

GANDHI P.R. COLLEGE, BHOPAL
Assignment-2020-21
M.A./M.Sc.-I SEM (REG./PVT.)
MATHEMATICS

ADV. ABSTRACT ALGEBRA-I

Paper-I

- Q.1 Define normal and subnormal series with example.
- Q.2 Show what a group G is nilpotent if and only if G is finite.
- Q.3 State and prove “Fundamental theorem of Galois theory.”
- Q.4 Let F be a field, then there exist an algebraically closed field K containing F as a subfield.
- Q5 Prove that every finite separable extension of a field is necessarily a simple extension.

M.A./M. SC I SEMESTER (REGULAR)
2020-21
MATHEMATICS PAPER- II
Real Analysis

Note: - All Questions are compulsory.

Q.1 Let f be continuous and α monotonically increasing on $[a, b]$ then prove that $f \in R(\alpha)$ on $[a, b]$

मान लें f सतत् हो तथा α एक $[a, b]$ पर एकरसीय रूप से वर्धमान हो । तब सिद्ध कीजिए कि $[a, b]$ पर $f \in R(\alpha)$

Q.2 Define:-

- (a) Integration of vector-valued functions
- (b) Rectifiable curves

परिभाषित कीजिए-

- (अ) सांदेश- मुल्यत फलनों का समाकलन
- (ब) परिशोधनीय वक्र

Q.3 if $A, B \in L(\mathbb{R}^n, \mathbb{R}^m)$ then prove that-

- (a) $\|A+B\| \leq \|A\| + \|B\|$ and (b) With the distance between A and B defined as $\|A-B\|$, $L(\mathbb{R}^n, \mathbb{R}^m)$ is a metric space.

यदि $A, B \in L(\mathbb{R}^n, \mathbb{R}^m)$ तब सिद्ध कीजिए कि-

- (अ) $\|A+B\| \leq \|A\| + \|B\|$ तथा (ब) A तथा B के बीच दूरी के साथ $\|A-B\|$ के रूप में परिभाषित है। $L(\mathbb{R}^n, \mathbb{R}^m)$, एक मेट्रिक स्थान है।

Q.4 Let α be monotonically increasing on $[a, b]$ suppose $f_n \in R(\alpha)$ on $[a, b]$, for $n=1, 2, 3, \dots$

and suppose $f_n \rightarrow F$ uniformly on $[a, b]$. Then prove that $f \in R(\alpha)$ on $[a, b]$ and

मान लें α ; $[a, b]$ पर एकरसीय रूप से वर्धमान हो । मान लीजिए $[a, b]$ पर $f_n \in R(\alpha)$ $n=1, 2, 3, \dots$ के लिए तथा मान लीजिए $[a, b]$ पर $f_n \rightarrow F$ एक रूप से है । तब सिद्ध लीजिए कि $[a, b]$ पर $f \in R(\alpha)$ तथा

$$\int_a^b f \, d\alpha = \lim_{n \rightarrow \infty} \int_a^b f_n \, d\alpha .$$

Q.5 Let $\sum a_n X^n$ be a power series with unit radius of convergence and let.

$$f(x) = \sum_{n=0}^{\infty} a_n x^n \quad (-1 < x < 1)$$

If the series $\sum a_n$ converges, then prove that

$$\lim_{x \rightarrow 1-0} f(x) = \sum_{n=0}^{\infty} a_n.$$

(Abel's Theorem).

मान लें $\sum a_n X^n$ अभिसरिता की इकाई त्रिज्या सहित एक घात श्रंखला हवें तथा मान लें

$$f(x) = \sum_{n=0}^{\infty} a_n x^n \quad (-1 < x < 1)$$

यदि श्रंखला $\sum a_n$ अभिसरित होती है तब सिद्ध कीजिए कि

$$\lim_{x \rightarrow 1-0} f(x) = \sum_{n=0}^{\infty} a_n.$$

(एबेल का प्रमेय).

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TOPOLOGY-I

Paper-III

- Q.1 Write the statements of continuum hypothesis and Zom's Lemma.
- Q.2 Let (X, \mathcal{J}) be a topological space. Then prove that
- (i) \emptyset is closed set
 - (ii) Finite union of closed sets is closed
 - (iii) Arbitrary intersection of open sets is open
- Q.3 Define topological space in terms of kuratowski closure.
- Q.4 Prove that every second countable space is first countable.
- Q5 Prove that a topological space X is locally connected if and only if component of every open subspace of X is open in X .

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MATHEMATICS

COMPLEX ANALYSIS-I

Paper-IV

- Q.1 State and prove Cauchy-Goursat theorem
- Q.2 Expand the functions $\sin z$ in a Taylor series about $z=0$ and determine the region of convergence.
- Q.3 State and prove Rouché's theorem
- Q.4 State and prove Morera's theorem.
- Q5 Show that the transformation where C is real, maps the right half of the circle into the upper half of the w -plane.

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MATHEMATICS

FANDAMENTALS OF COMPUTERS

(THEORY AND PRACTICAL)

Paper-V

Q.1 What are the main difference between compiler and interpreter?

Q.2 Write the method of creating new folder on Windows XP.

Q.3 Write short notes on the following (any two)

a- Drive Name

b-FAT

c- File and directory

d-External commands of DOS

Q.4 Explain menu of MS Word with diagram.

Q5 Explain the concept of Workbook and Worksheets in MS Excel.

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Optional Select any one

Paper-V

Differential and Integral Equations-I

Q.1 युगपत् अवकल समीकरणों को हल कीजिए रु

Solve the simultaneous differential equations:

Q.2 हल कीजिए:

Solve :

Q.3 समाकलन समीकरण को हल कीजिए

Solve the integral equation

Q.4 समाकलनमानलीजिए एक आव्यूह हो जो एक बंद तथा परिवर्त अंतराल पर में सतत है । तब सिद्ध कीजिए कि वहाँ के लिए एक हल मौजूद है तथा इसके अलावा यह हल अद्वितीय है।

Let $A(t)$ be an $n \times n$ matrix that is continuous in t on a closed and bounded interval I . Then prove that there exists a solution to the IVP $y' = A(t)y$ on I and, in addition, this solution is unique

Q5 समाकलन समीकरण को हल कीजिए

Solve the integral equation