Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

II SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: ENGINEERING MATHEMATICS II (MAT –1201)

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates

- Answer **ALL** the questions. All questions carry equal marks.

1A.	Expand f(x, y) = sinxy in powers of (x – 1) and $\left(y - \pi/2\right)$ up to the second degree terms	**3 M**
1B.	Evaluate $\int_0^{2a}\int_0^{\sqrt{2ax-x^2}} \frac{x}{\sqrt{x^2+y^2}}\,dydx$ by changing to polar co-ordinates.	**3 M**
1C.	Find the area lying inside the cardioid r = a (1 + cosθ) and outside the circle r = a, using double integration.	**4 M**
2A.	Discuss the extreme values of the function : $f(x, y) = x^3 + y^3 - 63(x + y) + 12xy$	**3 M**
2B.	Verify Cauchy's Mean Value theorem for functions $f(x) = e^x$ and $g(x) = e^{-x}$ in [a, b].	**3 M**
2C.	Test the series for convergence: (i) $\sum \sqrt[3]{n^3+1} - n$ (ii) $1 + \frac{2^2}{2!} + \frac{3^2}{3!} + \frac{4^2}{4!} + \ldots$	**4 M**
3A.	Solve: $\omega''(x) + 2\omega'(x) + \omega(x) = x$, $\omega(0) = -3$ and $\omega'(0) = 0$ using Laplace transform method.	**3 M**
3B.	The radius of a normal section of a right circular cylinder is 2 units. The axis lies along the straight line $\frac{x-1}{2} = \frac{y+3}{-1} = \frac{z-2}{5}$. Find its equation.	**3 M**
3C.	Find the volume bounded by the paraboloid $x^2 + y^2 = az$, the cylinder $x^2 + y^2 = 2ay$ and the plane z = 0	**4 M**

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4A.	Find the nature of series $1+\frac{x}{2}+\frac{x^2}{5}+\frac{x^3}{10}+\ldots.$	**3 M**
4B.	Evaluate $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}$.	**3 M**
4C.	Find (i) $L\left\{\frac{e^{-2t}-1}{t}\right\}$ (ii) $L^{-1}\left\{\frac{s}{s^2+4s+13}\right\}$.	**4 M**
5A.	If $H=f(y-z,\ z-x,\ x-y)$, then prove that $\frac{\partial H}{\partial x}+\frac{\partial H}{\partial y}+\frac{\partial H}{\partial z}=0.$	**3 M**
5B.	Express the following function in terms of unit step functions and hence find its Laplace transform $f(t)=\begin{cases} t^2, & 0\le t<2 \\ 2t-1, & 2\le t<3 \\ 7, & t\ge 3 \end{cases}$	**3 M**
5C.	Evaluate $\int_0^1 \frac{x^2dx}{\sqrt{1-x^4}}\times\int_0^1 \frac{dx}{\sqrt{1+x^4}}$ using Beta and Gamma functions.	**4 M**