B.TECH. SEM -V (CHEMICAL/ CIVIL/ ELECTRICAL/ MECHANICAL/ PRODUCTION/ COMPUTER/ INFO. TECH./ ELECTRONICS / BIO MEDICAL / E & TC) 2014 COURSE (CBCS) : WINTER - 2017

SUBJECT: ENGINEERING MATHEMATICS - IV

Day : **Thursday**
Date : **25/01/2018**

W-2017-2120

Time: **02.30 PM TO 05.30 PM**
Max. Marks: 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of nonprogrammable **CALCULATOR** is allowed.
4) Assume suitable data if necessary.

Q.1 Find the root of the equation $\cos x = xe^x$ using the Regula-Falsi method correct to four decimal places. **[10]**

OR

Find the positive root of $x^4 - x = 10$ correct to three decimal places. Using Newton-Raphson Method.

Q.2 Solve the examples by Jacobi's iteration method, the equations: **[10]**

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

OR

Solve the equations by Gauss-Seidel iteration method:

$$10x_1 - 2x_2 - x_3 - x_4 = 3$$
$$-2x_1 + 10x_2 - x_3 - x_4 = 15$$
$$-x_1 - x_2 + 10x_3 - 2x_4 = 27$$
$$-x_1 - x_2 - 2x_3 + 10x_4 = -9$$

Q.3 Solve the difference equation: **[10]**

a) $u_{n+3} - 2u_{n+2} - 5u_{n+1} + 6u_n = 0$

b) $y_{n+1} - 2y_n \cos\alpha + y_{n-1} = 0$

OR

Solve the simultaneous difference equation:

a) $u_{x+1} + v_x - 3u_x = x$

b) $3u_x + v_{x+1} - 5v_x = 4x$

Q.4 The area A of a circle of diameter d is given for the following values; find area for d = 97. **[10]**

d	80	85	90	95	100
A	5026	5674	6362	7088	7854

P.T.O.

OR

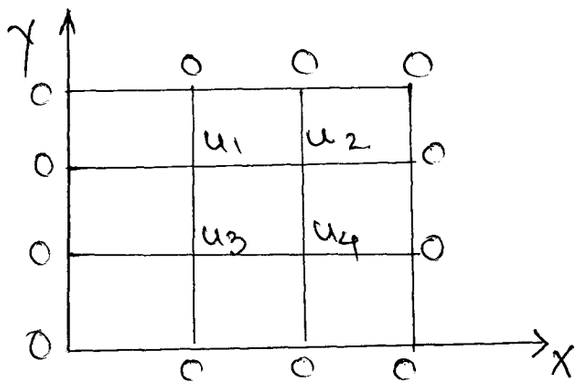
Using Simpson's 1/3rd rule to find $\int_0^{0.6} e^{-x^2}\,dx$ by taking seven ordinates.

Q.5 If $\frac{dy}{dn} = 2e^x - y,\ y(0) = 2,\ y(0.1) = 2.010,\ y(0.2) = 2.04$ and $y(0.3) = 2.09$; find $y(0.4)$ using Milen's predictor corrector method. **[10]**

OR

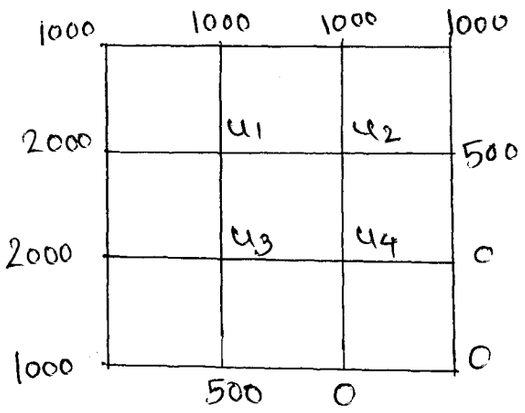
Use Euler's method to solve the $\frac{dy}{dx} = 1 + xy$, subject to the condition at $x = 0,\ y = 1$ and tabulate y for $x = 0(0.1)0.5$.

Q.6 Solve partial differential equation $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square with sides $x = 0 = y,\ x = 3 = y$ with $u = 0$ on the boundary and mesh length = 1. **[10]**



OR

Given the values of u(x, y) on the boundary of the square in the figure evaluate the functions u(x, y) satisfying the Laplace equation $-\nabla^2 u = 0$ at the pivotal points of the figure.



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