

Qp code: 60865

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- (b) Find the Pade's approximant $R_{5,4}$ for the function

$$f(x) = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \frac{x^9}{9}$$

Express the above rational function $R_{5,4}$ into continued fraction form

$x \backslash y$	0	1	2
0	1	3	7
1	3	6	11
2	7	11	17

(7+7)

6. (a) Determine the linear and quadratic spline data (1,-8) (2,-1), (3,18). Find also approximate values of $y(2.5)$.
 (b) Using Lagrange interpolation formula for one variable, derive Newton's bivariate interpolation polynomial and also estimate $f(0.5, 0.5)$ using Newton's bivariate polynomial. (7+7)
7. (a) Determine the weight A_k and the abscissas x_k and the remainder R in the quadrature formula $\int_a^b W(x)f(x)dx = \sum_{k=1}^n A_k f(x_k) + R$ so that the formula becomes exact for polynomials of highest possible degree. Hence discuss the cases for $W(x) = 1$ and $W(x) = \frac{1}{\sqrt{1-x^2}}$, when $n = 2$ and $n = 3$
 (b) Obtain the approximate value of the integral $\int_{-1}^1 (1-x^2)^{\frac{1}{2}} \cos x dx$ using
 i. Gauss Legendre integration method for $n = 2$ and 3.
 ii. Gauss Chebyshev integration method for $n = 2$ and 3. (7+7)
8. (a) Evaluate the double integral $\int_0^1 \int_0^{1+x^2} xy dy dx$ by using composite trapezoidal rule with five equal increments $\Delta x = 0.2$ along x -axis and five varying increments Δy bounded by the lines $y = 0$ and the parabolic curve $y = x^2 + 1$.
 (b) Derive Simpson's rule for $\int_a^b \int_c^d f(x, y) dy dx$ for two sub interval. (7+7)