Dumkal College

U.G. 6^{th} Semester Internal Examination-2021

MATHEMATICS
[HONOURS]
Course Code: MATH(H)DSE-T-03 & MATH(H)DSE-T-04

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-03

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-04

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

   (a) State and establish the principle of virtual work for a system of co-planer forces acting on a rigid body.

   (b) Three forces P, Q, R act along the sides of a traingle formed by the lines $x + y = 3$, $2x + y = 1$ and $x - y = -1$. Find the equation of the line of action of the resultant.

   (c) Two equal forces act along the generators of the same system of the hyperboloid $\frac{x^2+y^2}{a^2} - \frac{z^2}{b^2} = 1$ & cut the plane $z = 0$ at the extremities of perpendicular diameters of the circle $x^2 + y^2 = a^2$; show that the pitch of the eqivalent wrench is $\frac{a^2 b}{a^2+2b^2}$.

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