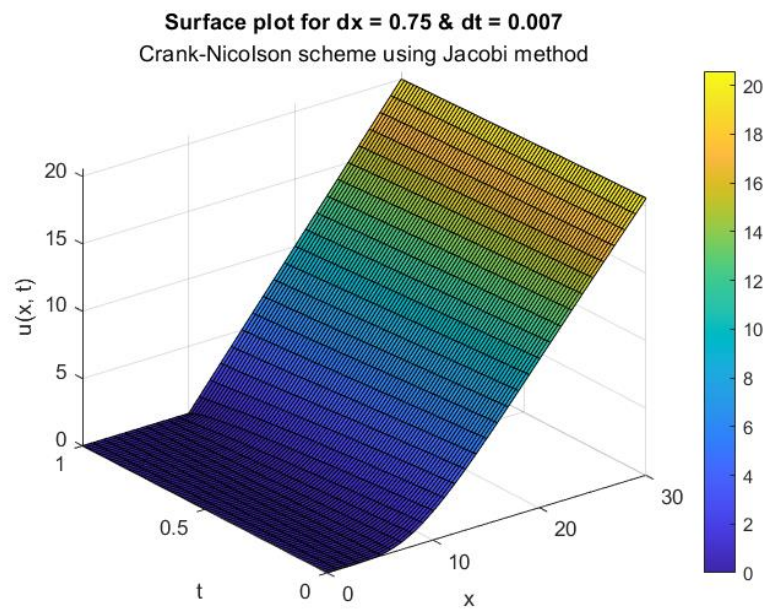
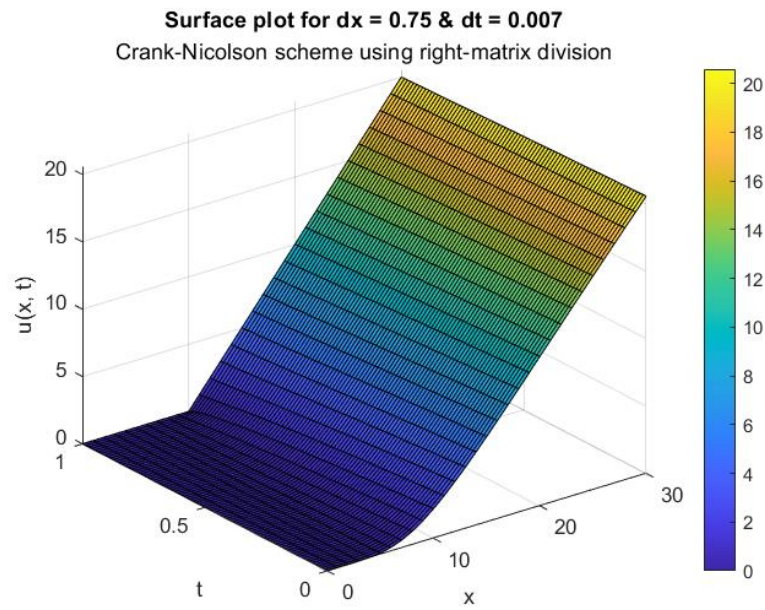


ii. BTCS scheme:

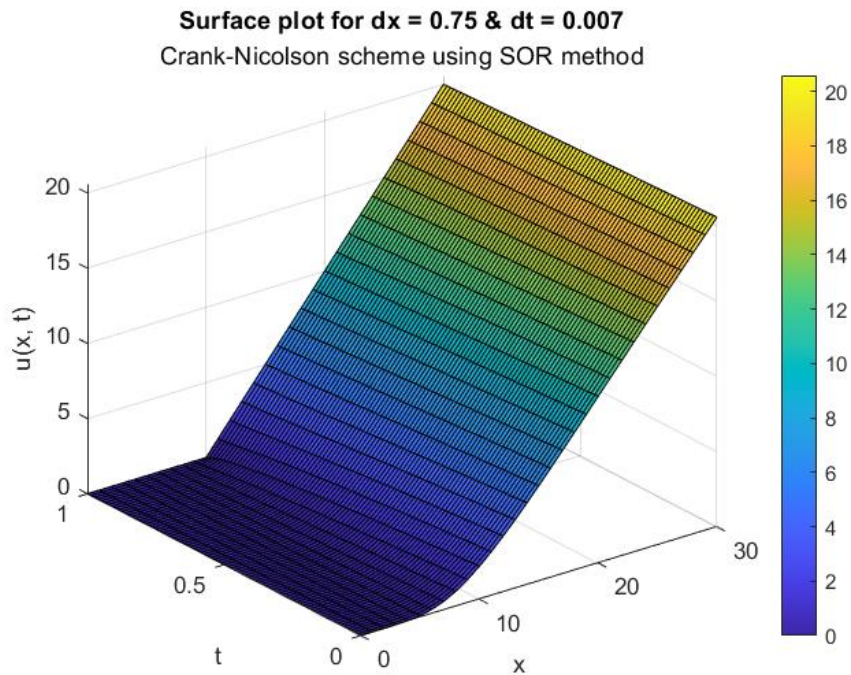




### iii. Crank Nicolson scheme:







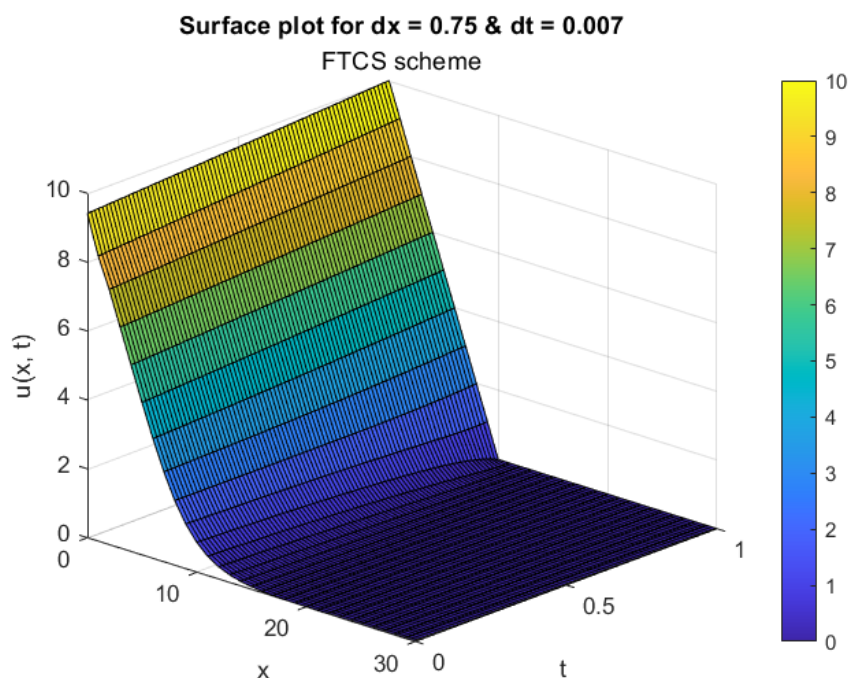
## **Observations:**

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.

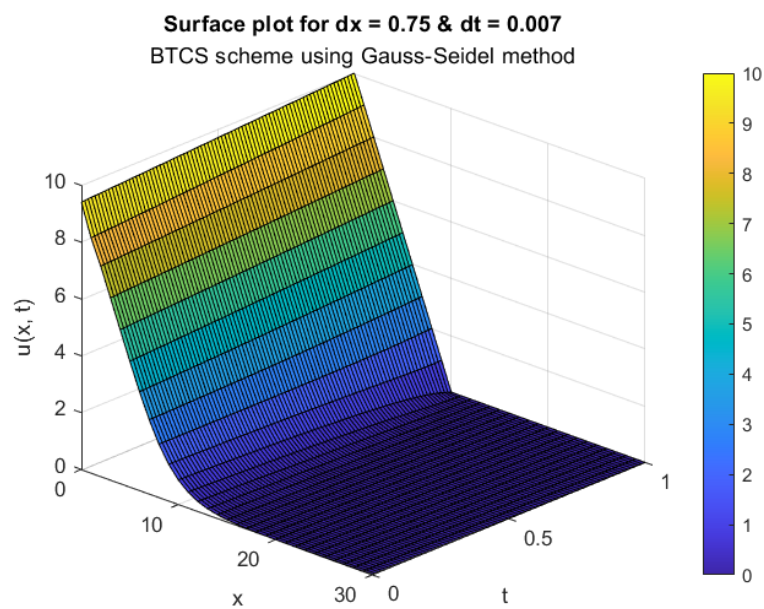
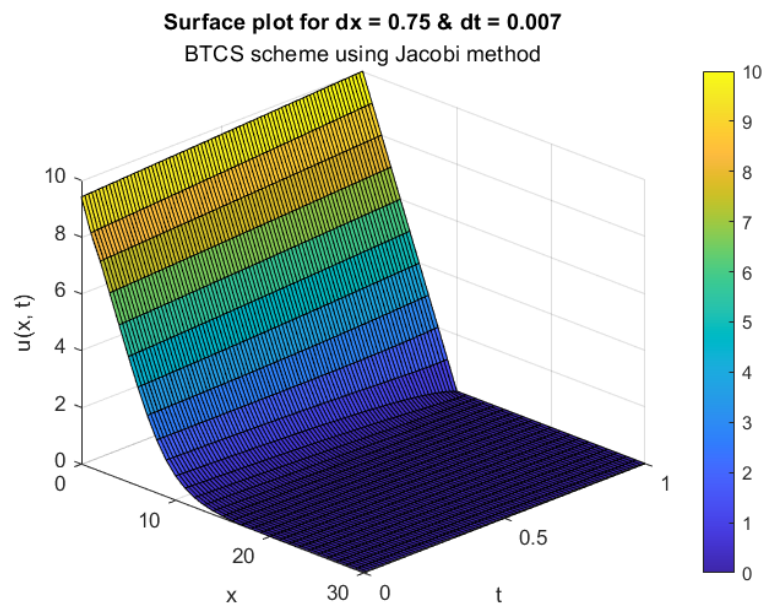
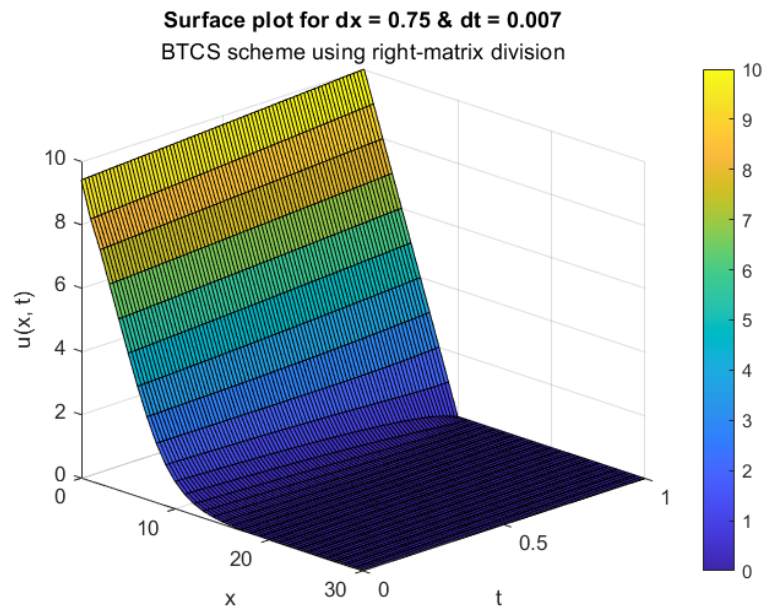
## **2 QUESTION - 2:**

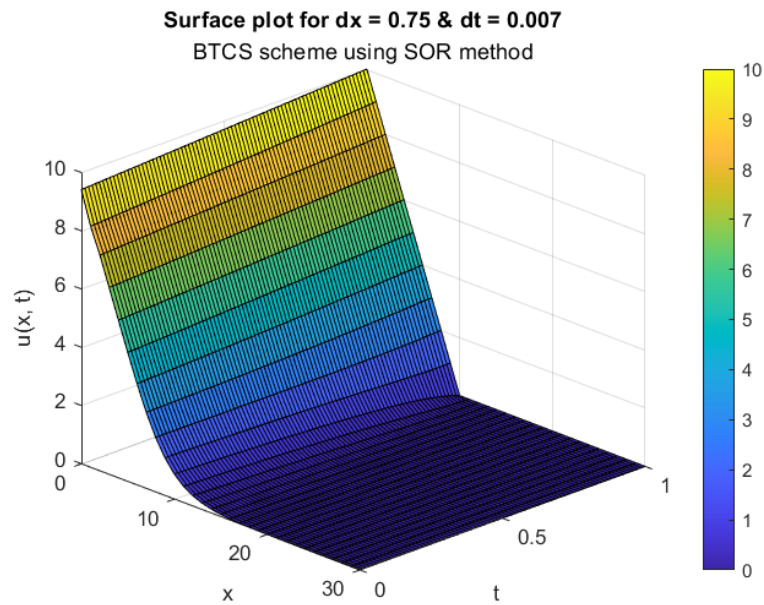
The surface plots for the solution of the Black Scholes PDE for European Put using different schemes are:

### **i. FTCS scheme:**

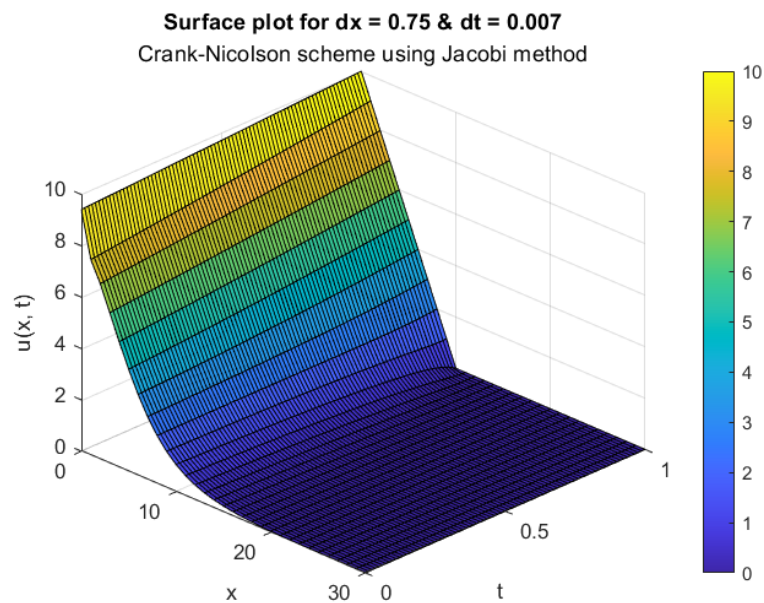
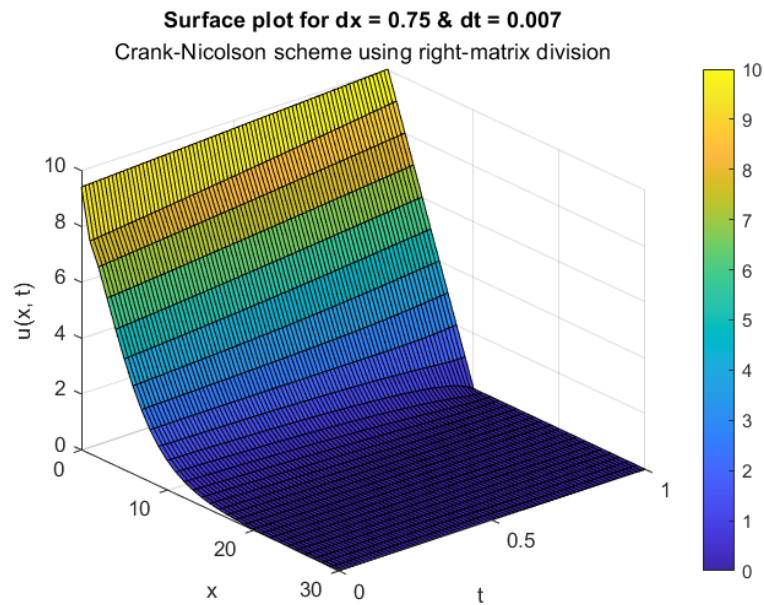


## ii. BTCS scheme:

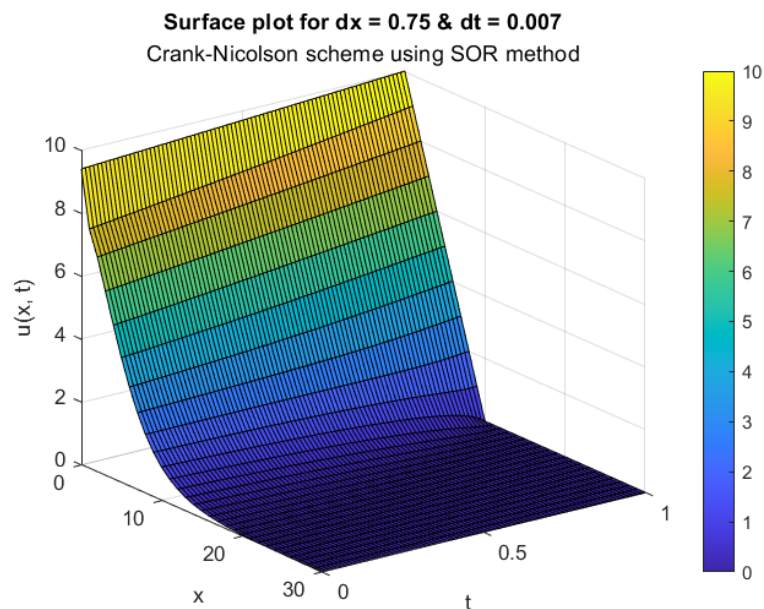
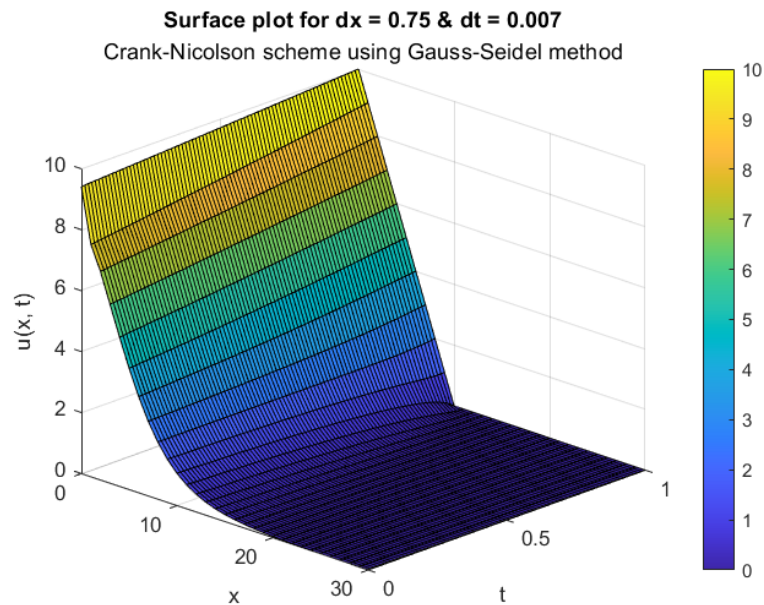




iii. Crank Nicolson scheme:







## **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