

SECTION-B

- 11) Apply Taylor's method of order 2 with $N = 10$ to initial value problem.

$$y' = y - t^2 + 1, \quad 0 \leq t \leq 2, \quad y(0) = 0.5.$$

- 12) Solve $y'' + 4y' + 3y = e^{-t}$, $y(0) = 1$, $y'(0) = 1$ by using Laplace transform.

- 13) Using the Lagrange mean value theorem show that.

$$|\cos(b) - \cos(a)| \leq |b - a|.$$

- 14) State and prove First shifting theorem in Laplace transformation.

- 15) Expand $f(z) = \frac{1}{z^2 - 3z + 2}$ in Laurent's series valid for the regions $1 < |z| < 2$ and $0 < |z - 1| < 1$.

SECTION-C

- 16) Using the Cauchy integral theorem evaluate :

$$\oint_C \frac{dz}{z(z+2)},$$

Where C is any rectangle containing the points $z = 0$ and $z = -1$ inside it.

- 17) Find the Laplace transform of the periodic function defined by the sawtooth wave

$$f(t) = t, \quad 0 \leq t \leq a, \quad f(t+a) = f(t).$$

- 18) The cross sections of a certain solid made by planes perpendicular to the x-axis are circles with diameters extending from curve $y = 3x^2$ to the curve $y = 16 - x^2$. Find the volume of the solid which lies between the points of intersection of these curves.