



R22 Regulation

Subject code:4B2AA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech II Semester Supplementary Examinations, January 2026

NUMERICAL METHODS AND APPLICATIONS

(CE)

Maximum Marks: 60

Date: 08.01.2026

Duration: 3 hours

- Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

Table with 4 columns: Question ID, Question Text, Marks, CO, BTL. Contains 10 questions (a-j) related to numerical methods.

Part-B

Table with 4 columns: Question ID, Question Text, Marks, CO, BTL. Contains 2 questions (a-b) for Part B.

OR

Table with 4 columns: Question ID, Question Text, Marks, CO, BTL. Contains 2 questions (3-4) for Part B, including a population data table and a function table.

OR																		
5	a) Apply Gauss forward Interpolation formula to find $f(3.75)$ from the following table <table border="1" style="margin: 10px auto;"> <tr> <td>x</td> <td>2.5</td> <td>3.0</td> <td>3.5</td> <td>4.0</td> <td>4.5</td> <td>5.0</td> </tr> <tr> <td>f(x)</td> <td>24.145</td> <td>22.043</td> <td>20.225</td> <td>18.644</td> <td>17.262</td> <td>16.047</td> </tr> </table> b) Given that $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$ and $\sin 60^\circ = 0.8660$ find $\sin 52^\circ$ using Newton's forward interpolation formula.	x	2.5	3.0	3.5	4.0	4.5	5.0	f(x)	24.145	22.043	20.225	18.644	17.262	16.047	5M	2	3
x	2.5	3.0	3.5	4.0	4.5	5.0												
f(x)	24.145	22.043	20.225	18.644	17.262	16.047												
6	a) Evaluate $\int_0^2 e^{-x^2} dx$ using Simpson's Rule taking $h=0.5$. b) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ using Trapezoidal rule with 6 sub intervals.	5M 5M	3	3														
OR																		
7	Find $\frac{dy}{dx}$ at $x=1.76$ and 1.72 from the following table <table border="1" style="margin: 10px auto;"> <tr> <td>x</td> <td>1.72</td> <td>1.73</td> <td>1.74</td> <td>1.75</td> <td>1.76</td> </tr> <tr> <td>y</td> <td>0.17907</td> <td>0.17728</td> <td>0.17552</td> <td>0.17377</td> <td>0.17204</td> </tr> </table>	x	1.72	1.73	1.74	1.75	1.76	y	0.17907	0.17728	0.17552	0.17377	0.17204	10M	3	2		
x	1.72	1.73	1.74	1.75	1.76													
y	0.17907	0.17728	0.17552	0.17377	0.17204													
8	Given $\frac{dy}{dx} = x + y^2$, $y(0) = 1, h=0.1$ calculate $y(0.2)$ using Runge-Kutta Method.	10M	4	2														
OR																		
9	Apply the method of modified Euler's, to find approximate value of y when $x=0.2$ in steps of 0.1 , given that $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$.	10M	4	3														
10	Solve the equation $u_{xx} + u_{yy} = 0$ for the square mesh with boundary values as shown, <div style="text-align: center; margin: 10px 0;"> </div>	10M	5	2														
OR																		
11	Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5, t \geq 0$ given that $u(x, 0) = 20$, $u(0, t) = 0$, $u(5, t) = 100$. Compute u for the time-step with $h = 1$ by the Crank-Nicholson method.	10M	5	3														