KN-5864

KN-5864 Seat No._____

B. Sc. (Sem. III) Examination

November / December - 2014

Mathematics : Paper - CC-MATH-302

(Numerical Analysis)

Time : 3 Hours] [Total Marks : 70

Instructions : (1) This question paper contains four questions.
(2) All questions are compulsory.
(3) Figures to the right indicate mark of the corresponding question.

1 (a) Discuss G-N Forward Interpolation formula for the function $y = f(x)$. **8**

(b) Attempt any two : **10**

(1) Evaluate : $\Delta e^{2x} \log 3x$

(2) Express $p(x) = x^3 + 4x^2 - 7x - 15$ in the form of $x^{[r]}$ where $h = 2$, also find $p(5)$.

(3) Find the error and correct the wrong figure in the following functional values : 2, 5, 10, 18, 26, 37, 50.

2 (a) State and prove Newton's Divided Difference formula. **8**

OR

(a) Prove that the value of a divided difference is independent of order of arguments. **8**

(b) Attempt any **two** : **10**

(1) If $f(x)=x^3-x$ then find $f(3,4,5,6)$.

(2) Find the value of y when $x=10$, using following table by Lagrange Interpolation formula :

x:	5	6	9	11
y:	12	13	14	16

(3) Given that $f(0)=8$, $f(1)=68$, $f(5)=123$, by using Newton's divided difference formula, find the value of $f(2)$.

3 (a) Derive Stirling's Interpolation formula. **8**

OR

(a) Derive Gauss Backward Interpolation formula. **8**

(b) Attempt any **two** : **10**

(1) Prove that $\sqrt{1+\delta^2\mu^2}=1+\frac{\delta^2}{2}$

(2) Prove that $e^x=\left(\frac{\Delta^2}{E}\right)e^x\frac{Ee^x}{\Delta^2 e^x}$

(3) Prove that $\delta^n y_x=\sum_{k=0}^{n}(-1)^k\frac{n!}{k!(n-k)!}y_{x+\frac{n}{2}-k}$

4 (a) Discuss Taylor's series method for solving the differential equation $\frac{dy}{dx} = f(x, y)$, with initial condition $y(x_0) = y_0$. **6**

OR

(a) State and prove Simpson's 1/3 rule. **6**

(b) Attempt any **two** : **10**

(1) Prove that $Q_{31}(1) = \frac{h}{24}\{-1, 13, 13, -1\}$.

(2) Using Picard's method, obtain a solution upto third approximation of the equation $\frac{dy}{dx} = y + x$ where $y = 1$ when $x = 0$.

(3) Apply Trapezoidal rule to estimate the value of the integral $\int_1^2 \frac{dx}{x+1}$ by dividing the interval $[1, 2]$ into 10 equal parts.
