Dumkal College

U.G. 6^{th} Semester Internal Examination-2022

MATHEMATICS
[HONOURS]
Course Code: MATH(H)DSE-T-3B & MATH(H)DSE-T-4A

Full Marks: 10+10 Time: 1 Hour

The figures in the right- hand margin indicate marks.
Symbols have their usual meaning.

After completion, send answer scripts in two separate pdf files with file name indicating paper name to the WhatsApp 7001717834 **within 30 minutes.**

MATH(H)DSE-T-3B

1. Answer any **two** questions: $2 \times 5 = 10$

   (a) What is linear Diophantine equation ? Determine all solutions in integers of the Diophantine equation $56x + 72y = 40$.

   (b) State Chinese Remainder theorem. Solve the set of simultaneous congruences $x \equiv 1 \pmod 3$, $x \equiv 2 \pmod 5$, $x \equiv 3 \pmod 7$.

   (c) State Fermat's Little theorem. Show that 17 divides $11^{104} + 1$.

MATH(H)DSE-T-4A

1. Answer any **two** questions: $2 \times 5 = 10$

   (a) A plane system of forces is equivalent to a couple of moment M & if the force turned through a right angle about their respective point of application in the same sence, they are equivalent to a couple N. Prove that when each force is turned about its point of application through an angle α in the same sence, the system will be equilibrium if $\tan\alpha = -\frac{M}{N}$.

   (b) A particle moves in a plane with an acceleration which is always directed towards a fixed point on the plane and varies directly as the distance from it; to find the path of the particle.

   (c) If from a rectangular lamina of sides a, b, half the rectangle be removed so as to leave a right angled traingle of sides a, b, then prove that the value of θ for the principal axis at the right angle is given by $\theta = \frac{1}{2}\tan^{-1}\left(\frac{ab}{a^2-b^2}\right)$.

* * *