GOVERNMENT COLLEGE OF ENGINEERING.
(An autonomous institute of Govt. of Maharashtra)

(I-II W-2016 SHU-101 ENGG. MATHS-1 [CE/MECH/ELPO/EXTC/CS/IN/IT] MARKS-15
TIME-1 HOUR
Date-07/11/2016

Q.1 Attempt any five:- **(15)**

a) Expand $\sin^5\theta$ in a series of sines of multiples of θ.

b) If $2\cos\theta = x + \frac{1}{x}$ and $2\cos\phi = y + \frac{1}{y}$. Prove that one value of $x^p y^q + \frac{1}{x^p y^q}$ is $2\cos(p\theta + q\phi)$.

c) Find the general value of $Log_{(-3)}(-2)$.

d) Use Demoiver 's theorem to find all roots of the equation $x^6 + 2x^3 - 3 = 0$.

e) Find $a + ib$ *form of* $\cos^{-1}\left(\frac{3i}{4}\right)$.

f) Separate $\tan^{-1}(x + iy)$ into real and imaginary part.

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CT –II SHU 101 ENGINEERING MATHEMATICS –I Time 1hour Marks 15

ATTEMPT ANY FIVE

Q1. If $y = x\log\left(\frac{x-1}{x+1}\right)$, prove that $y_n = (-1)^n(n-2)!\left[\frac{(x-n)}{(x-1)^n} - \frac{(x+n)}{(x+1)^n}\right]$.

Q2. If $f(x) = \tan x$, then prove that $f^n(0) - {}^nC_2 f^{n-2}(0) + {}^nC_4 f^{n-4}(0) - \cdots = \sin\frac{n\pi}{2}$.

Q3. Prove that $e^x = e\left[(x-1) + \frac{1}{2!}(x-1)^2 + \frac{1}{3!}(x-1)^3 + \cdots\right]$.

Q4. Evaluate :- $\lim_{x\to 0}\left\{\frac{2(\cosh x - 1)}{x^2}\right\}^{1/x^2}$.

Q5. Evaluate $\lim_{x\to 0}\frac{2x^2 - 2e^{x^2} + 2\cos x^4 + \sin^4 x}{x^4}$.

Q6. Find y_5 if $y = \frac{\log x}{x}$.