Internal Examination 2020

DEPARTMENT OF MATHEMATICS

1ST SEMESTER

MATH-H-CC-T-01

Calculus & Analytical Geometry

1. State and Prove Leibnitz Theorem. 6
2. If $y = \sin(m \sin^{-1} x)$ then prove that,
   $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} + (m^2 - n^2)y_n = 0$ 4

MATH-H-CC-T-02

Algebra

1. Show that the relation defined on $\mathbb{Z}$ by $\rho = \{(x, y): 3x + 4y \text{ is divisible by } 7\}$ is an equivalence relation. 5
2. Express $2 - 2i$ in polar form. Using De Moivre's Theorem prove that

$$\cot 5x = \frac{5\cot x - 10\cot^3 x + \cot^5 x}{1 - 10\cot^2 x + 5\cot^4 x}$$

2+3