Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 18

B.Tech (CSE) (Sem.–4)

# ENGINEERING MATHEMATICS - III

Subject Code : CS-204

Paper ID : [A0495]

Time : 3 Hrs. Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

## SECTION-A

1) If a complex valued function is analytic at a point, is it differentiable at that point too?

2) Define centre of mass of a body.

3) Is the mapping $f(z) = z^2$ a conformal mapping?

4) Define Bessel's function of kind 1.

5) Give an example of a uniform continuous function on the interval [1, 2].

6) State fundamental theorem of integral calculus.

7) Write down the statement of Cauchy's integral theorem.

8) Write the Cauchy Riemann equations for an analytic function.

9) What is a pole singularity?

10) Find Laplace transform of the function $f(t) = \sinh(at)$.

## SECTION-B

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

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

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

13) Using the Lagrange mean value theorem show that.

$$\left|\cos(b) - \cos(a)\right| \le \left|b - a\right|.$$

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

15) Expand $f(z) = \dfrac{1}{z^2 - 3z + 2}$ 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

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

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.