

Register Number:

Name of the Candidate:

B.Sc. DEGREE EXAMINATION, May 2015

(MATHEMATICS)

(THIRD YEAR)

(PART - III)

720. NUMERICAL METHODS AND TRIGONOMETRY

Time: Three hours

Maximum: 100 marks

Answer any FIVE questions

(5 × 20 = 100)

1. a) Using Newton's forward interpolation formula, calculate $y(1.02)$ upto three decimal places from the following table. (10)

| | | | | | |
|---|-------|-------|-------|-------|-------|
| x | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 |
| y | 0.841 | 0.891 | 0.932 | 0.964 | 0.985 |

- b) Using Stirling's formula, find the value of y when $x=16$ for the following data. (10)

| | | | | | | | |
|---|---|--------|--------|--------|--------|--------|--------|
| x | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| y | 0 | 0.0875 | 0.1763 | 0.2679 | 0.3640 | 0.4663 | 0.5774 |

2. a) Find a polynomial which takes the following values. (10)

| | | | | | |
|---|---|----|----|----|----|
| x | 0 | 1 | 2 | 3 | 4 |
| y | 5 | 13 | 29 | 53 | 85 |

- b) Find $\frac{dy}{dx}$ at $x=1.5$ from the following table. (10)

| | | | | | | |
|---|-------|-----|--------|------|--------|------|
| x | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| y | 3.375 | 7.0 | 13.625 | 24.0 | 38.875 | 59.0 |

3. a) Using trapezoidal rule, evaluate $\int_{0.6}^2 y dx$ from the following table. (10)

| | | | | | | | | |
|---|------|------|------|------|------|------|-------|-------|
| x | 0.6 | 0.8 | 1.0 | 1.2 | 1.4 | 1.6 | 1.8 | 2.0 |
| y | 1.23 | 1.58 | 2.03 | 4.32 | 6.25 | 8.36 | 10.23 | 12.45 |

- b) Using the method of false position, find a real root of the equation $x^3 - 2x - 5 = 0$ between 2 and 3 correct to three decimal places. (10)

4. a) Using Newton Raphson method, find a real root of the equation $3x - \cos x - 1 = 0$. (10)

- b) Use Graeffe's method to solve the equation $x^3 - x^2 - 17x - 15 = 0$. (10)

5. a) Using Gauss Elimination method, solve the following system of equations. (10)

$$3x - y + 2z = 12$$

- $x+2y+3z=11$
 $2x-2y-z=2$
- b) Solve the following system of equations using Gauss-Seidal method. (10)
- $5x-y-2z=142$
 $x-3y-z=-30$
 $2x-y-3z=5$
6. a) Using Crout's method, solve the system of equations. (10)
- $x+y+z=3$
 $2x-y+3z=16$
 $3x+y-z=-3$
- b) Using Taylor series method, find $y(0.1)$ given $\frac{dy}{dx} = x^2 - y^2$, $y(0)=1$. (10)
7. a) Using Euler's method, find $y(0.2)$, $y(0.4)$ and $y(0.6)$, if y satisfies (10)
- $\frac{dy}{dx} = y - x^2$, $y(0)=1$
- b) Apply fourth order Runge-Kutta method to find an approximate value of (10)
- y when $x=0.2$, given that $y'=x+y$, $y(0)=1$.
8. a) Prove that $\sin^{-1}x + \sin^{-1}y = \sin^{-1}\{x\sqrt{1-y^2} + y\sqrt{1-x^2}\}$ (10)
- b) Solve the equation $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\left(\frac{8}{31}\right)$ (10)
9. a) Solve the equation $x^9 + x^5 - x^4 - 1 = 0$. (10)
- b) Express $\cos 8\theta$ in terms of $\sin \theta$. (10)
10. a) Find $\text{Log}(1-i)$ (10)
- b) Find the sum of n terms of the series (10)
- $\text{cosec}\theta.\text{cosec}2\theta + \text{cosec}2\theta.\text{cosec}3\theta + \text{cosec}3\theta.\text{cosec}4\theta + \dots$
