

**M.Sc. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE)
M.Sc. (MACS)**

00198

Term-End Practical Examination

December, 2016

MMT-007(P) : DIFFERENTIAL EQUATIONS AND NUMERICAL SOLUTIONS

Time : 1 $\frac{1}{2}$ Hours

Maximum Marks : 40

Note : (i) *There are two questions in this paper, totalling 30 marks. Answer **both** of them.*

(ii) *Remaining 10 marks are for viva-voce.*

1. Write a 'C' program to solve the boundary value problem

$$y'' = y - 4xe^x, 0 < x < 1$$

$$y(0) - y'(0) = -1, y(1) + y'(1) = -e$$

using the shooting method. Use the Taylor series method

$$y_{i+1} = y_i + hy'_i + \frac{h^2}{2} y''_i + \frac{h^3}{6} y'''_i$$

$$y'_{i+1} = y'_i + hy''_i + \frac{h^2}{2} y'''_i$$

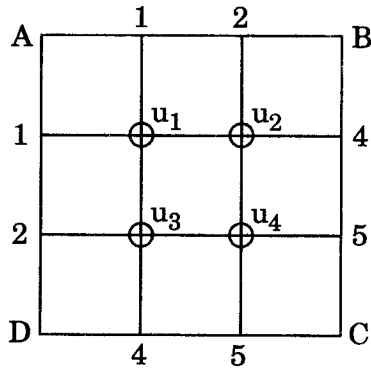
with $h = 0.2$ to solve the resulting initial value problem.

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2. Write a program in 'C' language to solve the elliptic equation

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

for the following square mesh with boundary values as shown in the figure.



Iterate until the maximum difference between two successive values at any point is less than 0.001.

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