# BSc MATHEMATICS SIXTH SEMESTER ASSIGNMENT

## LINEAR ALGEBRA

Course code: MM211

1. If  U is a subspace of a vector space V , what is U+U

2. Is the operation addition of subspaces commutative! Associative?

3. Suppose V is a finite dimensional vector space and U is a subspace of V such that dim u= dim v.  Prove that u= V.

4. If T∈L(V,W) is injective and $(v_1 v_2\ldots\ldots v_n)$ is linearly independent, then P.T.         $(Tv_1, Tv_2, \ldots\ldots Tv_n)$ is also linearly independent.

5. Suppose V is finite dimensional and S, T∈ L( V ),  Prove that  ST =I iff TS=I

## REAL ANALYSIS II

1. Discuss the continuity of  the following functions , at $x = 0$
   i)    $sgn(x)$  ii)$\frac{sinx}{x}$   iii) $x(sin\frac{1}{x})$

2. Discuss the continuity of (i) Thomae's functions and ii)Dirichlet's function

3. Find the derivative of i)$f(x) = x^3$ ;  $f(x) = \sqrt{x}$

4. Show that $-x \le sinx \le x$   $for\ x \ge 0$

5. Evaluate (i) $\lim_{x\to 0}(\frac{1-cosx)}{x^2}$   ii)$\lim_{x\to 0}\frac{e^x-1}{x^2}$    iii)$\lim_{x\to 0}\frac{e^x-1}{x}$

6. Determine whether the following functions are differentiable

i)$f(x) = |x|$ ; ii) $g(x) = |x| + |x + 1|$ iii) $h(x) = x^{\frac{1}{3}}$

7.  Find the relative extrema for i) $f(x) = x^3 - 3x + 5$  ii)  $x^4 + 2x^2 - 4$

8. Evaluate  $i)$ $\int_1^9 \frac{\sqrt{t}}{2+\sqrt{t}}dt$  $;ii)$ $\int_1^4 \frac{dt}{[t+4]\sqrt{t}}$

$$iii) \int_0^2 t^2[1 + t^3]^{\frac{-1}{2}}\,dt$$

9. Calculate the norm for a) $p_1 = \{0, 1, 2, 4\}$
   b) $p_2 = \{0, 2, 3, 4\}$

# ABSTRACT ALGEBRA II
## COURSE CODE: MM1644

1. Find $kern\emptyset$ and $\emptyset(20)$ for $\emptyset: Z \rightarrow Z_8$
   Such that $\emptyset(1) = (1,4,2,6)°(2,5,7)$
2. Find $kern\emptyset$ and $\emptyset(3)$ for $\emptyset: Z_{10} \rightarrow Z_{20}$ such that $\emptyset(1) = 8$
3. Find the order of the following
   a) $\frac{Z_6}{<3>}$ ; ii) $(Z_2 \times Z_4)/< (1,1) >$
4. Compute $(Z_2 \times Z_4)/< (1,2) >$
5. Find the solutions of the equation $x^3 - 2x^2 - 3x$ in $Z_{12}$
6. Solve the equation $3x = 2$ in $Z_7$ and in $Z_{23}$
7. Find the characteristics of the following
$$i)2Z \quad ii) Z_3 \times Z_3 \quad iii)Z_6 \times Z_{15}$$
8. Find the remainder of $37^{49}$, when it is divided by 7

# GRAPH THEORY
## ASSIGNMENT QUESTIONS    course code : MM 1661

**1  Draw K6. How many edges does its complement have?**

**2  Find the number of edges of Km,n**

**3   Draw a 3-regular graph having more than 4 vertices.**

**4   Find the Eulerian path of the following graph.**
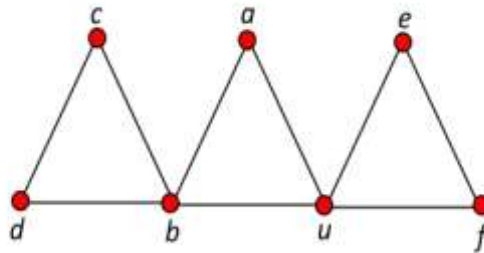


G

5.Draw all planar graphs with 5 vertices which are not isomorphic to each other

# COMPLEX ANALYSIS II
## COURSE CODE :1643

1. Find the residue of the following functions at its singularities given

   a)$f(Z) = \frac{1}{(1+Z)^3}$

   b)$f(z) = \frac{\cos z}{z^3}$

2. Evaluate $\int_0^\infty \frac{x^2}{x^2+1}dx$

3. Evaluate $\int_0^\infty \frac{x^2 dx}{(x^2+1)(x^2+4)}$

4. Evaluate $\int_{-\infty}^\infty \frac{dx}{x^2+2x+2}$

5. Evaluate $\int_0^\pi \frac{d\theta}{k+\cos\theta}$ $\quad k > 1$

6. Evaluate$\sum_{n=1}^\infty \frac{(-1)^n}{n^2+1}$