

**B.Tech. SEM -V (Chemical/ Civil/ Electrical/ Mechanical/ Production/  
Computer/ Info. Tech./ Electronics / Bio Medical / E & TC) 2014  
Course (CBCS) : WINTER - 2018  
SUBJECT : ENGINEERING MATHAMATICS - IV**

Day : Thursday  
Date : 06/12/2018

W-2018-2383

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

**N. B. :**

- 1) All question are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labelled diagram **WHEREVER** necessary.
- 4) Assume suitable data, if necessary.

**Q. 1** By using the bisection method, find an approximate root of the equation **(10)**  
 $\sin x = \frac{1}{x}$ , that lies between  $x=1$  and  $x=1.5$ (measured in radians). Carry out  
computations upto 7<sup>th</sup> stage.

**OR**

Using Newton's iterative method, find the root of  $x \log_{10} x = 1.2$  correct to  
five decimal places.

**Q. 2** Solve the following equations by Gauss Seidel iteration method: **(10)**  
 $10x - 2y - z - t = 3$   
 $-2x + 10y - z - t = 15$   
 $-x - y + 10z - 2t = 27$   
 $-x - y - 2z + 10t = -9$

**OR**

Solve:

$$\begin{aligned} 10x - 7y + 3z + 5u &= 6 \\ -6x + 8y - z - 4u &= 5 \\ 3x + y + 4z + 11u &= 2 \\ 5x - 9y - 2z + 4u &= 7 \end{aligned}$$
 by Gauss Elimination method.

**Q. 3** Solve simultaneous difference equations: **(10)**  
 $u_{x+1} + v_x - 3u_x = x$   
 $3u_x + v_{x+1} - 5v_x = 4^x$

**OR**

Solve:  $u_{n+2} - 4u_{n+1} + 4u_n = 2^n$

**P. T. O.**

- Q. 4** The table gives distances in nautical miles of the visible horizon for given heights in feet above the earth's surfaces: (10)

x=height	100	150	200	250	300	350	400
y=distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when x=218 ft.

**OR**

Evaluate:  $\int_0^6 \frac{dx}{1+x^2}$  by using

- Trapezoidal rule.
- Simpson's 1/3<sup>rd</sup> rule.

- Q. 5** Using modified Euler's method, find an approximate value of y when x=0.3, (10)  
given that  $\frac{dy}{dx} = x + y$  and y=1 when x=0.

**OR**

Using Runge – Kutta method of fourth order, solve  $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$  with y(0)=1 at x=0.2,0.4

- Q. 6** Solve the equation  $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$  subject to the conditions (10)  
 $u(x,0) = \sin \pi x, 0 \leq x \leq 1; u(0,t)=u(1,t)=0$ . Carry out computations for two levels, taking h=1/3, k=1/36.

**OR**

Solve the Poisson's equation  $u_{xx} + u_{yy} = -81xy, 0 < x < 1, 0 < y < 1$ , given that  $u(0,y) = 0, u(x,0) = 0, u(1,y) = 100, u(y,1) = 100$  and h=1/3.

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