

**B.TECH. SEM -IV MECHANICAL 2014 COURSE (CBCS) :**  
**SUMMER - 2018**  
**SUBJECT : NUMERICAL METHODS & OPTIMIZATION TECHNIQUES**

Day : **Tuesday**  
Date : **12/06/2018**

**S-2018-2305**

Time : **10.00 AM TO 01.00 PM**  
Max. Marks : 60

**N.B.:**

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

**Q.1** Newton's method for finding  $\sqrt{R}$  where  $R = AB$  gives this approximation [10]

$$\sqrt{AB} \approx \frac{A+B}{4} + \frac{AB}{A+B}$$

Show that if  $x_0 = \frac{1}{2}(A+B)$ , then only one iteration is required to obtain this approximation.

**OR**

Calculate the approximate value for  $4^{3/4}$  using false position method.

**Q.2** Solve the following set of equations by Gauss Siedel method. [10]

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

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

**OR**

What is an ill conditional system? How do you find solution for such a system?

**Q.3** Find the equation of the line that fits the following data by Newtons forward method and hence find  $f(4)$ . [10]

x	0	5	10	15
y	12	15	17	21

**OR**

Write a MATLAB program to find the equation of straight line that fits user entered data of x and y by method of least squares.

**Q.4** Calculate the value of integral  $\int_3^6 \log(\sin x) \cdot dx$  taking  $h = 0.5$ . [10]

**OR**

Find  $y(2.2)$  for  $xy' = x - y$ ,  $y(2) = 2$  dividing the region into four parts.

**Q.5** Determine minimum of  $f(x) = x^2 - 6x + 2$  on  $[0, 10]$  using Fibonacci search. [10]

**OR**

Explain Golden section search algorithm.

**Q.6** Explain Steepest Descent Procedure. [10]

**OR**

What is optimality criteria for multivariable optimization?

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