



Shri. Dnyaneshwar Maharaj Trust's (Pune)

**THAKUR COLLEGE OF
ENGINEERING & TECHNOLOGY**

(Approved by AICTE, Govt. of Maharashtra & Affiliated to University of Mumbai
(Accredited by National Board of Accreditation, New Delhi)*

* Accredited Programmes : - Computer Engineering • Electronics & Telecommunication Engineering • Information Technology (w.e.f.: 16-09-2011 for 3 years)

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ISO 9001:2008 Certified

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**Term Test - I
Applied Mathematics I**

YEAR / SEM: F.E. / I
BRANCH: COMMON

DATE : 09/09/2014
TIME : 10:00 am to 11:00 am
MARKS: 20

Note: Attempt any five sub questions from Question no. 1 for 10 marks.

Q.1 (i) Prove that $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$

(ii) If $u = \log\left(\frac{x}{y}\right)$ then find $u_x + u_y$

(iii) Find the series of $\log_e\left(\frac{1+x}{1-x}\right)$

(iv) Prove that $\lim_{x \rightarrow 0} \tan x \log x = 0$

(v) Write Taylor's series expansion of $f(x)$ about $x = a$ i.e. in powers of $(x-a)$

(vi) If $u = \log x - \log y$ then $x^2 u_{xx} + y^2 u_{yy} + 2xy u_{xy} = ?$

Q.2 Find a and b , if $\lim_{x \rightarrow 0} \frac{x(1+a \cos x) - b \sin x}{x^3} = 1$

[5]

OR

Q.2 If $u = \log(x^2 + y^2)$, prove that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$

[5]

Q.3 If $u = f[e^{y-z}, e^{z-x}, e^{x-y}]$, then show that $u_x + u_y + u_z = 0$.

[5]

OR

Q.3 If $u = \sin^{-1}(x^2 + y^2)^{\frac{1}{5}}$, show that $x^2 u_{xx} + 2xy u_{xy} + y^2 u_{yy} = \frac{2}{25} \tan u (2 \tan^2 u - 3)$.

[5]
