GATE

GATE ALL BRANCHES CRASH COURSE 2025

ENGINEERING MATHEMATICS
Numerical Techniques

DPP

Q1 The root of the equation $x^2 - 3\sin x + 2\ln(x+1) = 3.5$ evaluated using Newton-Raphson method with initial guess $x_o = 2$ is _____ (Correct to three decimal places).

Q2 Which of the following interval consists of a root for the equation
$(x+4)^3 - e^{1.92x} + 5 \cdot \cos\frac{x}{3} = 9.$
(A) (0, 1) (B) (1, 2)
(C) (2, 3) (D) (3, 4)

Q3 The order of convergence of secant method is ____.
(Round off to two decimal places).

Q4 The real root of the equation $3\ln x + 4x = 5$ is _____.
(Round off to two decimal places).

Q5 The critical frequencies of oscillation 'x' of a loaded spring is given by $x^3 - 3.250x^2 + x - 0.063 = 0$.
If initial guess is '3' in newton-Raphson method; then x =
(A) 2.9143 (B) 1.7864
(C) 3.4261 (D) 3.4261

Q6 Three variables x, y, z are connected by the following equations.
6.2x + 7.9y + 12.6z = 18.0
7.5x + 4.8y + 4.8z = 6.39
13x + 3.5y – 13z = – 17.4
Value of 'z' evaluated using gauss elimination is _____.

Q7 A car starts from rest and it's speed is measured for first '6' seconds as below.

Time t(s):	0	1	2	3	4	5	6
Speed v(m/s)	0	2.5	5.5	8.75	12.5	17.5	24.0

The distance travelled in 1st 6-seconds using Simpson's 1/3 rd rule is _____ m. (Round off to three decimal places).

Q8 For $0 < x_1 < x_2$, the value of $\int_{x_1}^{x_2} e^x dx$ is calculated using analytical integration & trapezoidal rule. If 'I' is the analytical value & 'T' is the trapezoidal value then (Assume single step for trapezoidal rule)
(A) I > T
(B) T > I
(C) T = I
(D) Can't decide until x_1 and x_2 are known

Q9 The difference between the value evaluated using Simpson's 1/3rd rule and analytical integration of
$\int_{2.946}^{3.946} (2.786x^2 + 9.81x + 4.8967)dx$
where number of subintervals in Simpson's 1/3rd rule is 8 is _____.

Q10 The order of the fitting polynomial in Simpson's 3/8th rule is
(A) 1 (B) 2
(C) 3 (D) 4

Q11 For the differential equation,
$\frac{dy}{dx} = 3(1+x) - y$ Where $y(1) = 4.$
The value of y(1.2) evaluated using modified-Euler method with step size of h = 0.2 is _____.

Q12 For the equation $\frac{dy}{dx} = 3(1+x) - y$, if the exact solution is given by $y = 3x + e^{1-x}$, then the %
error in the value of y(1.6) evaluated using forward Euler method with y(1) = 4 and h = 0.2 is _____.

Q13

Using Runge-kutta 4th order method, the value of y(0.1) for the DE $\frac{dy}{dx} = y - x$ with y(0) = 2 and step size = 0.1 is . (Round off to two decimal places)

Q14 The order of error of the solution at a point for a 1st order DE evaluated by taking step size 'h' and using Runge-Kutta 4th order method is of $O(h^k)$. The value of 'k' is _____.

(A) 4 (B) 5

(C) 6 (D) 3

Q15 For the DE with $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) =1. The value at x = 0.2 by taking h = 0.2 and using R-k 4th order method is _____ (Round off to two decimal places).

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Answer Key

Q1	2.001~2.008
Q2	(D)
Q3	1.6~1.64
Q4	1.1~1.18
Q5	(A)
Q6	1~1.4
Q7	58~59
Q8	(B)
Q9	0~0
Q10	(C)
Q11	4.2~4.6
Q12	0.5~0.8
Q13	2.1~2.4
Q14	(B)
Q15	1.05~1.29