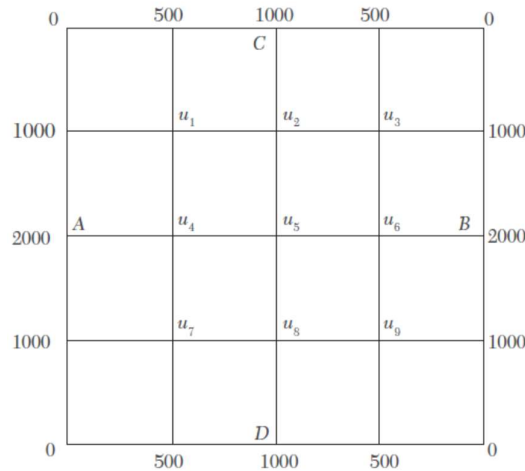**2021**

ADVANCED COMPUTATIONAL HYDRAULICS

Full Marks: 60

Time: Two hours

The figures in the margin indicate full marks for the questions.

1. Consider a plate of size 4m x 4m that is subjected to the boundary condition as shown in the figure. Find the temperatures at the interior using suitable grid size. Show at least 3 iteration. Use Laplace equation   20

2. Consider a steel rod that is subjected to temperature of 120° C on the left end and 40° C on the right end. If the rod is of the length 0.1m, use explicit method to find the temperature distribution in the rod from t = 0 sec and t = 9 sec. Use Δx= .02m and Δt=3 sec and λ=1.   20

3. The transverse displacement u of a point at a distance x from one end and at any time t of a vibrating string satisfies the equation $\partial^2 u/\partial t^2 = 4\partial^2 u/\partial x^2$, with boundary conditions u = 0 at x = 0, t > 0 and u = 0 at x = 4, t > 0 and initial conditions u = x(4 – x) and $\partial u/\partial t$ = 0, 0 ≤ x ≤ 4. Solve this equation numerically for one-half period of vibration, taking h = 1 and k = 1/2.   20