University B.T. & Evening College
Department of Mathematics
Semester 1 Assignment

HCC 1

1. Show that the solid generated by the revolution of the arc f(x)= $\frac{1}{x}$ for $x \in [1, \infty)$ with respect to X axis is of infinite surface area but of finite volume .
2. Show that a parabola does not have an asymptote though it has infinite branches.

HCC 2

1. Show that the composition of two bijective mappings is bijective.
2. Solve, if possible, the system of equations

$$x+2y-z=10$$

$$-x+y+2z=2$$

$$2x+y-3z=8$$

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Semester 3 Assignment

HCC 5

1. State and prove Lagrange's mean value theorem.
2. Show that if **I** be an interval and f: **I** → **R** be continuous on **I**, then f(**I**) is an interval.

HCC 6

1. Let (1 3 5 7) and (2 3 6 8) ∈ S_8. Then find α ∈ S_8 such that $\alpha * (1\ 3\ 5\ 7) * \alpha^{-1} = (\ 2\ 3\ 6\ 8)$ where * denotes the composition of permutations.
2. Explain with and example that the converse of Lagrange's theorem is not true in general.

HCC 7

1. Prove that the sequence $f_n(x) = \frac{x^n}{1+x^n}$, $x \in [0,2]$ is not uniformly continuous on [0,2].
2. State and prove the Riemann's condition of integrability.

SE 1

1. Let, $A_1, A_2, A_3, \ldots, A_n$ be n sets. Prove that
   (i) $\mathcal{P}(\bigcup_{i=1}^{n} A_i) \supseteq \bigcup_{i=1}^{n} \mathcal{P}(A_i)$
   (ii) $\mathcal{P}(\bigcap_{i=1}^{n} A_i) = \bigcap_{i=1}^{n} \mathcal{P}(A_i)$

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Semester 5 Assignment

HCC 11

1. Show that the automorphism group of $\mathbb{Z}_2 x\ \mathbb{Z}_2$ is of order 6.
2. Find the class equation of S_4.

HCC 12

1. Discuss the convergence of Gauss-Jacobi iteration method.
2. Find the rate of convergence of Newton-Raphson method.

DSE 1

1. Show that the set X= {(x , y) : $x^2+y^2=16$} is not a convex set.
2. Solve the following L.P.P by simplex method

   Maximize Z = x+y+3z

   Subject to, 3x+2y+z ≤ 3

   2x+y+2z ≤ 2

   x , y ≥ 0

DSE 2

1. Prove that, any positive integer greater than 1 can be expressed uniquely (up to the ordering of primes) in terms of powers of primes.
2. Determine all integer solutions of the Diophantine equation

   221x + 35y = 11