

MSC MATHEMATICS ASSIGNMENT PAPERS

Part -I (PREVIOUS)

Paper -I, ALGEBRA

Max. Marks:20

1. Answer the following all questions.

8X2½=20

1. Let G be a group containing an element of finite order $n > 1$ and exactly two conjugacy classes, then prove that $|G| = 2$.
2. Prove that Every finite group has a composition series
3. Prove that the centre of a ring is a subring
4. Let $\{A_i\}_{i \in I}$ be a family of right ideals in a ring R . Then prove that $\bigcap_{i \in I} A_i$ is also a right ideal.
5. If $f: M \rightarrow N$ is an R -homomorphism of an R -module M to an R -module N , then prove that
 - i) $\text{Ker}(f)$ is an R -submodule of M
 - ii) $I_m f$ is an R -submodule of N
6. Let M be a finitely generated free module over a commutative ring R . Then prove that all bases of M are finite
7. Prove that every Boolean ring commutative and is of characteristic 2.
8. Define a Boolean algebra and give an example of it and also prove that in any Boolean algebra $a'' = a$

MSC MATHEMATICS ASSIGNMENT PAPERS

Part -I (PREVIOUS)

Paper -II, REALANALYSIS

Max. Marks:20

1. Answer the following all questions.

8X2½=20

1. Prove that closed subsets of compact sets are compact
2. Let f be a continuous mapping of a compact metric space X into a metric space Y . Then prove that f is uniformly continuous on X
3. Define Riemann-Stieltjes integral and prove that

$$\int_a^b f d\alpha \leq \int_a^b f d\alpha \text{ with the usual notation}$$

4. Give an example to show that a convergent series of continuous functions may have a discontinuous sum
5. Define outer measure μ^* and prove that $\mu^*(E_1) \leq \mu^*(E_2)$ if $E_1 \subset E_2$
6. Let X be a measurable space. Suppose $f \in L^2(\mu)$ and $g \in L^2(\mu)$. Then prove that $fg \in L(\mu)$ and $\int_X |fg| d\mu \leq \|f\| \|g\|$

7. Show that $\int_0^1 \frac{\log x}{\sqrt{x}} dx$ is Convergent, but $\int_1^2 \frac{\sqrt{x}}{\log x} dx$ is divergent

8. Find the Fourier series of the periodic function f with period 2π , defined by

$$f(x) = \begin{cases} 0 & \text{for } -\pi < x \leq 0 \\ x & \text{for } 0 \leq x \leq \pi \end{cases}$$

What is the sum of the series at $x=0$