(b) Use Graeffe's method to solve the equation

$$x^3 - x^2 - x = 2.$$

6. (a) Solve, by Gauss - Seidal method of iteration, the equations

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110.$$

(b) Using Taylor series method, compute the value of y(0·2) correct to 3 decimal places from

$$\frac{dy}{dx} = 1 - 2xy,$$

given that y(0) = 0.

7. (a) Use Euler's method to find y(0·4) given

$$\frac{dy}{dx} = xy, \quad y(0) = 1.$$

(b) Apply the fourth order Runge - Kutta method to find y(0·2) given that

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

Register Number :

Name of the Candidate :

5 2 3 7

B.Sc. DEGREE EXAMINATION, 2008

(MATHEMATICS)

(THIRD YEAR)

(PART - III - A - MAIN)

(PAPER - V)

720. NUMERICAL METHODS AND TRIGONOMETRY

(Including Lateral Entry)

December] [Time : 3 Hours

Maximum : 100 Marks

Answer any FIVE questions.
All questions carry equal marks.

(5 × 20 = 100)

1. (a) The following table indicates the values taken from a record. Find the value of *y* at *x* = 1·05, using Newton's forward interpolation formula :

x :	1·0	1·1	1·2	1·3	1·4	1·5
y :	0·841	0·891	0·932	0·964	0·985	1·015

Turn over

(b) From the given table, compute the value of sin 38° :

x	0	10	20	30	40
sin x	0	0·17365	0·34202	0·5000	0·64279

2. (a) Using Stirling's formula, compute y(35) from the data given below :

x :	20	30	40	50
y :	512	439	346	243

(b) Construct Newton's forward interpolation polynomial for the following data. Use it to find the value of y for $x = 5$.

x :	4	6	8	10
y :	1	3	8	16

3. (a) Given the following data :

x :	0	1	2	3	4
y :	1	1	15	40	85

find $y'(0{\cdot}5)$.

(b) Evaluate :

$$\int_0^1 \frac{dx}{1 + x}$$

using

(i) Trapezoidal rule.

(ii) Simpson's one third rule by taking $h = \frac{1}{6}$.

4. (a) Solve the equation

$$x^4 - x - 9 = 0$$

for roots lying between 1 and 2 by Newton Raphson method.

(b) Use Regula - Falsi method to find the real root of $xe^x - 3 = 0$, correct to three decimal places.

5. (a) Find a real root of the equation

$$\cos x = 3x - 1$$

correct to 3 decimal places by using iteration method.

Turn over

8. (a) If

$$\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{2},$$

show that

$$xy + yz + zx = 1.$$

(b) If *n* is a positive integer, prove that

$$(1 + i)^n + (1 - i)^n = (\sqrt{2})^{n+2} \cos \frac{n\pi}{2}.$$

9. (a) Solve :

$$x^9 + x^5 - x^4 - 1 = 0.$$

(b) Show that the product of the four values of

$$\left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}\right)^{3/4} \text{ is } 1.$$

10. (a) Show that

$$\log_i i = \frac{4n + 1}{4m + 1}$$

where *m* and *n* are integers.

(b) Show to *n* terms of the series

$$\sin \alpha + \sin(\alpha + \beta) + \sin(\alpha + 2\beta) + \ldots.$$

5

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