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# B.Tech. (2010 Batch) (Sem. - 1) <br> ENGINEERING MATHEMATICS-I 

M Code: 54001
Subject Code: AM-101
Paper ID: [A0111]
Time: 3 Hrs.
Max. Marks: 60
INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B \& C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B \& C carrying EIGHT marks each.
4. Select at least TWO questions from each SECTION - B \& C.

## SECTION A

1. a) What do you mean by double point and node.
b) Explain Homogeneous functions.
c) Define Moment of Inertia.
d) Write down Taylor's and Maclaurin's series.
e) Explain Beta and Gamma functions.
f) Discuss Errors and approximations.
g) Discuss the convergence of the series $\sum_{n=1}^{\infty} \frac{n^{2}}{3^{n}}$
h) Define absolutely convergent series with an example.
i) What do you mean by uniform convergence.
j) Discuss hyperbolic functions of complex variables.

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## SECTION B

2. Trace the following curves:
a) $x^{2} y^{2}=a^{2}\left(y^{2}-x^{2}\right)$
b) $\mathrm{r}=\mathrm{a} \cos 2 \theta$
3. a) Find the area of the segment cut off from the parabola $x^{2}=8 y$ by the line $x-2 y+8=0$.
b) Show that the area included between the curve $x^{3}+y^{3}=3$ axy and its asymptote is equal to the area of the loop.
4. a) If $\mathrm{z}=\log \left(\mathrm{u}^{2}+\mathrm{v}\right), \mathrm{u}=\mathrm{e}^{x^{2}+y^{2}}, \mathrm{v}=\mathrm{e}^{\mathrm{x}^{2}+\mathrm{y}}$ then find $\frac{\partial z}{\partial x} \& \frac{\partial z}{\partial y}$
b) State and discuss Lagrange's method of undetermined multipliers.
5. Find the points on the surface $z^{2}=x y+1$ nearest to the origin.

## SECTION C

6. Find the equation of the sphere through the circle $x^{2}+z^{2}=a^{2}, y=k$ and having its centre on the plane $x+y+z=b$
7. a) Evaluate $\int_{1}^{2} \int_{1}^{3} x y^{2} d x d y$
b) Test the convergence of the series $x+2 x^{2}+3 x^{3}$ $\qquad$
8. a) Separate real and imaginary parts of $\tanh (x+i y)$ and $\sinh (x+i y)$
b) Sum the series $\cos x+\sin x \cos 2 x+\left(\sin ^{2} x / 1.2\right) \cos 3 x+\ldots \ldots \ldots \infty$
9. a) Find all the values of $(-1)^{1 / 6}$
b) Define right circular cone. Find the equation of a right circular cone generated when the straight line $2 x+3 z=6, x=0$ revolves about $z$-axis.
