DF-3016
B. Sc. (Sem. III) Examination
March/April – 2016
Mathematics - MTH - 303
(Numerical Analysis - I)

Time : Hours] [Total Marks : 50

Instructions :

(1) Fill up strictly the details of signs on your answer book.
Name of the Examination :
B. Sc. (SEM. 3)
Name of the Subject :
MATHEMATICS - MTH - 303
Seat No. : 

(2) The question paper has four sections and 18 questions in all.
(3) All sections and questions are compulsory.
(4) Follow usual notations.
(5) Use of non-programmable calculator is allowed.
(6) These are to be answered by writing the correct option in your answer sheet.

SECTION - A : Q. 1 to 4 Multiple Choice Questions : (1 mark)
SECTION - B : Q. 5 to 8 Multiple Choice Questions : (2 marks)
SECTION - C : Q. 9 to 14 Multiple Choice Questions : (3 marks)
SECTION - D : Q. 15 to 18 Multiple Choice Questions : (5 marks)

O.M.R. Sheet भरणे अनेकी अवतरणी सुनानावे आपेक्ष
O.M.R. Sheet-ले पाठवे आपेक्ष घे.

Important instructions to fillup O.M.R. Sheet
are given on back side of the provided O.M.R. Sheet.
1 If \((0, 12), (1, 25)\) and \((2, 4)\), then \(\nabla^2 f(x_2)\) = ________

(A) 34 
(B) 54 
(C) -54 
(D) -34

2 The relative error \(E_R\) is defined by

(A) \(\frac{\text{Absolute error}}{\text{True value}}\)

(B) \(\frac{\text{Absolute value}}{\text{True value}}\)

(C) None of these

(D) \(\frac{\text{Percentage error}}{\text{True value}}\)
3  The first approximation to the root of \( f(x) = 0 \) in false-position method is given by

(A) \( \frac{bf(b) - af(a)}{f(b) - f(a)} \)

(B) \( \frac{af(a) - bf(b)}{f(b) - f(a)} \)

(C) \( \frac{af(b) + bf(a)}{f(b) + f(a)} \)

(D) \( \frac{af(b) - bf(a)}{f(b) - f(a)} \)

4  \( \Delta[(x+1)(x+2)] = \)______________

(A) 4 \(- 2x\)

(B) 2x \(- 4\)

(C) 2x \(+ 4\)

(D) 4x \(+ 4\)
5. If \( y(15) = 25 \), \( y(20) = 34 \), \( y(25) = 42 \) and \( y(30) = 50 \), then the value of \( \Delta^3 y_0 \) is
(A) 1
(B) 2
(C) 3
(D) 0

6. The relative error of the number 8.6, if both of its digits are correct, is ________.
(A) 0.058
(B) 0.0058
(C) 0.00058
(D) 0.58

7. Using Bisection method, the root of the equation \( x^3 - 2x - 5 = 0 \) between 2 and 3 correct to two decimal places at the third iteration is
(A) 2.125
(B) 2.135
(C) 2.145
(D) 2.115

8. \( \frac{1}{h} \left( \Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + \cdots \right) = \) __________
(A) D
(B) \( \mu \)
(C) None of these
(D) E

[ Contd...]
SECTION-C

9 The second degree polynomial which satisfies the set of values (0, 1), (1, 2) and (2,1) is

(A) 1−2x+x^2
(B) 1−2x−x^2
(C) 1+2x+x^2
(D) 1+2x−x^2

10 If (2.5, 4.32), (3.0, 4.83), (3.5, 5.27), (4.0, 5.47) and (4.5, 6.26), then
\[ \Delta^4 y_{-2} = \]

(A) 0.5
(B) 1
(C) −1
(D) 0

11 An approximate value of \( \pi \) is given by 3.1428571 and its true value is 3.1415926, then the relative error is

(A) −0.0004
(B) −0.00403
(C) None of these
(D) −0.000403
12 The absolute error in the product of two numbers \(56.54 \pm 0.005\) and \(12.4 \pm 0.05\) is

(A) 1.889
(B) 0.889
(C) None of these
(D) 2.889

13 Using Newton-Raphson method, the real root of the equation \(\sin x = 1 - x\) correct up to three decimal places is

(A) 0.0511
(B) 0.511
(C) 0.5251
(D) 0.521

14 Using method of false-position, the real root of the equation \(2x - \log_{10} x - 7 = 0\) correct up to two decimal places is

(A) 3.78
(B) 4.78
(C) None of these
(D) 2.78
The table gives the value of \( f(x) \), then \( f(32) = \ldots \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = f(x) )</td>
<td>0.2707</td>
<td>0.3027</td>
<td>0.3386</td>
<td>0.3794</td>
</tr>
</tbody>
</table>

(Using Gauss’s Forward Difference Interpolation Formula)

(A) 0.3155  
(B) 0.3145  
(C) 0.3135  
(D) 0.3165

The sum of the numbers 0.1532, 15.45, 0.000354, 305.1, 8.12, 143.3, 0.0212, 0.643 and 0.1734 is \ldots  
(Where each number is correct to the digits given)

(A) 472.95 ± 0.13  
(B) 472.95 ± 0.15  
(C) None of these  
(D) 472.95 ± 0.14

Using Bisection method, the real root of the equation \( x^3 - 2x - 5 = 0 \) correct up to four decimal places is

(A) 2.1946  
(B) 2.0946  
(C) None of these  
(D) 2.2946
The table gives the value of \( f(x) \), then \( f(1.91) = \) ________.

<table>
<thead>
<tr>
<th>( x )</th>
<th>1.7</th>
<th>1.8</th>
<th>1.9</th>
<th>2.0</th>
<th>2.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>5.47</td>
<td>6.05</td>
<td>6.68</td>
<td>7.39</td>
<td>8.17</td>
</tr>
</tbody>
</table>

(A) 7.91  
(B) 9.91  
(C) None of these  
(D) 5.91