



**GAS-3163**

Seat No. \_\_\_\_\_

**B. Sc. (Sem. - III) Examination**

**November / December - 2013**

**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 difference interpolation formula for the function  $f(x)=0$ . 8  
(b) Attempt any **two** of the following. 10
- (1) Express  $p(x) = x^3 + 4x^2 - 7x - 15$  in the form of  $x^{[r]}$ , where  $h=2$ . Also find  $p(5)$ .
- (2) Prove in usual notation (a)  $E^{1/2} = \mu + \frac{1}{2}\delta$   
(b)  $\Delta^2(3e^x) = 3(e^h - 1)^2 e^x$
- (3) The value of  $x$  and  $y$  are given as below, find the value of  $y$  at  $x = 5.5$

X	5	6	9	11
Y	15	13	14	16

- 2 (a) State and prove Newton Divided Difference Formula. 8

OR

- (a) Discuss Bessel's central difference interpolation formula for the function  $y = f(x)$ .  
(b) Attempt any two. 10

(1) Find third degree polynomial

$$f(x), \text{ if } f(1) = 3, f(1, 2) = 5, f(1, 2, 4) = 7, f(1, 2, 4, 7) = 3$$

Then find  $f(x)$ .

(2) Prove that the Divided difference are symmetric for all values of  $x$ .

(3) Find the value of the factorial polynomial

$$P(u) = 3u^{[4]} - u^{[2]} + u^{[1]} - 7 \text{ at } u = 6$$

- 3 (a) Discuss the Euler's method for solving the differential equation  $\frac{dy}{dx} = f(x, y)$ , with initial condition  $y = y_0$  when  $x = x_0$ . 8

OR

- (a) State and prove Simpson's one-third Rule.  
(b) Attempt any two. 10

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

(2) Using Picard's method to find the second approximation of  $y$  at  $x = 0.2$  given that

$$y=1 \text{ when } x=0 \text{ and } \frac{dy}{dx} = x - y.$$

(3) State and prove Trapezoidal Rule.

- 4 (a) Derive Lagrange's interpolation formula for unequal interval. 8

OR

- (a) Discuss Gauss backward central difference interpolation formula for the function  $y=f(x)$ .  
(b) Attempt any two. 8
- (1) Find third degree polynomial  $p(x)$  which passes through the points (0,1), (1,5), (2,21), (3,55) and (4,113)

(2) Find the value of  $\Delta^2 \left( \frac{a^{2x} + a^{4x}}{(a^2 - 1)^2} \right)$ .

- (3) Evaluate  $\left( \frac{\Delta^2}{E} \right) x^3$  when  $x$  vary by a constant increment 1.
-