

SECTION-B

2. Obtain Fourier series of the function $f(x) = x^2$, $-\pi \leq x \leq \pi$ and hence show that

$$\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = \frac{\pi^2}{6}.$$
3. Using Laplace transform evaluate $\int_0^{\infty} e^{-t} \frac{\sin^2 t}{t} dt$.
4. Solve the linear PDE $(x^2 - y^2 - z^2)p + 2xyq = 2xz$.
5. Prove that $u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic and find a function $v(x, y)$ such that the function $f(z) = u + iv$ is analytic.
6. Solve the given system of linear equations using Gauss-Seidal method
 $2x + 17y + 4z = 35, 28x - 4y - z = 32, x + 3y + 10z = 24.$

SECTION-C

7. i) Let $f(t)$ be piecewise continuous on $[0, \infty)$, be of exponential order and periodic T .
Then $L[f(t)] = \frac{1}{1 - e^{-sT}} \int_0^T e^{-st} f(t) dt, s > 0.$
- ii) Solve $(2D^2 - 5DD' + 2D'^2)z = 5 \sin(2x + y)$
8. i) By using Power method calculate the dominant eigen values and corresponding
Eigen value of $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}.$
- ii) Given $y' = y - x$, $y(0) = 2$, find $y(0.1)$ and $y(0.2)$ using Runge-Kutta method of fourth order.
9. i) In a Normal distribution, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution?
- ii) A manufacturer claims that only 4% of his products supplied by him are defective. A random sample of 600 products contains 36 defectives. Test the claim of the manufacturer.