

- Q.4 (a) Find the Laplace transformation of $\sin \sqrt{t}$. [5]
 (b) Find the inverse transforms of $\frac{1}{s(s+1)^3}$. [4]
 (c) Find the Fourier transform of $f(x) = \begin{cases} 1 & \text{for } |x| < 1 \\ 0 & \text{for } |x| > 1 \end{cases}$. Hence evaluate $\int_0^{\infty} \frac{\sin x}{x} dx$. [5]

- Q.5 (a) Prove that $A^3 - 4A^2 - 3A + 11I = 0$, where $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}$. [7]
 (b) Investigate for consistency of the following equations and if possible, find the solutions: [7]
 $4x - 2y + 6z = 8$
 $x + y - 3z = -1$
 $15x - 3y + 9z = 21$

- Q.6 (a) If $f(1.15) = 1.0723, f(1.20) = 1.0954, f(1.25) = 1.1180$ and $f(1.30) = 1.1401$, find $f(1.28)$. [7]
 (b) Compute the value of $\int_1^{2.2} (\sin x - \log x + e^x) dx$ using Simpson's 1/3rd rule. [7]

- Q.7 (a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with initial condition $y = 1$ at $x = 0$; find y for $x = 0.1$ by Euler's method. [7]
 (b) Find an approximate value of y when $x = 0.1$, if $dy/dx = x - y^2$ and $y = 1$ at $x = 0$, using Taylor's series. [7]

- Q.8 Solve the Laplace equation $u_{xx} + u_{yy} = 0$ from the given Fig.1 (upto 4 iteration). [14]

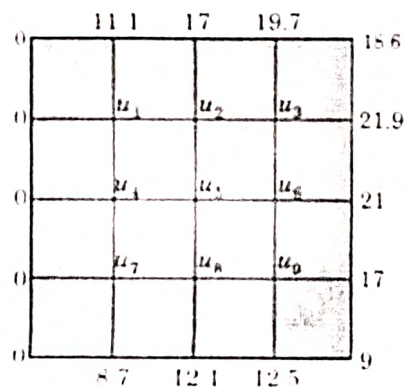


Fig.1

- Q.9 (a) Find a real root of the equation $x \log_{10} x = 1.2$ by Regula-Falsi method, correct 4 decimal places. [8]
 (b) Find the missing values in the following data: [6]

x	0	1	2	3	4
y	1	3	9	-	81

Also, explain why y_3 is not 27.

