Roll No. .....

BCA–504(N)

B. C. A. (Fifth Semester)
EXAMINATION, Dec., 2014

(New Course)

Paper Fourth

NUMERICAL METHODS

Time : Three Hours] [*Maximum Marks : 75*

Note : Section A is compulsory. Attempt any *seven* questions from Section B and *one* question from Section C.

Section—A

1. Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$. With $y(0) = 1$ at $x = 0.2,\ 0.4$. 8

2. (a) Employ Striling formula to compute $y_{12.2}$ from the following table $(y_x = 1 + \log_{10} \sin x)$: 4

x^0	$10^5\, u_x$
10	23,967
11	28,060
12	31,788
13	35,209
14	38,368

(b) Compute the value of $\int_{0.2}^{1.4} (\sin x - \log x + e^x)\, dx$ using Simpson's 3/8th rule. 4

Section—B

3. Find by Newton's method, the real root of the equation $3x = \cos x + 1$, correct to four decimal places. 6

4. Find the missing term in the following table using interpolation : 6

x	y
0	1
1	3
2	9
3	—
4	81

5. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule. 6

6. Using Gauss elimination method, solve the equations : 6

$$x + 2y + 3z - u = 10$$
$$2x + 3y - 3z - u = 1$$
$$2x - y + 2z + 3u = 7$$
$$3x + 2y - 4z + 3u = 2$$

7. Find the value of y for $x = 0.1$ by Picard's method, given that : 6

$$\frac{dy}{dx} = \frac{y - x}{y + x}, y(0) = 1$$

8. Use Gauss's forward formula to evaluate y_{30}, given that : 6

$$y_{21} = 18.4708$$
$$y_{25} = 17.8144$$
$$y_{29} = 17.1070$$
$$y_{33} = 16.3432$$

and

$$y_{37} = 15.5154$$

9. Find the missing y_x values from the first differences provided : 6

y_x	Δy_x
0	0
—	1
—	2
—	4
—	7
—	11

10. Determine $f(x)$ as a polynomial in x for the following data : 6

x	$f(x)$
– 4	1245
– 1	33
0	5
2	9
5	1335

11. Apply Gauss-Seidel iteration method to solve the equations : 6

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

12. Using Euler's method, find an approximate value of y corresponding to $x = 1$, give that $dy/dx = x + y$ and $y = 1$ when $x = 0$. 6

Section—C

13. Given the table : 17

x	$\log x$
310	2.49136
320	2.50515
330	2.51851
340	2.53148
350	2.54407
360	2.55630

Find the value of log 337.5 by Everett's formula.

14. Employ Bessel's formula to find the value of F at $x = 1.95$, given that : 17

x	F
1.7	2.979
1.8	3.144
1.9	3.283
2.0	3.391
2.1	3.463
2.2	3.997
2.3	4.491

Which other interpolation formula can be used here ? Which is more appropriate ? Give reasons.

15. Find the maximum and minimum value of y from the following data : 17

x	y
−2	2
−1	−0.25
0	0
1	−0.25
2	2
3	15.75
4	56

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