

Dr. B. R. Ambedkar Open University
Faculty of Science, Department of Mathematics
II yr M.Sc (Mathematics), 2017-18
Course -6, Functional Analysis
Assignment-1

Max Marks : 15

Mim. Marks : 6

Section - A

Answer any one of the following :

(10 marks)

1. (a) State and prove Holder's inequality for integrals.
(b) State and prove Minkowski's inequality integrals.
2. Let N, N' be normed linear spaces and T be a linear transformation of N onto N' . Then T is one-to-one and T^{-1} is bounded \Leftrightarrow there is a positive real number m such that
 $m\|x\| \leq \|Tx\|$, for all $x \in N$

Section - B

Answer any one of the following:

(5 marks)

3. Every normed linear space can be embedded in a Banach space.
4. State and prove Hahn –Banach theorem.

Dr. B.R. Ambedkar Open University
Faculty of Science , Department of Mathematics
II yr M.Sc(Mathematics), 2017-18
Course – 6, Functional Analysis
Assignment - 2

Max Marks : 15

Min.Marks : 6

Section-A

Answer any one of the following :

(10 marks)

1. State and prove Cauchy-Schwarz Inequality.
2. State and prove the theorem on Gram Schmidt orthonormalization process.

Section-B

Answer any one of the following:

(5 marks)

3. (i) State and prove the Pythagoras theorem for inner product spaces.
(ii) Show that any orthogonal set of nonzero vectors in an inner product space is independent.
4. State and prove Bessel's inequality.

Dr.B.R.Ambedkar Open University
Faculty of Science, Department of Mathematics
II year M.Sc (Mathematics) 2017-18
Course-7, Complex Analysis
Assignment-1

Max.Marks:15

Min.Marks:6

Section: A

Answer any one of the following:

(10marks)

1. a) Prove that (i) $f(z) = |z|$ is continuous everywhere and differentiable nowhere.
(ii) $f(z) = |z|^2$ is differentiable at origin but nowhere else.
b) If f is analytic on a region R and its modulus is constant on R show that f is constant on R .
2. a) Define an analytic function. Derive Cauchy – Riemann equations.
b) Show that the function $f(z) = xy + iy$ is nowhere analytic.

Section: B

Answer any one of the following:

(5marks)

3. Describe the values of z for which $\left| \frac{z-3}{z+3} \right| = 2$
4. Derive Cauchy's integral formula and evaluate $\int_C \frac{e^{iz}}{z^3} dz$ where C is the circle $|z| = 2$.