

Government General Degree College, Dantan-II
Internal Assessment/4th Semester/Session : 2019-2020

SEC-2(Integral Calculus)

Subject-**Mathematics**(General)

Full marks-20

Answer **any four** questions: $4 \times 5 = 20$

1. Determine the intrinsic equation of the curve $y = a \log \sec(x/a)$, origin being taken as fixed point.
2. Obtain the intrinsic equation of the cycloid $x = a(\theta + \sin \theta)$, $y = a(1 - \cos \theta)$, vertex being taken as fixed point.
3. Determine the length of the perimeter of the cardioid $r = a(1 - \cos \theta)$ and show that the arc of upper half of the curve is bisected by $\theta = \frac{2\pi}{3}$.
4. Prove that the length of the arc of the parabola $y^2 = 4ax$ which is intercepted between the points of intersection of the parabola and the straight line $3y = 8x$ is $a \left(\log 2 + \frac{15}{16} \right)$.
5. Find the length of the perimeter of the curve $(ax)^{2/3} + (by)^{2/3} = (a^2 - b^2)^{2/3}$.
6. If for a curve $x \sin \theta + y \cos \theta = f'(\theta)$ and $x \cos \theta - y \sin \theta = f''(\theta)$, prove that $s = f(\theta) + f''(\theta) + k$, where k is a constant.
7. Prove that the perimeter of the curve $x = \frac{1-t^2}{1+t^2}$, $y = \frac{2t}{1+t^2}$ is 2π .
8. Prove that the length of the loop of the curve $x = t^2$, $y = t - \frac{t^3}{3}$ is $4\sqrt{3}$.