

DEPARTMENT OF MATHEMATICS
GOVERNMENT COLLEGE FOR WOMEN

PARADE GROUND, JAMMU

Reframing of Panel of Board of Studies in Mathematics

A. Member Nominated by Vice Chancellor, University of Jammu.

1. Prof. Romesh Kumar (7780857102) - Professor, Department of Mathematics,
University of Jammu

B. Eminent Academician

1. Dr. Chanchal Kumar (9417702970)

Associate Professor, Indian Institute of Science Education and Research
(IISER) Mohali.

2. Prof. (Dr.) K Singh Charak, HOD, Mathematics Department , Jammu
University

3. Dr. T.K. Sharma, Principal, Govt Degree College, Gool

4. Dr. Meeru Abrol, Principal, Govt Degree College, Ramban

C. Alumni (Meritorious)

1. Dr. Shally Gupta (9419149146)

HOD Mathematics, Govt. MAM PG College, Jammu

D. Nominee from Industry/ Corporate sector

1. Er. Rohit Singh Bhau (8899220575)

Sound Engineer/ Film Industry/ Music producer with MNC

E. Faculty Members of the College

1. Dr.Sushma Chib (7006850080)

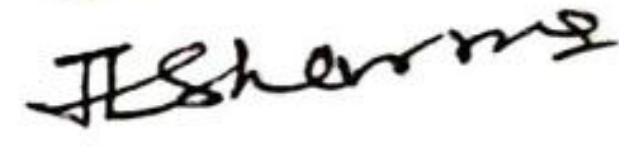


(Convenor and H.O.D. Mathematics)

2. Prof Anita Sharma (9419220363)



3. Dr. Jagdish Lal Sharma (7006547133)



4. Dr. Smarti Gosani (9906267208)



GOVERNMENT COLLEGE FOR WOMEN

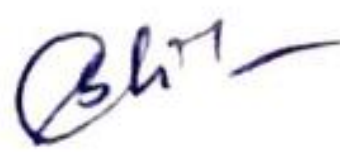
PARADE GROUND JAMMU

(An Autonomous College with CPE status by UGC)

Minutes of meeting of BOS in Mathematics

A meeting of Board of Studies in Mathematics was held on July 26, 2021 at 11:30 a.m. at Govt. College of Women, Parade Ground, Jammu.

Present:-

1. Prof. Romesh Kumar, Department of Mathematics, University of Jammu, Jammu
2. Prof. (Dr.) Dr. Chanchal Kumar
Associate Professor, Indian Institute of Science Education and Research (IISER) Mohali.
3. Prof. (Dr.) K Singh Charak
HOD, Mathematics Department, Jammu University
4. Dr. T.K. Sharma, Principal, Govt Degree College, Gool
5. Dr. Meeru Abrol, Principal, Govt Degree College, Rambal
6. Dr. Shally Gupta
HOD Mathematics, Govt. MAM PG College, Jammu.
7. Er. Rohit Singh Bhau
Sound Engineer/ Film Industry/ Music producer with MNC.
8. Dr. Sushma Chib  (Convener and H.O.D. Mathematics)
9. Prof. Anita Sharma Faculty member

10. Dr. Jagdish Lal Sharma

Faculty member

11. Dr. Smarti Gosani

Faculty member

Agenda:-

1. To revise the syllabus for B.A./ B.Sc./ B.C.A. semester 3rd and 4th (Core/ Skill) under CBCS.
2. To prepare "Learning Outcome Based Curriculum Frame Work" (LOCF).
3. To prepare a Panels of Paper Setters/ Examiners to be sent to the Controller of Examination of College.
4. Any other item with the permission of the chair.

Resolved:

1. The members of the Board of Studies revised and unanimously approved the syllabus of B.A. /B.Sc. /B.C.A. semester 3rd and 4th for the sessions 2021 and onwards, incorporating the valuable comments of the External member Dr. Chanchal Kumar, Associate Professor, Indian Institute of Science Education and Research, Mohali.
2. The Convener of the Board of Studies presented the copy of "Learning Outcome Based Curriculum Frame Work" (LOCF) in the meeting for the valuable comments of the members of the Board of Studies.
3. The members of the Board of Studies unanimously approved the revised panel of paper setters and evaluators.

In the last, Convener of the Board of Studies appreciated all the members for their contribution in the preparation of syllabi of semesters III & IV and concluded the meeting with the vote of thanks.

Signature:-

1. Prof. Romesh Kumar
2. Prof. (Dr.) K Singh Charak
3. Prof. (Dr.) Dr. Chanchal Kumar
4. Dr. T.K. Sharma
5. Dr. Meeru Abrol
6. Dr. Shally Gupta

7. Er. Rohit Singh Bhau

8. Dr. Sushma Chib

9. Prof. Anita Sharma

10. Dr. Jagdish Lal Sharma

11. Dr. Smarti Gosani

The minutes of meeting are submitted for information and approval.

Chib

Convener,
BOS, Mathematics
GCW, Parade

SPS

Principal
Govt. College for Women
Parade, Jammu

Dr Sushma Chib
Convener,
Board of Studies in Mathematics
GCW Parade Jammu

Dear Madam, The syllabus of Real Analysis Abstract Algebra and skill enhancement courses :
logic sets and relations and vector calculus seems alright and I approve of the syllabus.

Romesh Kumar
Professor,
Department of Mathematics.

Dr. Sushma Chib
Convener,
Board of Studies in Mathematics,
GCW Parade, Jammu.

Respected Madam,

I have gone through the document sent by you. Overall I agree with the new syllabus for the courses. I request you to kindly make the following minor corrections/typos before making the final draft of the courses.

A list of typos:

UMATC-301; Title- Real Analysis

(In Unit-I) Please replace 'squeeze principle' with squeeze principle.

(In Unit -II) Please replace 'point wise' with 'pointwise' .

(In References) : 4. K. A. Ross (not 'ross').

UMATS-301 ; Title - Logic, Sets & Relation

(In Objective) Please replace 'inclusive' with 'inclusion' (in the second line).

(In Subunit-1) Composition of relations (replace 'relation' with 'relations').

Once again I confirm my consent for the new syllabus of the courses.

Yours sincerely,




Chanchal Kumar
(IISER Mohali)

Dr.Sushma Chib
Convener
BOS in Mathematics.
Women College Parade.
Jammu.

Dear Madam

The syllabus of Real Analysis, Abstract Algebra and skill enhancement courses: Logic sets and relations and Vector Calculus seems alright and I approve the syllabus.


Principal
Govt. Degree College
Gool (Ramban)
Prof. (Dr.)T.K.Sharma
Principal
GDC Gool

OFFICE OF THE PRINCIPAL
GOVT. DEGREE COLLEGE RAMGARH
(Opp. Baba Sidh Goria Temple, Swankha, Samba)

Prof. Dr. Meeru Abrol
Mob. 9419377430

No:-GDC-RAM/2021/

Dated:

Dr. Sushma Chib
Convener
BOS Mathematics
Women College, Parade
Jammu.

Dear Convener,

After going through the contents of the main courses and skill Courses of Semester -III and IV. The following points should be clarified and incorporated in the syllabus:

1. In course No. UMATC-301, unit -3 . Specify clearly which tests are without proof.
2. In course No. UMATC - 401, clarify the theorems and results of which proof is to be done.

Meeru

Dr. Meeru Abrol
Principal
Govt. Degree College
Ramgarh

PG Department of Mathematics

MAM College, Jammu.

Ref No. 49

Dated:- 09/08/21

Dr. Sushma Chib,

Converer BOS in Mathematics,

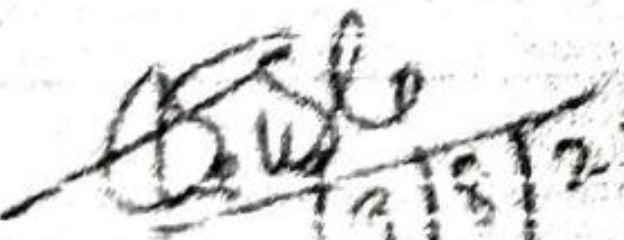
Govt. College for Women Parade,

Jammu.

Dear Mam,

The perusal of the contents of the main courses and skills Courses of 3rd and 4th semesters. In this context my suggestion to this aspect is that these courses does not demand any change but some topics about set theory may also be incorporated.

With Regards


19/8/21
Dr. Shally Gupta,

HOD mathematics,

Govt. MAM College,

Jammu.

DEPARTMENT OF MATHEMATICS
UNIVERSITY OF JAMMU PH-215288

NO. Nil

Dated: 04.08.2021

Dr. P. S. Chahal
HOD Mathematics
Women College, Parade
Jammu

Dear Sir,

I am going through the contents of the main courses.

- (1) Real Analysis
- (2) Abstract algebra

and the following courses:

- (3) Set theory
- (4) Vector Algebra

It is found that none of the courses has a prescribed textbook. I am of the opinion that there must be a prescribed text book for each course. For example, for the course Real Analysis, P. P. Goldberg's Real Analysis and Gopalakrishnan's University Algebra, or there are many standard books which can be prescribed for the main courses.

Dr. P. S. Chahal
HOD Mathematics
University of Jammu
Jammu

[Signature]
04/08/2021

Dated: 17 August 2021

Dr. Sushma Chib,
Convenor BOS in Mathematics,
Govt. College for Women, Parade,
Jammu

Dear Mam,

The content of the main courses and skill courses of 3rd and 4th semesters are adequate and do not require any further modifications, according to me. Thank you for asking for my input in this matter.

Yours sincerely,

Er. Rohit Singh Bhau



Sound Engineer & Music Producer



GOVERNMENT COLLEGE FOR WOMEN
PARADE GROUND JAMMU
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Syllabus for the Examinations to be held in 2021, 2022 and 2023
B.A/B.SC/BCA Semester-III (CBCS)

Subject: Mathematics

Course No: UMATC-301

Title: Real Analysis

Credits: 06

Duration of Examination:

Total Marks: 150

Internal Assessment Test: 01 Hour

Internal Assessment: 30 Marks

External Examination: 03 Hours

External Examination: 120 Marks

Objectives: The subject of real analysis is concerned with studying the behavior and properties of functions, sequences, and sets on the real number line, which we denote as the mathematically familiar \mathbb{R} . It is simply a nearly linear development of mathematical ideas you have come across throughout your study of mathematics. However, instead of relying on sometimes uncertain intuition (which we have all felt when we were solving a problem we did not understand), we will anchor it to a rigorous set of mathematical theorems.

Learning Outcomes: The students will learn about

- Real Numbers and the Axiom of Completeness
- Learn to define sequence in terms of functions from \mathbb{R} to a subset of \mathbb{R}
- Recognise bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence
- Sequences and Limits of Sequences
- The Monotone Convergence Theorem and the Bolzano- Weierstrass Theorem
- Infinite Series
- Open and Closed Sets of Real Numbers
- Compact, Perfect and Connected Sets
- Convergence Tests
- Limits of Functions and Continuity
- The Intermediate Value Theorem
- Derivatives and the Mean Value Theorem
- Sequences of Functions and Uniform Convergence
- Power Series

Syllabus:

UNIT-I

Finite and infinite sets, countable and uncountable sets, Real line, intervals, absolute value, triangle inequality, bounded and unbounded sets, suprema and infima of sets, axiomatic definition of real number system as a complete ordered field, the field of rational numbers is not complete, Archimedean property, existence of rational and irrational numbers between two distinct real numbers, concept of cluster points and statement of Bolzano-Weierstrass theorem. Examples and exercises based on these topics.

UNIT-II

Real sequences, bounded sequences, convergence and divergence of sequences, uniqueness of limit point, algebra of limits, Order preservation, Squeeze principle, Cauchy's first and second theorems on limits, Cauchy sequences, Cauchy's general principle of convergence for sequences, monotone sequences, monotone convergence theorem, Nested Interval theorem. Examples and exercises based on these topics.

UNIT-III

Infinite Series, Cauchy's Convergence criterion for series, positive term series, Geometric series, Comparison tests, p-test, Root test, Ratio test, Raabe's test (without proof), alternating series, Leibnitz test, absolute and conditional convergence. Examples and exercises based on these topics.

UNIT-IV

Sequences of real functions, point-wise and uniform convergence of sequences of functions, M_n -Test for uniform convergence of sequences of functions, Series of real functions, point wise and uniform convergence of series of functions, Weierstrass's M-Test for uniform convergence of series of functions. Examples and exercises based on these topics.

UNIT-V

Statement of results on sequences and series of real functions about uniform convergence and continuity, uniform convergence and integrability and uniform convergence and differentiability. Power series, radius of convergence and interval of convergence of power series. Examples and exercises based on these topics.

Books Recommended:

1. T. M. Apostol, Calculus (Vol. 1), John Wiley and Sons (Asia) P. Ltd., 2002.

Ahmed
H. Sharma

Bhil

2. R. G. Baste and D. R. Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. ltd., 2002.
3. E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4. K. A. Ross, Elementary Analysis-The theory of calculus series-Undergraduate Texts in Mathematics, Springer Verlag, 2003.
5. R.R. Goldberg's Methods of Real Analysis.

Or another standard textbook a class teacher can prescribe.

Instructions for paper Setters and candidates

For External Examination

The question paper for semester end examination will be of 120 marks and consist of three sections:

Section A (30 marks);

Five short answer type questions of 6 marks each, one from each unit. All questions will be compulsory.

Section B (50 marks);

Five medium answer type questions of 10 marks each, one from each unit. All questions will be compulsory.

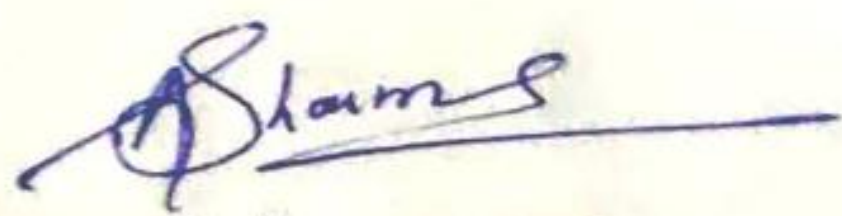
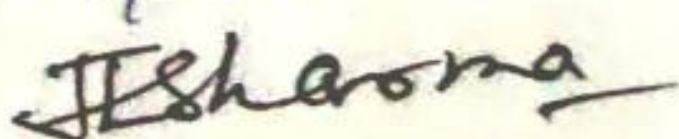
Section C (40 marks);

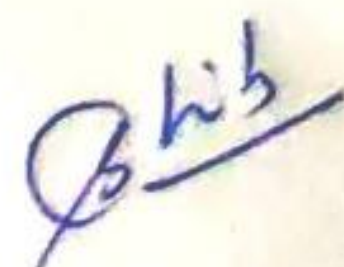
Five long answer type questions of 20 marks each, one from each unit. Each question will have two or three parts. The students will have to attempt any two questions.

For Internal Examination

The internal assessment will be of thirty marks in which 7.5 marks are for attendance and 22.5 marks for internal test.

The test will comprise of eight questions of 4.5 marks each from 50% of the syllabus covered and candidate will have to attempt any five questions.



The examination to be held in the session 2021, 2022 and 2023.

Core Courses B.A./B.Sc./B.C.A.(Prog.) Mathematics

Semester: I

Title: Differential Calculus
Course Number: UMATC-101

Semester: III

Title: Real Analysis
Course Number: UMATC-301

Semester: II

Title: Differential Equations
Course Number: UMATC-201

Semester: IV

Title: Abstract Algebra
Course Number: UMATC-401

Discipline Specific Elective (DSE) B.A./B.Sc./B.C.A.(Prog.) Mathematics

Semester: V

Title: Linear Algebra
Course Number: UMATDSE-501
or

DSE-2

Title: Matrices
Course Number: UMATDSE-502

Semester: VI

Title: Numerical Methods
Course Number: UMATDSE-601
or

DSE-2

Title: Complex Analysis
Course Number: UMATDSE-602

Generic Elective (GE) B.A. (Prog.) Mathematics

Semester: V

Title: Numerical Ability-I
Course Number: UMATGE-501

Semester: VI

Title: Numerical Ability-II
Course Number: UMATGE-601

Skill based Papers B.A./B.Sc./B.C.A.(Prog.) Mathematics

Semester: III

Title: Logics, Sets and Relation
Course Number: UMATS-301

Semester: IV

Title: Vector Analysis
Course Number: UMATS-401

Semester: V

Title: Probability and Statistics
Course Number: UMATS-501

Semester: VI

Title: Analytic Geometry
Course Number: UMATS-601



GOVERNMENT COLLEGE FOR WOMEN
PARADE GROUND JAMMU
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For Examinations to be held in 2021, 2022, and 2023
Skill Enhancement Course

Syllabus : Semester-III (CBCS) BA/BSc./BCA Mathematics

TITLE: Logic, Sets & Relation

TIME DURATION:

Sessional Exam: 40min

External Exam: 2hr

Code:UMATS-301

CREDITS: 02

TOTAL MARKS: 50

Sessional Assignment: 10

External Exam: 40

OBJECTIVES: The main objective of this course is to make all students be able to define set, inclusion, element, object, and roster notation. Identify the elements of a given set. Describe conventions used to list sets. List the elements of a set using roster notation. List the elements of a set by describing the set and the rules that its elements follows. Determine whether a relation is a function and identify the domain and range of a function.

Learning Outcomes: At the end of this course, student should be able to

- Define sets using the list or set builder notation and use the representation of a given set to distinguish membership properties of elements, subsets and perform its operations.
- Relate symbolic laws of logic to natural languages, and determine the truth value of unquantified sentences using logical rules.
- Analyze and determine the truth value of quantified sentences, given its universal set by constructing truth value table or by applying the concept of solution sets.
- Describe memberships of sets, including the empty set, using proper notation, and decide whether given items are members and determine the cardinality of a given set.
- Describe the relations between sets regarding membership, equality, subset, and proper subset, using proper notation.
- Perform the operations of union, intersection, complement, and difference on sets using proper notation.
- Be able to draw and interpret Venn diagrams of set relations and operations and use Venn diagrams to solve problems.
- Recognize when set theory is applicable to real-life situations, solve real-life problems, and communicate real-life problems and solutions to others.
- Define and provide an example of a relation
- Describe and provide examples of a function
- Compare and contrast a relation and a function

o **Syllabus**

Unit 1: Logic & Sets

Subunit 1: Logic

Introduction, Logic, Statement, Truth value of a Sentence, Compound sentence, Negation of a Sentence, Tautology, Contradiction, Converse, Inverse, Contrapositive. Theorems, examples and exercises based on these concepts.

Subunit 2: Sets

Introduction, Set, Empty set, Subset, Union of two sets, Intersection of two sets, Difference of two sets, Universal set, Complement of a set, Equal sets, Power set, Venn diagram. Theorems, examples and exercises based on these concepts.

Unit 2: Relations and Functions

Subunit 1: Relations

Cartesian product, Examples, theorems, Relation, Domain and range of a relation, Composition of relations, Inverse of relation, types of relation.

Subunit 2: Functions

Functions, Definition, types of function, Composition function, Properties of composition, Theorems, examples and exercises based on these concepts.

Books Recommended:

1. R. P. Grimaldi, **Discrete Mathematics and Combinatorial Mathematics**, Pearson education, 1988.
2. P. R. Halmos, **Naïve set Theory**, Springer, 1974.
3. E. Kamke, **Theory of Sets**, Dover Publishers, 1950.

Bhams
H Sharma

Bhish

Instructions for paper Setters and candidates

For External Examination

The question paper for semester end examination will be of 40 marks and consist of three sections:

Section A (08 marks);

Four short answer type questions of 2 marks each, two questions from each unit. All questions will be compulsory.

Section B (20 marks);

Four medium answer type questions of 5 marks each, two questions from each unit. All questions will be compulsory.

Section C (12 marks);

Three long answer type questions of 12 marks each, 1.5 questions from each unit. The students will have to attempt only one question of 12 marks from this section.

For Internal Examination

The internal assessment will be of ten marks in which no marks have been earmarked for attendance, however the eligibility criterion for appearing in the end semester examination shall remain the same as is followed in other courses.

The test will comprise of eight questions of 2 marks each from 50% of the syllabus covered and candidate will have to attempt any five questions.

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Purposed Project for 3rd Semseter for the Course: Logic, Sets & Relations:

Minor Project:

1. How PN-Junction Diodes can be used in OR, AND, NOT-Gate?

Or

2. How PN-Junction Diodes can be used in NOT, NAND, NOR-Gate?

Or

3. Draw working model for relation & Functions.

Major Project:

1. Half Wave Rectifier.

Or

2. Full wave Rectifier.

Or

3. To design and stimulate the Logic gate Circuit.

Or

4. Working model on types of functions injective, surjective, bijective.

J. Sharma
J. Sharma

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GOVERNMENT COLLEGE FOR WOMEN
PARADE GROUND JAMMU
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Syllabus for the Examinations to be held in 2021, 2022 and 2023

B.A/B.SC/BCA Semester-IV (CBCS)

Subject: Mathematics

Course No: UMATC-401

Title: Abstract Algebra

Credits: 06

Duration of Examination:

Total Marks: 150

Internal Assessment Test: 01 Hour

Internal Assessment: 30 Marks

External Examination: 03 Hours

External Examination: 120 Marks

Objectives: This course aims to provide a first approach to the subject of algebra, which is one of the basic pillars of modern mathematics. The students should have a background of sets and logic to grasp the content of this. The focus of the course will be the study of certain structures called groups, rings, fields and some related structures. Abstract algebra gives to student a good mathematical maturity and enables to build mathematical thinking and skill.

Learning Outcomes: By the end of the module the students should be able to:

- understand the basic concepts of group actions and their applications in both algebraic and geometric contexts
- understand the basic concepts of group presentations and use appropriate techniques and reasoning to derive properties of groups defined by generators and relations.
- Learn about the fundamental concepts of subgroups, normal subgroups, isomorphism theorems, cyclic and permutation groups
- understand the elementary concepts of rings such as the concepts of ideals, quotient rings, integral domains, and fields and appreciate the similarities and differences between the these concepts and those of group theory
- Comprehend axiomatic presentations of abstract data types and derive and prove their properties.

Syllabus:

UNIT-I

Binary operations, semi-groups, groups, abelian groups, non-abelian groups, finite groups and infinite groups with examples from number system, matrices, functions, the group Z_n of integers under addition modulo n , group $U(n)$ of units under multiplication modulo n , group of quaternion's. Results on semi-groups and groups. Permutation group (symmetric group), even and odd permutations. Examples and exercises based on these topics. (Theorem with proof)

UNIT-II

Subgroups, their characterization, intersection, union, product. Examples of subgroups including centre of a group, Normalizer of an element of a group, subgroup generated by a subset, Commutator subgroup of a group, characterization of an abelian group in terms of Commutator subgroup. Cyclic groups, their generators and properties. Examples and exercises based on these topics. (Theorem with proof)

UNIT-III

Order of an element of a group. Cosets, their examples and properties, index of a subgroup, Lagrange's theorem and its applications including Euler's theorem and Fermat's theorem. Normal subgroups, their examples and characterization, quotient groups. (Theorem with proof)

UNIT-IV

Homomorphism and isomorphism of groups and their examples, Kernel of a homomorphism, fundamental theorem of homomorphism including second and third laws of isomorphism, group of automorphisms, Inner automorphism, Cayley's theorem. Examples and exercises based on these topics. (Theorem with proof)

UNIT-V

Concepts of rings, commutative rings and non-commutative rings, integral domains and fields with examples from number systems, Z_n the ring of integer modulo n , ring of matrices, polynomial rings, rings of continuous functions, results on rings, integral domains and fields. Subrings, ideals, quotient ring, homomorphism and isomorphism, fundamental theorem of ring homomorphism. Examples and exercises based on these topics. (Theorem with proof)

J. Sharma
J. Sharma

BWS

Books Recommended:

1. John B. Fraleigh, A First course in Abstract Algebra, 7th Edition., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
4. George E Andrews, Number Theory, Hindustan Publishing Corporation, 1984.
5. Gopalakrishnan's University Algebra

Or any standard textbook a class teacher can prescribe.

Instructions for paper Setters and candidates

For External Examination

The question paper for semester end examination will be of 120 marks and consist of three sections:

Section A (30 marks);

Five short answer type questions of 6 marks each, one from each unit. All questions will be compulsory.

Section B (50 marks);

Five medium answer type questions of 10 marks each, one from each unit. All questions will be compulsory.

Section C (40 marks);

Five long answer type questions of 20 marks each, one from each unit. Each question will have two or three parts. The students will have to attempt any two questions.

For Internal Examination

The internal assessment will be of thirty marks in which 7.5 marks are for attendance and 22.5 marks for internal test.

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J. Sham

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The test will comprise of eight questions of 4.5 marks each from 50% of the syllabus covered and candidate will have to attempt any five questions.

The examination to be held in the session 2021, 2022 and 2023.

Core Courses B.A./B.Sc./B.C.A.(Prog.) Mathematics

Semester: I

Title: Differential Calculus
Course Number: UMATC-101

Semester: II

Title: Differential Equations
Course Number: UMATC-201

Semester: III

Title: Real Analysis
Course Number: UMATC-301

Semester: IV

Title: Abstract Algebra
Course Number: UMATC-401

Discipline Specific Elective (DSE) B.A./B.Sc./B.C.A.(Prog.) Mathematics

Semester: V

Title: Linear Algebra
Course Number: UMATDSE-501

or

DSE-2

Title: Matrices
Course Number: UMATDSE-502

Semester: VI

Title: Numerical Methods
Course Number: UMATDSE-601

or

DSE-2

Title: Complex Analysis
Course Number: UMATDSE-602

Generic Elective (GE) B.A. (Prog.) Mathematics

Semester: V

Title: Numerical Ability-I
Course Number: UMATGE-501

Semester: VI

Title: Numerical Ability-II
Course Number: UMATGE-601

Skill based Papers B.A./B.Sc./B.C.A.(Prog.) Mathematics

Semester: III

Title: Logics, Sets and Relation
Course Number: UMATS-301

Semester: IV

Title: Vector Analysis
Course Number: UMATS-401

Semester: V

Title: Probability and Statistics
Course Number: UMATS-501

Semester: VI

Title: Analytic Geometry
Course Number: UMATS-601



GOVERNMENT COLLEGE FOR WOMEN
PARADE GROUND JAMMU
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For Examinations to be held in 2021, 2022, 2023

Syllabus : Semester-IV (CBCS) BA/BSc./BCA Mathematics

TITLE: Vector Calculus

TIME DURATION:

Sessional Exam: 40min

External Exam: 2hr

Code: UMATS-401

CREDITS: 02

TOTAL MARKS: 50

Sessional Assignment: 10

External Exam: 40

OBJECTIVES: The main objective of teaching this course is to use the dot product to determine: the projection of a vector in another direction, the angle between two vectors and to do an engineering estimate of these quantities, also to find the cross product of two vectors.

Learning Outcomes: After the completion of the course, Students will be able to

- Write an expression for the derivative of a vector-valued function. Find the tangent vector at a point for a given position vector.
- Find the unit tangent vector at a point for a given position vector and explain its significance.
- Calculate the definite integral of a vector-valued function.
- Understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.

Syllabus

Unit 1:

Subunit 1: Dot product, Cross product, scalar triple product.

Subunit 2: Integration of vectors, definite integral. Indefinite integral, oriented curve, smooth curve, Work done and circulation.

Unit 2:

Subunit 1: Scalar function, Vector function, Derivative of a Vector function in term of its components, Constant Vector, articles and examples.

Subunit 2: Scalar and vector point function. Divergence of a vector point function and curl of a vector point function.

J. Sharma
J. Sharma

Bliz

Books Recommended:

1. Vector calculus by Shanti Narayan & P. K. Mittal, S. Chand Publications.
2. G. B. Thomas & R. L. Finney, Calculus, 9th edition, Pearson Education, Delhi, 2005.
3. P. C. Matthew's Vector Calculus, Springer Verlag London Limited 1998.
4. H. Anton, I Bivens & S. Davis, Calculus, John Wiley & Sons, Asia Private Limited, 2002.

Instructions for paper Setters and candidates

For External Examination

The question paper for semester end examination will be of 40 marks and consist of three sections:

Section A (08 marks);

Four short answer type questions of 2 marks each, two questions from each unit. All questions will be compulsory.

Section B (20 marks);

Four medium answer type questions of 5 marks each, two questions from each unit. All questions will be compulsory.

Section C (12 marks);

Three long answer type questions of 12 marks each, 1.5 questions from each unit. The students will have to attempt only one question of 12 marks from this section. .

For Internal Examination

The internal assessment will be of ten marks in which no marks have been earmarked for attendance, however the eligibility criterion for appearing in the end semester examination shall remain the same as is followed in other courses.

The test will comprise of eight questions of 2 marks each from 50% of the syllabus covered and candidate will have to attempt any five questions.

Shanti Narayan
P. K. Mittal

Shanti Narayan

Purposed Project for 4th Semseter for the Course: Vector Calculus:

Minor Project:

1. To find the weight of a given body using the parallelogram law of vectors with working model.
2. Position vector in 3d Space. Or
3. Vectors Math art integrated Project. Or

Major Project:

1. Wheat Stone Bridge. Or
2. Slide Wire Bridge. Or
3. Magnetic Field due to solenoid. Or
4. Magnetic field due to infinite long straight wire carrying current.

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Shams

Shams