Total No. of Questions : 4] **SEAT No. :**

P806 **[Total No. of Pages : 2**

[5315]-406
T.Y. B.Sc.
MATHEMATICS
MT - 346 : Problem Course Based on MT - 344 and MT - 345
(2013 Pattern) (Paper - VI) (Semester - IV)

Time : 2 Hours] ***[Max. Marks : 40***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Answer to the two sections should be written in separate answer books.***
4) ***Tie answer books of both sections together.***

SECTION - I

(Ring Theory)

Q1) a) Attempt any three of the following : **[6]**

i) Find all solution of the congruence $2x = 6 \pmod 4$.

ii) State the characteristics of Z_5 and $5Z$.

iii) Does there exist an integral domain of characteristic 6? if so, give an example.

iv) List all polynomials of degree 3 in $Z_2[x]$

b) Attempt any one of the following : **[4]**

i) Find the sum and product of the polynomials

$f(x) = 4x-5$, $g(x) = 2x^2 - 4x + 2$ in $Z_8[x]$.

ii) Prove that if p is a prime in an integral domain D, then p is an irreducible.

Q2) Attempt any two of the following : **[10]**

a) Show that the boolean ring is commutative.

b) Find the remainder of 49! modulo 53

c) Let D be a Euclidean domain and let v be a euclidean norm on D. Show that if a and b are associates in D, then $v(a) = v(b)$.

P.T.O.

SECTION - II

(Partial Differential Equations)

Q3) a) Attempt any three of the following : **[6]**

i) Find the integral curves of the equations

$$\frac{dx}{z-y}=\frac{dy}{x-z}=\frac{dz}{y-x}$$

ii) Solve the differential equation

$a^2\ y^2\ z^2\ dx + b^2x^2z^2\ dy + c^2x^2y^2\ dz = 0$

by variable separable method.

iii) Find the general integral of

$yzp + xzq = xy$

iv) Find a complete integral of dairaut's partial differential equation.

$z = px + qy + pq$

v) Show that the differential equation

$(2x + y^2 + 2x\ z)\ dx + 2xy\ dy + x^2\ dz = 0$

is integrable.

b) Attempt any one of the following : **[4]**

i) Show that the differential equation

$zydx - zxdy - y^2dz = 0$ is integrable and find its primitive.

ii) Find the general solution of

$y^2p - xyq = x(z - 2y)$

Q4) Attempt any two of the following: **[10]**

i) Find the complete integral by Jacobi's method

$P_1P_2P_3 = z^3\ x_1x_2x_3$

ii) Find the complete integral of

$p = (z + qy)^2$

by using charpits method.

iii) Find the orthogonal trajectories of the family of parabola with vertices at origin and foci on y – axis.

$x^2 = 4by$, where b is parameter.