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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATION- DEC 2017
Ph.D (Mathematics)

COURSE CODE: 17P1WMA113   MAX. MARKS: 35

COURSE NAME: Advanced Numerical Analysis

COURSE CREDITS: 03   MAX. TIME: 2 Hrs

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q1.Find the negative root of the equation $x^3 + 2x^2 + 2.2x + 0.4 = 0$ that lies between -1 and 0,correct to 4 places of decimals,using Regula Falsi method. [5]

Q2.Solve the system of equations using Gauss elimination method. [6]

$$4.12x - 9.68y + 2.01z = 4.93$$
$$1.88x - 4.62y + 5.5z = 3.11$$
$$1.1x - 0.96y + 2.72z = 4.02$$

Q3.Find eigenvalues of the matrix $A = \begin{bmatrix} 3 & -5 \\ -2 & 4 \end{bmatrix}$ by power method. [5]

Q4.Find the values of the function $u(x,t)$ satisfying the equation $\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}$ and the boundary conditions

$$u(0,t) = 0, u(8,t) = 0 \text{ and}$$

$$u(x,0) = \frac{1}{2}x(8 - x) \text{ at the points } x = i, i = 0,1,2,3,4 \text{ and } t = \frac{1}{8}j, j = 0,1,2,3,4,5.$$

Take $h = 1$ *and* $k = \frac{1}{8}$ using Bender-Schimidt method. [7]

Q5.What do you understand by finite element methods. Differentiate between Rayleigh-Ritz method and Galerkin method. [5]

Q6.Solve the boundary value problem defined by

$$y'' + y = -x, 0 < x < 1 \text{ with } y(0) = y(1) = 0$$ [7]