P. S. SCIENCE & H. D. PATEL ARTS COLLEGE, KADI

Internal Examination

B. Sc. Semester - II [Mark : 40

21-3-2016] **Mathematics - 122** [1-30 to 3-00

1. **[A]** state & prove De' Morve's theorem. 4

OR

[A] Express $\cos^n\theta$ and $\sin^n\theta$ inrerms of $\cos\theta$ and $\sin\theta$ resp.

[B] **Attempt any two** 6

(1) Solve $x^3 + x^2 + x + 1 = 0$ using De'Morve's theorem.

(2) Find Equation whose roots are $2\cos\frac{\pi}{7}, 2\cos\frac{3\pi}{7}, 2\cos\frac{5\pi}{7}$

(3) Prove that $\frac{\sin 7\theta}{\sin\theta} = 7 - 56\sin^2\theta + 112\sin^4\theta - 64\sin^6\theta$

2. **[A]** State and prove cauchy's root test. 4

OR

[A] State and prove De' Almbert ratio test.

[B] **Attempt any two.** 6

(1) Prove that $\tan h^{-1}z = \frac{1}{2}\log\left(\frac{1+z}{1-z}\right)$

(2) Determine the series $\frac{x}{2.3} + \frac{x^2}{3.4} + \frac{x^3}{4.5} + \ldots\ldots$ cgt OR dgt.

(3) Determine the series are cgt OR dgt.

(i) $\sum\left(1-\frac{1}{n}\right)^{n^2}$ (ii) $\sum\left(1+\frac{3}{n}\right)^{n^2}$

3. [A] State the Linear differential Equation and Obtain its general solution. 4

OR

[A] State Bernoulli's differential equation and obtain it's general solution

[B] **Attempt any two.** 6

(1) Solve : $\frac{dy}{dx} = \frac{x+2y^3}{y}$

(2) Solve : $\frac{dy}{dx} - y = xy^5$

(3) Solve : $y = 2px + p\sqrt{x}$ Where $p = \frac{dy}{dx}$

4. [A] Prove that Every square Matrix [aij] can be uniquely Expressed as sum of symmetric and skew-symmetric metrix. 4

[B] **Attempt any two.** 6

(1) Find Inverse of $A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & -1 & 1 \\ 1 & -1 & 2 \end{bmatrix}$

using Row reducation Method.

(2) Solve system using Row Reduction Method.

$2x - 3y = 1$

$2x - y + z = 2$

$3x + y - 2z = 1$

(3) Find Rank of Matrix $A = \begin{bmatrix} 3 & 2 & 0 & 1 \\ 1 & -1 & 2 & 2 \\ 0 & 1 & -3 & -1 \end{bmatrix}$