

Roll No.

Y – 3631 (A)
B.C.A. (Second Semester) (SPECIAL) EXAMINATION, August-2021
(SECOND CHANCE)
ADVANCE CALCULUS
Paper – I

Time : Three Hours

Maximum Marks : 80 (For Regular Students)

Minimum Pass Marks : 32

Note—Attempt *all* questions.

1. (a) If $u = x^2 + y^2 + z^2$ then prove that 8

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 24$$

- (b) State and prove mean value theorem. 8

2. (a) Find the envelope of the family of straight lines $y = mx + am^p$. 8

- (b) Discuss the maximum or minimum values of the following function. 8

$$u = xy + \frac{a^3}{x} + \frac{a^3}{y}$$

3. (a) Prove that $B(m, n) = \frac{\sqrt{m} \sqrt{n}}{\sqrt{m+n}}$ ($m, n > 0$) 8

- (b) Show that 8

$$\int_0^{\pi/12} \tan^n x dx = \frac{\pi}{2} \sec \frac{n\pi}{2}$$

4. (a) Evaluate 8

$$\int_0^3 \int_0^2 xy(1+x+y) dx dy$$

- (b) Evaluate 8

$$\int_0^1 \int_0^1 \frac{dx}{\sqrt{1-x^2}} \frac{dy}{\sqrt{1-y^2}}$$

5. (a) Does the improper integral $\int_1^{\infty} \frac{dx}{x}$ exist? 8

- (b) Test the convergence of the integral 8

$$\int_1^{\infty} \frac{\cos x}{1+x^2} dx$$

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