

B. TECH, B. TECH + MBA DUAL DEGREE
PROGRAMMES (CSE, ECE, MAE, E & EE, E & I,
AE, NS & T, S & AE, NANOTECH), B. TECH
(MAE) + M. TECH (AUTOMOBILE) - DD,
B. TECH (AE) + M. TECH (AVIONIC) - DD,
B. TECH + M. TECH (NS & T) - DD, B. TECH +
M. TECH (NANOTECH) - DD & B. TECH
(CSE, ECE, MAE) - EVENING

SECOND SEMESTER END TERM EXAMINATION :
APRIL, 2014

APPLIED MATHEMATICS - II

DIFFERENTIAL EQUATIONS &
COMPLEX ANALYSIS

Time : 3 Hrs.

Maximum Marks : 70

Note: Attempt questions from all sections as directed.

SECTION - A (30 Marks)

Attempt any 5 questions.

Each question carries 6 marks.

1. (a) Show that every function $y(x) = 2 + ce^{-2x^2}$, where c is an arbitrary constant, is a solution of the

differential equation $\frac{dy}{dx} + 4xy = 8x$.

P.T.O.

(b) Solve the $4xydx + (x^2 + 1)dy = 0$. (3+3)

2. Solve $(D^2 - 2D + 1)y = xe^x \sin x$.

3. Form a partial differential equation for the following relation.

(i) $z = f\left(\frac{y}{x}\right)$

(ii) $az + b = a^2x + y$ (3+3)

4. Solve the partial differential equation $p^2x + q^2y = z$.

5. Solve the partial differential equation

$$(D^3 - 6D^2D' + 11DD'^2 - 6D'^3)z = e^{5x+6y}$$

6. Show that $f(z) = \bar{z}$ is nowhere differentiable.

SECTION - B (20 Marks)

Attempt any two questions.

Each question carries 10 marks.

7. (a) Evaluate $\oint_C \frac{1}{z^2 + 4} dz$, where $C : |z - i| = 2$ in the

positive sense. (5)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + z = 0$, given that when $x = 0$, $z = e^y$
and $\frac{\partial z}{\partial x} = 1$. (5)

8. (a) Solve the Partial differential equation $q = px + q^2$
using Charpit's Method. (7)

(b) Evaluate $\oint_C \frac{1}{z^2 + 4} dz$, where $C : |z| = 1$ in the
positive sense. (3)

9. (a) Solve the $x^2 \frac{d^2 y}{dx^2} - 5x \frac{dy}{dx} + 8y = 2x^3$. (6)

(b) Find the nature of singularity and residue of
function $f(z) = \frac{1}{z^2(z-3)^2}$. (4)

SECTION - C (20 Marks)
(Compulsory)

10. (a) Use the Cauchy-Residue theorem to evaluate the

integral $\oint_C \frac{z+1}{z^2-2z} dz$, where C is positively oriented
circle $|z| = 3$. (7)

(b) Solve the $(D^2 - 4D + 3)y = 2xe^{3x} + 3e^x \cos 2x$ (7)

(c) Solve $\frac{\partial^3 z}{\partial x^3} - 3\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial y^3} = e^{x+2y}$ (6)