



15530/E 642

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**V Semester B.A./B.Sc. Degree Examination,  
October/November 2014**

**Mathematics (Optional)**

**(KUD – Repeaters)**

**Paper – II : NUMERICAL METHODS**

Time : 3 Hours]

[Max. Marks : 80

**Instructions :** 1) Answer **all** questions.

2) Students are allowed to use Scientific Calculators.

I. Answer **any five** questions : **(5 × 2 = 10)**

1. Explain “Fixed point Iteration method” to find the roots of the equation  $f(x) = 0$ .
2. Find the real root of  $x^3 - 4x - 9 = 0$  using bisection method in two stages.
3. Solve by Gauss-Elimination method  $5x - 2y = 2.5$ ,  $10x + 8y = 35$ .
4. Explain Gauss Jordan method to solve the equations :  
 $a_1x + b_1y = c_1$ ;  $a_2x + b_2y = c_2$ .
5. With usual notation prove that  $E = 1 + \Delta$ .
6. State Newton Gregory formula for backward difference.
7. Write the normal equations of a straight line  $y = ax + b$ .
8. State Simpson’s 3/8th rule to evaluate  $\int_a^b f(x) dx$ .



II. Answer **any eight** questions :

**(8 × 5 = 40)**

9. Find the real root for the equation  $x \log_{10} x = 1.2$  in (2, 3) using bisection method in five stages.

10. Find the real root of the equation  $x^3 - 5x + 1 = 0$  using secant method in four stages.

11. Explain Newton-Raphson method to find the real root of the equation  $f(x) = 0$ .

12. Solve by Gauss-Elimination method :

$$x + 2y + z = 3; \quad 2x + 3y + 3z = 10; \quad 3x - y + 2z = 13.$$

13. Solve by Gauss-Jordan method :

$$x + 2y + z = 8; \quad 2x + 3y + 4z = 20; \quad 4x + 3y + 2z = 16.$$

14. Derive Newton's Gregory forward interpolation formula.

15. The following data are taken from the steam table :

Temp°C ( $x$ )	140	150	160	170	180
Pressure ( $y$ )	3.685	4.854	6.302	8.076	10.225

Find the pressure at temperature 175°C.

16. Find the missing values from the table :

$x$	7	9	11	13	15	17
$y$	32	78	-	144	-	381

17. Find the best fitting straight line to the data :

$x$	0	5	10	15	20	25	30
$y$	10	14	19	25	31	36	39

18. Solve by Gauss-Seidel method :

$$10x + 2y + z = 9; \quad x + 10y - z = -22; \quad -2x + 3y + 10z = 22.$$



19. Find  $f'(1.1)$  from the table :

$x$	1	1.2	1.4	1.6	1.8	2.0
$y$	0.00	0.128	0.544	1.296	2.432	4.00

20. Evaluate  $\int_0^1 \frac{dx}{1+x}$  by trapezoidal rule by dividing eight subintervals.

III. Answer **any three** of the following : **(3 × 10 = 30)**

21. (a) Explain “Bisection method” to find real root of equation  $f(x) = 0$ .  
(b) Solve the equation  $2x - 5 = 3 \sin x$  by Newton–Raphson method corrected to four decimal places.

22. (a) Explain Gauss-Elimination method to solve  
 $a_1x + b_1y + c_1z = d_1$ ;  $a_2x + b_2y + c_2z = d_2$ ;  $a_3x + b_3y + c_3z = d_3$ .  
(b) Solve by using Gauss-Jordan method :  
 $2x - 3y + z = -1$ ;  $x + 4y + 5z = 25$ ;  $3x - 4y + z = 2$ .

23. (a) State and prove Lagrange’s interpolation formula for unequal intervals.  
(b) Find the cubic polynomial which takes the following values :

$x$	0	1	2	3
$y$	1	2	1	10

24. (a) Derive general quadrature formula for equidistant ordinates.  
(b) Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  dividing the interval  $[0, 1]$  into six equal parts and find the value of  $\pi$ .

25. (a) With usual notation prove that  $u_x = u_{x-1} + \Delta u_{x-2} + \dots + \Delta^{n-1}u_{x-n} + \Delta^n u_{x-n}$ .  
(b) Express  $2x^3 - 3x^2 + 3x - 10$  and its successive differences in factorial notation.

