Maths. (*Hons*)
(Mid-Term: CC - 11)

Full Marks: 15. **Time: $1\frac{1}{2}$ *hrs.***

Answer any three questions.

1. If $f(x,y)=\begin{cases}\frac{x^2-y^2}{x^2+y^2} & ; \quad (x,y)\neq(0,0)\\ 0 & ; \quad (x,y)=(0,0)\end{cases}$,then, show that repeated limits exists and are equal but simultaneous limit does not exist at the origin. 5.

2. State and prove Euler's theorem on homogeneous function of two variables. 5.

3. Find all the maximum and minimum vales of the function $f(x,y)=x^3+y^3-63(x+y)+12xy.$ 5.

4. Change the order of integration $\int_0^1\int_x^{x(2-x)} f(x,y)dx\,dy.$ 5.

Maths. (*Hons*)
(Mid-Term: CC - 12)

Full Marks: 15. **Time: $1\frac{1}{2}$ *hrs.***

Answer any three questions.

1. Define automorphism. If f is an automorphism of a group G *and* H is a subgroup of G, then prove that $f(H)$ is a subgroup of G. 5.

2. If H is a p-sylow's subgroup of a group G, then prove that for $x\in G, x^{-1}Hx$ is also a p-sylow's subgroup of G. 5.

3. Define commutator of a group G. If G' is a commutator subgroup of G, then, prove that G is abelian iff $G'=\{e\}$. 5.

4. Define Normaliser of an element of a group. Prove that $N(a)$is a subgroup of G. 5.

Maths. (*Hons*)
(Mid Term: DSE - I)

Full Marks: 15. **Time: $1\frac{1}{2}$ *hrs.***

Answer any three questions.

1. Define convex set and prove that the intersection of two convex sets is covex. 5.

2. Solve the LPP $max.\ Z=4x_1+10x_2$, *subject to constrants* $2x_1+x_2\leq 10,\ \ 2x_1+5_x2\leq 20,\ \ 2x_1+3x_2\leq 18,\ \ x_1,x_{2z}\geq 0$ 5.

3. Solve the transportation problem using North-West Corner rule

	M_1	M_2	M_3	M_4	Supply
P_1	2	3	11	7	6
P_2	1	0	6	1	1
P_3	5	8	15	9	10
Demand	7	5	3	2	

5.

4. Find the optimum strategies and value of the from the pay-off matrix 5.

Player Y

Player $X\begin{bmatrix}1 & 4\\ 5 & 3\end{bmatrix}$

Maths. (*Hons*)
(Mid Term: DSE - II)

Full Marks: 15. **Time: $1\frac{1}{2}$ *hrs.***

Answer any three questions.

1. Define binomial random variable, mean, and variance. 5.

2. Find moment of Poisson distribution. 5.

3. Prove that $E(X+Y)=E(X)+E(Y)$. 5.

4. Find k and evaluate $P(x)$ *for* 5.

x	0	1	2	3	4	5	6	7
$P(x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

5. Define moment generating function of normal distribution. 5.