II Semester B.C.A. Examination, May/June 2018  
(CBCS) (2014-15 and Onwards) (F+R)  
COMPUTER SCIENCE  
BCA 205 : Numerical and Statistical Methods  

Time : 3 Hours  
Max. Marks : 100  

**Instruction** : Answer all Sections.  

**SECTION - A**  

1. Answer any ten questions of the following :  

1) Subtract .9432E-4 from .5452E-3.  

2) Mention four types of errors.  

3) Write the formula for secant method.  

4) Construct the difference table for the following :  

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>f(x)</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

5) Write the Newton backward interpolation formula.  

6) Explain Cholesky method of solving the linear equation of the form AX = B.  

7) Write the Taylor's series expansion of f(x).  

8) Write the formula for Harmonic mean for discrete series.  

9) Find the coefficient of variation, given: arithmetic mean is 9.58 and standard deviation is 14.20.  

10) Write the formula to calculate the coefficient of correlation for two groups.  

11) Find the probability of getting a head in tossing a coin.  

12) If \(P(B) = \frac{1}{4}\) and \(P(A \cap B) = \frac{3}{14}\), find \(P(A/B)\).  

P.T.O.
II. Answer any six of the following:

13) Find a real root of the equation \(x^3 - 4x - 9 = 0\) using bisection method in four stages lies in the interval \((2, 3)\).

14) Find \(f(1.4)\) from the following data:

<table>
<thead>
<tr>
<th>(x)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f(x))</td>
<td>10</td>
<td>26</td>
<td>58</td>
<td>112</td>
<td>194</td>
</tr>
</tbody>
</table>

15) Find the polynomial of which satisfies the following data:

<table>
<thead>
<tr>
<th>(x)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f(x))</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>18</td>
<td>27</td>
</tr>
</tbody>
</table>

16) Evaluate \(\int_0^6 \frac{dx}{1 + x^2}\) by Simpson's \(\left(\frac{3}{8}\right)^n\) rule by taking \(h = 1\).

17) By using Trapezoidal rule, evaluate \(\int_0^1 \frac{dx}{1 + x}\). Divide \((0, 1)\) into six equal parts.

18) Solve the system of linear equation by using Crout's LU decomposition method:

\[
\begin{align*}
x_1 + x_2 + x_3 &= 1 \\
4x_1 + 3x_2 - x_3 &= 6 \\
3x_1 + 5x_2 + 3x_3 &= 4
\end{align*}
\]

19) Solve the system of linear equations by Cholesky method:

\[
\begin{align*}
x_1 + 2x_2 + 3x_3 &= 5 \\
2x_1 + 8x_2 + 22x_3 &= 6 \\
3x_1 + 22x_2 + 82x_3 &= -10
\end{align*}
\]

20) Determine the single-precision and double precision machine representation of 492.788125.
SECTION – C

III. Answer any six of the following: (6x5=30)

21) Solve the system of equations by Gauss-elimination method:

\[ \begin{align*}
x + 2y + z &= 3 \\
2x + 3y + 3z &= 10 \\
x + 10y - z &= -22
\end{align*} \]

22) Solve the following system of equations by Gauss-Seidel method:

\[ \begin{align*}
x + y + 54z &= 110 \\
27x + 6y - z &= 85 \\
6x + 15y + 2z &= 72
\end{align*} \]

23) Find the largest eigen value and the corresponding eigen vector of

\[ A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \]. Do only five steps.

24) Use Taylor’s series method to find \( y \) at \( x = 0.2 \) considering terms upto the third degree given \( \frac{dy}{dx} = x^2 + y^2 \) and \( y(0) = 1 \).

25) Solve \( \frac{dy}{dx} = y - x^2, \ y(0) = 1 \) by Picard’s method upto the third approximation.

Hence find the value of \( y(0.2) \).

26) By using Runge-Kutta method of 4th order, solve \( \frac{dy}{dx} = x + y^2, \ y(0) = 1 \) for \( x = 0.2 \).

27) Find the Arithmetic Mean (AM) from the following data by step deviation:

<table>
<thead>
<tr>
<th>Marks</th>
<th>0 – 10</th>
<th>10 – 20</th>
<th>20 – 30</th>
<th>30 – 40</th>
<th>40 – 50</th>
<th>50 – 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Students</td>
<td>10</td>
<td>5</td>
<td>30</td>
<td>25</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

28) State the prove Baye’s theorem.
IV. Answer any four of the following: (4x5=20)

29) Find the standard deviation from assumed mean method for the following data:

<table>
<thead>
<tr>
<th>C.I</th>
<th>0 - 10</th>
<th>10 - 20</th>
<th>20 - 30</th>
<th>30 - 40</th>
<th>40 - 50</th>
<th>50 - 60</th>
<th>60 - 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>1</td>
<td>4</td>
<td>17</td>
<td>45</td>
<td>26</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

30) Find the coefficient of skewness for the following data:

<table>
<thead>
<tr>
<th>Variable</th>
<th>0 - 5</th>
<th>5 - 10</th>
<th>10 - 15</th>
<th>15 - 20</th>
<th>20 - 25</th>
<th>25 - 30</th>
<th>30 - 35</th>
<th>35 - 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>13</td>
<td>21</td>
<td>16</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

31) Find the rank correlation coefficient for the following data:

<table>
<thead>
<tr>
<th>x</th>
<th>65</th>
<th>45</th>
<th>67</th>
<th>38</th>
<th>48</th>
<th>50</th>
<th>26</th>
<th>47</th>
<th>70</th>
<th>62</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>64</td>
<td>40</td>
<td>58</td>
<td>46</td>
<td>52</td>
<td>49</td>
<td>38</td>
<td>47</td>
<td>59</td>
<td>60</td>
</tr>
</tbody>
</table>

32) If A and B are two events with $P(A) = \frac{5}{8}$, $P(B) = \frac{3}{8}$ and $P(A \cup B) = \frac{1}{8}$. Find:

i) $P(\text{not } A)$, ii) $P(\text{not } B)$, iii) $P(A/B)$, iv) $P(B/A)$.

33) If A and B are two events then prove that $P(A/B) = \frac{P(A) - P(A \cap B)}{1 - P(B)}$, where $P(B) \neq 1$.

34) Obtain the function of the normal probability curve to the following data:

<table>
<thead>
<tr>
<th>X_i</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>f_i</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>