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GA—82—2023

FACULTY OF ARTS AND SCIENCE

B.Sc. (First Year) (Second Semester) EXAMINATION

APRIL/MAY 2023

(New Pattern)

MATHEMATICS

Paper-III

Calculus-II (Integral Calculus)

(Saturday, 6-5-2022)

Time : 10.00 a.m. to 12.00 noon

Time— Two Hours

Maximum Marks—40

N.B. :— (i) Attempt all questions.

(ii) Figures to the right indicate full marks.

1. Integrate $\frac{Lx + M}{Ax^2 + 2Bx + C}$ 15

Or

(a) Prove that reduction formula : 8

$$\int \sin^n x \, dx = -\frac{1}{n} \sin^{n-1} x \cos x + \frac{n-1}{n} \int \sin^{n-2} x \, dx$$

(b) Integrate $\frac{1}{\sqrt{2x^2 - x - 2}}$ 7

2. Prove that : 15

$$\int x^m (a + bx^n)^p \, dx = \frac{x^{m-n+1} (a + bx^n)^{p+1}}{b(np + m + 1)} - \frac{a(m - n + 1)}{b(np + m + 1)} \int x^{m-n} (a + bx^n)^p \, dx$$

P.T.O.

Or

- (a) Integrate $(px + q) / \sqrt{(ax^2 + bx + c)}$. 8
- (b) Integrate $\sin^3 x \cos^2 x$. 7
3. Attempt any *two* of the following : 5 each

(a) Integrate $\int \frac{dy}{(y^2 + 1)^2}$

(b) Integrate $x^2 / \sqrt{x^2 + 4}$

(c) Show that :

$$\int_0^{\pi/2} \left(\frac{\theta}{\sin \theta} \right)^2 d\theta = \pi \log 2$$

(d) Evaluate :

$$\int_0^{\pi/2} \sin^6 \theta d\theta.$$