

- i) $x_{n+1} = x_n + \frac{N}{x_n}$
 ii) $x_{n+1} = \frac{1}{2} \left(x_n + \frac{N}{x_n} \right)$
 iii) $x_{n+1} = \frac{1}{2} \left(x_n - \frac{N}{x_n} \right)$
 iv) $x_{n+1} = \frac{1}{3} \left(2x_n + \frac{N}{x_n^2} \right)$

- f) Varies type of Runge-Kutta methods are classified according to their _____.
 i) degree
 ii) order (01)
 iii) rank
 iv) none of these
- g) True/False : The second order Runge-Kutta formula is Euler's method. (01)
 h) True/False : Newton Raphson method is applicable to the solution of both algebraic and transcendental method. (01)
 i) Write Milne's corrector formula. (01)
 j) Which formula we use to derive Trapezoidal rule ? (01)
 k) Write formula of Euler's Modified method. (02)
 l) Write Newton's Iterative formula to find value of $\sqrt[3]{N}$. (02)

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions. [14]

- a) Derive General Quadrature formula. (07)
 b) Find area bounded by curve and x -axis from the following table from $x = 7.47$ to $x = 7.52$ (07)

x	7.47	7.48	7.49	7.50	7.51	7.52
y	1.93	1.95	1.98	2.01	2.03	2.06

Q-3 Attempt all questions. [14]

- a) Find the 1st and 2nd order derivatives of $f(x)$ at $x = 1.05$ and $x = 1.25$ (08)

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
$f(x)$	1.00	1.02470	1.04881	1.07238	1.90544	1.11803	1.14017

- b) Obtain $f'(90)$ using Sterling's formula from the following table: (06)

x	60	75	90	105	120
$f(x)$	28.2	38.2	43.2	40.9	37.7

Q-4 Attempt all questions. [14]

- a) Derive differentiation formula based on Newton's forward interpolation formula. (07)
 b) Derive Euler Maclaurin Sum formula. (07)

Q-5 Attempt all questions. [14]

- a) Find a real root of $\sin x = 1 + x^3$, correct to three decimal places using Newton Raphson method. (05)
 b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ Rule. Take $h = 1$. (05)
 c) Find a positive root of the equation $xe^x = 1$ which lies between 0 and (04)



