



THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

MAT/ MAS 1414 Integral Calculus

Max. Marks: 75

Time:3 Hrs

Answer any FIVE questions:

(5 X 15 = 75 Marks)

1. Evaluate (i) $\int \frac{6x+5}{\sqrt{6+x-2x^2}} dx$. (ii) Evaluate $\int \sqrt{(x-3)(7-x)} dx$.
2. (i) Establish a reduction formula $\int x^n \cos ax dx$.
(ii) Establish a reduction formula $\int \cos^n x dx$. Hence evaluate $\int_0^{\frac{\pi}{2}} \cos^8 x dx$.
3. Find the area bounded by the parabola $y^2 = 4ax$ and $x^2 = 4by$.
4. Change the order of integration $\int_0^a \int_{\frac{x^2}{a}}^{2a-x} xy dy dx$
5. Prove that $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ and hence evaluate $\Gamma(1/2)$.
6. Find the length of one loop of the curve $3ay^2 = x(x-a)^2$.
7. Show that the entire length of the astroid $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ is $6a$.
