VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Winter 2019 - 20

Continuous Assessment - II

Programme Name & Branch: B.Tech & All

Course (Code): CVPDE (MAT3003)

Slot: A1+TA1

Examination Duration: 90 minutes

Maximum Marks: 50

Examination Type: **CLOSED BOOK**

Answer any **FIVE** Questions ($5 \times 10 = 50$)

Q1. a) Find the poles and the residues at each pole of $f(z) = 1/(z^2 e^z)$. [5]

b) Identify the singularities of $f(z) = \frac{\cos \pi z^2 + \sin \pi z^2}{(z-1)^2(z-2)}$ inside the circle $C : |z| = 3$ and hence evaluate $\int_C f(z)\mathrm{d}z$ by Cauchy's integral formula. [5]

Q2. Evaluate $\int_0^{2\pi} \frac{\mathrm{d}\theta}{(5-3\cos\theta)^2}$ using residue theorem. [10]

Q3. Evaluate $\int_0^{\infty} \frac{\sin mx}{x}\mathrm{d}x$, when $m > 0$, using Cauchy's residue theorem. [10]

Q4. a) Eliminate the arbitrary function and derive a partial differential equation from the relations $f(x + y + z, x^2 + y^2 + z^2) = 0$. [5]

b) Eliminate the arbitrary constants a and b from the relations $z = (x - a)^2 + (y - b)^2 + 1$ to form the partial differential equation. [5]

Q5. Solve the equation $xp - yq = y^2 - x^2$. [10]

Q6. Solve the following equations: [10]

a) $py + qx + pq = 0$,

b) $z = px + qy + pq$.