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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
Test 3 EXAMINATION- December 2017
B.Tech II Semester (Civil Engg.)

COURSE CODE: 10B11MA312 MAX. MARKS: 35
COURSE NAME: NUMERICAL METHODS
COURSE CREDITS: 4 MAX. TIME: 2 Hrs

Note: *All questions are compulsory and carry equal marks. Carrying of mobile phone during examinations will be treated as case of unfair means. Use of scientific calculator is allowed.*

1. What are well conditioned and ill-conditioned systems of linear equations? Explain with an example for each.
2. Explain different types of finite difference operators with their notations and relations.
3. Using the following data, find x for which y is minimum and find this value of y.

x	0.60	0.65	0.70	0.75
y	0.6221	0.6155	0.6138	0.6170

4. Apply Romberg's method to compute $\int_4^{5.2} \log_e x\,dx$, given that

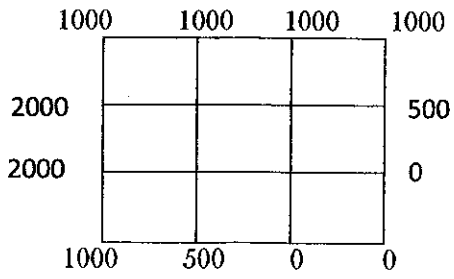
x	4.0	4.2	4.4	4.6	4.8	5.0	5.2
$\log_e x$	1.3863	1.4351	1.4816	1.526	1.5686	1.6094	1.6486

5. Evaluate the following double integration using Simpson's 1/3 rule with $h = k = 0.25$:

$$\int_0^1 \int_0^1 xe^y\,dxdy$$

6. Using Runge-Kutta method of order 4, find y for $x = 0.1, 0.2, 0.3$ given that $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$. Continue to find the solution at $x = 0.4$ using Milne's predictor corrector method.

7. Given the values of $u(x, y)$ on the boundary of the square in the figure below. Evaluate the function $u(x, y)$ satisfying the partial differential equation $u_{xx} + u_{yy} = 0$ at the pivotal points of the figure by Gauss Seidal method. Initially, one of the four u_i's may be assumed to be zero for approximation.



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