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 on your answer book.

Name of the Examination :
B. Sc. (SEM. 3)

Name of the Subject :
MATHEMATICS - MTH - 303

Subject Code No. : 3 0 1 6

Seat No. :

Student's Signature

(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 तर संग्रहणी अन् पत्री सुचनाओ उपेक्षे
O.M.R. Sheet-वी पण वापर वेला पालित का रहे.

Important instructions to fillup O.M.R. Sheet are given on back side of the provided O.M.R. Sheet.
1 \[ \Delta[(x+1)(x+2)] = \underline{\quad} \]

(A) \[ 2x + 4 \]
(B) \[ 4x + 4 \]
(C) \[ 4 - 2x \]
(D) \[ 2x - 4 \]

2 If \((0, 12), (1, 25)\) and \((2, 4)\), then \[ \nabla^2 f(x_2) = \underline{\quad} \]

(A) \[ -54 \]
(B) \[ -34 \]
(C) \[ 34 \]
(D) \[ 54 \]

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

(A) None of these

(B) \[ \frac{\text{Percentage error}}{\text{True value}} \]

(C) \[ \frac{\text{Absolute error}}{\text{True value}} \]

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

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

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

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

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

5 \[ \frac{1}{h} \left( \Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + \ldots \right) = \]

(A) None of these
(B) E
(C) D
(D) μ

6 If \( y(15)=25, \ y(20)=34, \ y(25)=42 \) and \( y(30)=50 \), then the value of \( \Delta^3 y_0 \) is

(A) 3
(B) 0
(C) 1
(D) 2

7 The relative error of the number 8.6, if both of its digits are correct, is _________.

(A) 0.00058
(B) 0.58
(C) 0.058
(D) 0.0058

8 Using Bisection method, a 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) 2.145
(B) 2.115
(C) 2.125
(D) 2.135
9 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) None of these
(B) 2.78
(C) 3.78
(D) 4.78

10 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) \(1 - 2x - x^2\)

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

(A) \(-1\)

(B) 0

(C) 0.5

(D) 1
12 An approximate value of $\pi$ is given by $3.1428571$ and its true value is $3.1415926$, then the relative error is

(A) None of these

(B) $- 0.000403$

(C) $- 0.0004$

(D) $- 0.00403$

13 The absolute error in the product of two numbers $56.54 \pm 0.005$ and $12.4 \pm 0.05$ is

(A) None of these

(B) $2.889$

(C) $1.889$

(D) $0.889$

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

(A) $0.5251$

(B) $0.521$

(C) $0.0511$

(D) $0.511$

DF-3016_B ] 6 [ Contd...
The table gives the value of \( f(x) \), then \( f(1.91) = \) \[ \text{__________} \].

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

The table gives the value of \( f(x) \), then \( f(32) = \) \[ \text{______} \].

<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) 0.3135  
(B) 0.3165  
(C) 0.3155  
(D) 0.3145
17 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 ________. (Where each number is correct to the digits given)

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

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

(A) None of these
(B) 2.2946
(C) 2.1946
(D) 2.0946