

B.Sc MATHEMATICS SIXTH SEMESTER

ASSIGNMENT QUESTIONS

LINEAR ALGEBRA

course code:MM1642

- 1.If U is a subspace of a vectorspace V , what is $U+U$
2. Is the operation addition of subspaces commutative! Associative?
3. Suppose V is a finite dimensional vectorspace and U is a subspace of V such that $\dim u = \dim v$. Prove that $u = V$.
- 4.If $T \in L(V, W)$ is injective and $(v_1 v_2 \dots v_n)$ is linearly independent, then P.T. $(Tv_1, Tv_2, \dots, Tv_n)$ is also linearly independent.
5. Suppose V is finite dimensional and $S, T \in L(V)$, Prove that $ST = I$ iff $TS = I$

REAL ANALYSIS II

COURSE CODE: MM1641

1. Discuss the continuity of the following functions , at $x = 0$
 - i) $\text{sgn}(x)$
 - ii) $\frac{\sin x}{x}$
 - 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 $-x \leq \sin x \leq x$ for $x \geq 0$
5. Evaluate (i) $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$ ii) $\lim_{x \rightarrow 0} \frac{e^x - 1}{x^2}$ iii) $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$
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

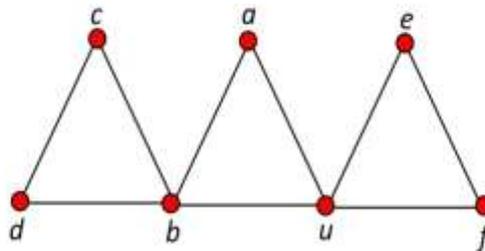
COURSECODE: MM1644

1. Find $\text{kern}\phi$ and $\phi(20)$ for $\phi: Z \rightarrow Z_8$
Such that $\phi(1) = (1,4,2,6)^\circ(2,5,7)$
2. Find $\text{kern}\phi$ and $\phi(3)$ for $\phi: Z_{10} \rightarrow Z_{20}$ such that $\phi(1) = 8$
3. Find the order of the following
 - a) $\frac{Z_6}{\langle 3 \rangle}$; ii) $(Z_2 \times Z_4)/\langle (1,1) \rangle$
4. Compute $(Z_2 \times Z_4)/\langle (1,2) \rangle$
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) $2Z$ ii) $Z_3 \times Z_3$ 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 K_6 . How many edges does its complement have?
- 2 Find the number of edges of $K_{m,n}$
- 3 Draw a 3-regular graph having more than 4 vertices.
- 4 Find the Eulerian path of the following graph.



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