JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Sc-III Semester (Mathematics and Computing)

COURSE CODE (CREDITS):24BS1MA311 (03) MAX. MARKS: 35

COURSE NAME: Introduction to Numerical Computing

COURSE INSTRUCTOR: NKT MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

<table>
<tr><th>Q.No</th><th>Question</th><th>CO</th><th>Marks</th></tr>
<tr><td>Q1</td><td>Round off the number 27.8793 to four significant figures and then find absolute, relative and percentage error.</td><td>CO-1</td><td>3</td></tr>
<tr><td>Q2</td><td>Find the root of $\tan x + x = 0$ correct to three decimal places using bisection method. The root of the equation lies between 2 and 2.1</td><td>CO-1</td><td>3</td></tr>
<tr><td>Q3</td><td>Using Newton-Raphson formula, establish an iterative formula to calculate the cube root of positive real number N.</td><td>CO-2</td><td>3</td></tr>
<tr><td>Q4</td><td>Evaluate $y = e^{2x}$ for $x = 0.05$ using the following table
<table>
<tr><td>x</td><td>0</td><td>0.10</td><td>0.20</td><td>0.30</td><td>0.40</td></tr>
<tr><td>$y = e^{2x}$</td><td>1</td><td>1.2214</td><td>1.4918</td><td>1.8221</td><td>2.2255</td></tr>
</table></td><td>CO-3</td><td>3</td></tr>
<tr><td>Q5</td><td>The following data gives the melting point of an alloy of lead and zinc, where T is the temperature and P is the percentage of lead in the alloy
<table>
<tr><td>P(%)</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td></tr>
<tr><td>T</td><td>180</td><td>204</td><td>226</td><td>250</td><td>276</td><td>304</td></tr>
</table>
Find the melting point of the alloy containing 84 % lead.</td><td>CO-3</td><td>4</td></tr>
<tr><td>Q6</td><td>Use Lagrange's interpolation formula to find $f(0.35)$ from the following data
<table>
<tr><td>x</td><td>0</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td></tr>
<tr><td>$f(x)$</td><td>1</td><td>1.1052</td><td>1.2214</td><td>1.3499</td><td>1.4918</td></tr>
</table></td><td>CO-3</td><td>5</td></tr>
<tr><td>Q7</td><td>Compute by Simpson's one-third rule, the integral $\int_0^1 x^2(1-x)dx$ correct to three decimal places taking step length of 0.1.</td><td>CO-4</td><td>4</td></tr>
<tr><td>Q8</td><td>Find $\frac{dy}{dx}$ at $x = 0.5$ of the function $y = f(x)$, tabulated below
<table>
<tr><td>x</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td><td>0.8</td></tr>
<tr><td>$f(x)$</td><td>1.5836</td><td>1.7974</td><td>2.0442</td><td>2.3275</td><td>2.6511</td></tr>
</table></td><td>CO-4</td><td>5</td></tr>
<tr><td>Q9</td><td>Using Runge-Kutta method, find the approximate value of y for $x = 0.1$, if
$\frac{dy}{dx} = x + y^2$, $y(0) = 1$.
Fix your calculator to 5 decimal places and take h as 0.1.</td><td>CO-5</td><td>5</td></tr>
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