

First Internal Assessment 2018
NABADWIP VIDYASAGAR COLLEGE

MATH-H-CC-T-01

FM-10, TIME-20min.

Answer any two questions :-

$5 \times 2 = 10$

1. If $y = e^{m \sin^{-1} x}$, prove that $(1 - x^2)y_{n+2} - xy_{n+1}(2n + 1) - (m^2 + n^2)y_n = 0$. Also find $(y_n)_0$.
2. Show that I.F. of $\frac{dy}{dx} + Py = Q$ is $e^{\int P dx}$.
3. Establish the formula of $\int \sin^m x \cos^n x dx$, $m > 1, n > 1$. Hence find $\int \sin^5 x \cos^3 x dx$.
4. Write the parametric equations of the Astroid $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$. Find the exact length of the curve $x = \cos 3t, y = \sin 3t, 0 \leq t \leq \pi$.

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MATH-H-CC-T-02

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Answer any two questions :-

$5 \times 2 = 10$

1. Express z in polar form, where $z = 1 - i$. State De Moivre's theorem. Applying De Moivre's theorem, prove that $\tan 4\theta = \frac{4 \tan \theta - 4 \tan^3 \theta}{1 - 6 \tan^2 \theta + \tan^4 \theta}$.
2. State and prove fundamental theorem of arithmetic.
3. Find the rank of the matrix $\begin{pmatrix} 2 & -1 & 1 & 4 \\ 1 & 0 & 1 & 5 \\ 4 & -1 & 3 & 14 \\ 3 & -1 & 2 & 9 \end{pmatrix}$.
4. State whether the function is injective or not and surjective or not. Hence find f^{-1} , where $f: R \rightarrow R$ by $f(x) = \frac{x}{1-|x|}$.