UNIVERSITY OF KOTA

SCHEME OF EXAMINATION AND

COURSES OF STUDY

Faculty of Science

Bachelor of Science (B.Sc.)

Mathematics

(MAT9600P)

Semester- I, II, III, IV, V, VI

UNIVERSITY OF KOTA

MBS Marg, Near Kabir Circle, KOTA (Rajasthan)-324 005

INDIA

Edition: 2025

B.Sc. (Mathematics) Semester Scheme

Course Code MAT9600P

B.Sc. (Mathematics) I, II, III, IV Semester

Year / Semester	Serial Number, Code & Nomenclature of Paper			Duration of Exam	Teaching Hrs/Week & Credit			Distribution of Marks			Min. Pass Marks	
	Number	Code	Nomenclature		L	P	C	Internal Assess.	Sem. Assess.	Total Marks	Internal Assess.	Sem. Assess
I Year I Semester	MAT 101	DCC	Mathematics-1	3 Hrs	4	--	4	30	70	100	12	28
	MAT 102	DCC	Mathematics Practical-1	2 Hrs		2	2	--	50	50	--	25
	Total				04	02	06	30	120	150	--	
I Year II Semester	MAT 201	DCC	Mathematics-2	3 Hrs	4	--	4	30	70	100	12	28
	MAT 202	DCC	Mathematics Practical-2	2 Hrs		2	2	--	50	50	--	25
					04	02	06	30	120	150	--	
First Year Total					08	04	12	60	240	300	--	
II Year III Semester	MAT 301	DCC	Mathematics-3	3 Hrs	4	--	4	30	70	100	12	28
	MAT 302	DCC	Mathematics Practical -3	2 Hrs	--	2	2	--	50	50	--	25
	Total	04	02	06	30	120	150	--				
II Year IV Semester	MAT 401	DCC	Mathematics-4	3 Hrs	4	--	4	30	70	100	12	28
	MAT 402	DCC	Mathematics Practical -4	2 Hrs	--	2	2	--	50	50	--	25
	Total				04	02	06	30	120	150	--	
	Second Year Total				08	04	12	60	240	300	--	
III Year V Semester	MAT 501A	DSE	Mathematics-5A	3 Hrs	4	--	4	30	70	100	12	28
	MAT 501B	DSE	Mathematics-5B	3 Hrs	4	--	4	30	70	100	12	
	MAT 502	DSE	Mathematics Practical -5	2 Hrs	--	2	2	--	50	50	--	25
	Total	04	02	06	30	120	150	--				
III Year VI Semester	MAT 601A	DSE	Mathematics-6A	3 Hrs	4	--	4	30	70	100	12	28
	MAT 601B	DSE	Mathematics-6B	3 Hrs	4	--	4	30	70	100		
	MAT 602	DSE	Mathematics Practical -6	2 Hrs	--	2	2	--	50	50	--	25
	Total			04		02	06	30	120	150	--	
	Second Year Total			08		04	12	60	240	300	--	

Objectives of the Course:

- Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.
- A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.

- Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.
- Introduction to various courses like group theory, ring theory, field theory, metric spaces, number theory.
- Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- Ability to pursue advanced studies and research in pure and applied mathematical science.

Duration of the Course:

The B.Sc. [Bachelor of Science] program consists of three academic years separated into six semesters. Students who pass the first and second semester examinations have the option of graduating with a science certificate. Additionally, students have the choice to graduate with a diploma in science after completing the examinations for the third and fourth semesters. The student will receive a Bachelor of Science (B.Sc.) degree after successfully completing the three-year curriculum.

Eligibility for Admission:

The basic eligibility for admission to the course is XII with Physics, Chemistry and Mathematics for B.Sc. (Mathematics) with minimum marks as per the Govt. of Rajasthan Norms. The admission in the course is based on merit of XII class.

Structure of the Program:

The B.Sc. program consists of Core and applied courses of theory as well as practical papers which are compulsory for all students.

Maximum Marks:

Maximum marks of a theory and practical paper shall be decided on the basis of their contact hours/credit per week. One teaching hour per week shall equal to one credit and carry 25 maximum marks and therefore, four teaching hours per paper per week shall carry 100 maximum marks for each theory paper/course. Each four contact hours per week for laboratory or practical work shall be equal to two credits per week and carry 50 maximum marks.

Scheme of Examinations:

The examination shall be divided into two parts in which first part is internal assessment and second part is semester assessment or external assessment. The schemes for the internal and external examinations shall be as under:

a) The assessment of the student for theory paper shall be divided into two parts in which first part is internal assessment (30% of maximum marks) and second part is semester assessment or external assessment (70% of maximum marks). For practical papers there will be only one external assessment (100% of maximum marks).

b) The internal assessment for each theory paper shall be taken by the teacher concerned in the Department during each semester. There will be two components of internal assessment: one by test having 2/3 weightage (20 marks) and another by seminar / assignment / presentation / quiz /group discussion / viva-voce of 1/3 weightage (10 marks), for theory papers in each semester. Internal assessment test shall be of one hour duration for each paper and shall be taken according to academic calendar notified by the University / Departments. There will be no internal examination in the practical paper.

c) A student who remains absent (defaulter) or fails or wants to improve the marks in the internal assessment may be permitted to appear in the desired paper(s) (only one time) in the same semester with the permission of the concerned Head of the Department. A defaulter / improvement fee of Rupees 250/- per paper shall be charged from such candidates. Duly forwarded application of such candidates by the teacher concerned shall be submitted to HOD who may permit the candidate to appear in the internal assessment after depositing the defaulter/ improvement fee. A record of such candidates shall be kept in the Department.

d) The external assessment shall be of three hours duration for each theory paper and two hours

duration for practical paper. The practical examination shall be taken by the panel of at least one external and one internal examiner at the end of each semester.

e) Also proposed to include the one hour of practical is equivalent to one hour teaching workload of the faculty member

f) The syllabus for each theory paper is divided into five independent units and each theory question paper will have the format as mentioned below:

Section A: Compulsory Part-*There will be ten short answer type questions covering all units but not more than two questions from each unit.*
Section B:*long answer type questions* covering all units but not more than two questions from each unit, descriptive type. *Students have to attempt* 5 questions in Section B, taking one from each unit. *Paper setter shall be instructed to design question paper covering from all five units.*

g) The pattern of question paper of internal and external shall be as follows:

(A) Continuous or Internal Assessment-30% weightage of Maximum Marks
The internal assessment for each theory paper shall be taken by the teacher concerned in the Department during each semester as,

Continuous Assessment Weightage					External Assessment Weightage	Total
Regular Students		Private Student		Total	Paper based External Evaluation (End term examination)	Marks (Total credits)
Mid-Term	Seminar/ project / Presentation/ participation in different activities/ attendance	Report Writing	Viva-voce			
20	10	20	10	30	70	100 (04)

- The 30 marks of continuous assessment for each Mathematics paper will have a mid-term test of 20 marks and remaining 10 marks will be devoted to Seminar/ project / Presentation/ participation in different activities/ attendance. Also, only one chance to improve his/her marks of continuous assessment (mid-term) will also be given to the student in the same semester with a fee of Rs. 250/- per paper, after the approval of the competent authority of Department/College. For private students of B.Sc. program is also divided into two component as report writing (20 marks) and Viva-voce (10 marks) as mentioned above.
- **Report writing and Viva-voce:** Each private student of B.Sc. program will prepare a report on any topic of each course in minimum 1000 words from the prescribed syllabus of the concerned theory paper/course. The student needs to report the Concerned College at the time prescribed by the College/University to submit the report and the College will arrange a Viva-voce on that report. **It is proposed that the engaged teacher be paid at the rate of per answer book per student charges**. The examination section will generate an option of bill when the teacher fills the continuous assessment marks on examination portal (like done for external answer book evaluation). The various components of the report may be:

❖ Name of Course/Class:
❖ Name of Student:
❖ Father's/Husband Name:
❖ Examination Form No:
❖ Enroll. No:
❖ Name of College (Center):
❖ Name of Paper:
❖ Title of topic:

- No. of Unit of topic (as per prescribed syllabus):
- Introduction about the topic:
- Details/Analysis about the topic
- Conclusion of the topic:
- References:
-

(B) Semester or External Assessment- 70% weightage of Max. Marks

Semester or External Assessment:

Duration of Examination: 3 Hours **Max. Marks: 70**

SECTION-A: 10x2=20

(Answer all questions)

(Two question from each unit with no internal choice)

Q. No. 1

(i) …… **2 Mark**
(ii) …… **2 Mark**
(iii) …… **2 Mark**
(iv)…… **2 Mark**
(v)…… **2 Mark**
(vi)…… **2 Mark**
(vii)…… **2 Mark**
(viii)…… **2 Mark**
(ix)…… **2 Mark**
(x)…… **2 Mark**

SECTION-B: 5x 10 =50

(Answer all questions)

(One question from each unit with internal choice) (Maximum two sub-divisions only)

Q. No. 2. . ……

Or

……

Q. No. 3. ……

Or

……

Q. No. 4. ……

Or

……

Q. No. 5. ……

Or

……

Q. No. 6. ……

Or

……

(c) Distribution of Marks for Practical Examinations:

Duration of Exam: 02 Hours **Maximum Marks: 50**

	Name of Exercise	Marks
1.	Exercise No. 1 Exercise No. 2	30
2	Viva-voce	10
3	Practical Record	10
	Total Marks	50

Rules regarding determination of results:

Each semester shall be regarded as a unit for working out the result of the candidates. The result of each semester examination shall be worked out separately (even if he/she has appeared at the paper of the lower semester along with the papers of higher semester) in accordance with the following conditions:

a) The candidate shall be declared as pass in a semester examination, if he/she secures at least 40% marks in each theory paper separately in external & internal examination and 50% marks in each practical paper/project/dissertation with 40% aggregate marks in that semester.

b) A candidate declared as fail/absent in one or more papers at any odd semester examination shall be permitted to take admission in the next higher semester (even semester) of the same academic session.

c) A candidate may be promoted in the next academic session (odd semester) if he/she has cleared collectively at least 50% of the papers of both semesters of previous academic session. The candidate who does not fulfill the above condition will remain as an ex-student and will reappear in the due papers along with next odd/even semester exams.

d) If any student who is provisionally admitted in higher odd semester but could not secure prescribed minimum marks in previous semesters will be treated as ex-student and his/her admission fee will be carry forwarded to the next odd semester of forthcoming academic session.

e) If a candidate, who is declared as pass, wishes to improve his/her performance in the theory papers of previous semester, he/she may re-appear only one time in these papers in next odd/even semester examinations.

f) Candidate shall not be permitted to re-appear or improve the marks obtained in the external examination of practical / dissertation in any condition.

g) If the number of papers prescribed in a semester examination is an odd number, it shall be increased by one for the purpose of reckoning 50% of the papers for considering the student pass/fail.

h) A candidate may be given only two additional chances for passing the semester thus maximum tenure for completing for three years under-graduate program up to five years and so on.

i) The marks secured in the Gen Hindi, Gen English, Elementary Computer applications and Environment studies shall be counted in awarding the division to a candidate. The candidate shall have to clear the compulsory subjects in the additional three chances and non-appearance or absence in the examination of compulsory subjects shall be counted as chance and shall be declared fail in that examination.

j) The grace marks scheme shall be applicable as per university norms.

Classification of Successful Candidates:

The classification of successful candidates after last semester examination shall be as under:

Description of Marks Obtained	Division / Result
75% and above marks in a paper.	Distinction in that paper.
A candidate who has secured aggregate 60% and above marks	First Division
A candidate who has secured aggregate 50% and above but less than 60% marks	Second Division
A candidate who has secured aggregate 40% and above but less than 50% marks	Pass

Course Outcomes:

Programme Outcomes (POs)

PO1 – Scientific Thinking: Demonstrate the ability to apply scientific reasoning and logical thinking to analyze and solve problems.

PO2 – Practical & Technical Competence: Perform experiments, use scientific tools, and apply technical knowledge relevant to the science stream.

PO3 – Employability & Entrepreneurship: Apply scientific and analytical skills to secure industry jobs or initiate entrepreneurial ventures.

PO4 – Higher Education Preparedness: Exhibit readiness for advanced studies and professional courses such as Management, Law, and Applied Sciences.

PO5 – Social & Environmental Responsibility: Identify, analyze, and propose solutions to societal and environmental issues using scientific knowledge.

Programme Specific Outcomes (PSOs) – Mathematics Stream

PSO1 – Mathematical Literacy: Recall, interpret, and use standard mathematical notation, terminology, and conventions accurately.

PSO2 – Global & Local Relevance: Analyze mathematical applications in addressing both global challenges and local issues.

PSO3 – Modelling & Problem-Solving: Formulate mathematical models, solve problems effectively, and communicate results clearly.

PSO4 – Application of Knowledge: Convert real-life problems into mathematical form, apply relevant formulas, and draw logical conclusions.

PSO5 – Positive Mathematical Outlook: Demonstrate a constructive attitude towards mathematics as a valuable and intellectually stimulating discipline.

SEM-I
MAT101- MATHEMATICS-1

Duration 3 hrs. **Max. Marks: 70**

Note: The question paper will contain three sections as under –
Section-A: One compulsory question with 10 parts, having 2 parts from each unit. (Total marks : 10 x 2 = 20)
Section-B: 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit (Total marks : 10 x 5 = 50)
Lecture- Sixty Lectures including diagnostic and formative assessments during lecture hours.

Unit I

Binary operation. Addition and multiplication modulo operations. Definition of a group with examples and simple properties, Permutation group, cycle, transpositions, even and odd permutations and alternating group. Order of an element of a group and its properties.

द्विआधारी संक्रिया . जोड़ और गुणन मॉड्यूलो ऑपरेशन । समूह की परिभाषा एवं उदाहरण तथा सामान्य गुणधर्म, क्रमचय पक्षांतरण समूह, चक्र, स्थानान्तरण, सम और विषम क्रमचय और एकांतर समूह। किसी समूह के अवयवों का कोटि और उसके गुणधर्म ।

Unit-II

Subgroups of a group with its properties, Cyclic groups and their properties, Cosets. Index of a subgroup, Lagrange's theorem and its applications.

Normal subgroups with properties. Simple groups, Quotient groups.

किसी समूह के उपसमूह, उपसमूह के गुणधर्म, चक्रीय समूह और उनके गुणधर्म, सहसमुच्चय । उपसमूह का सूचकांक, लैग्रेंज का प्रमेय और उसके अनुप्रयोग। उपसमूह और उनके गुणधर्म सरल समूह, विभाग समूह।

Unit-III

Polar coordinates, angle between radius vector and tangent, polar sub tangent and subnormal. Perpendicular from pole on tangent. Pedal equation of a curve. Derivative of length of an arc in cartesian and polar coordinates. Curvature, Radius of curvature and its formula in various forms. Centre of curvature, chord of curvature.

ध्रुवीय निर्देशांक, ध्रुवंतर रेखा और स्पर्शरेखा के बीच का कोण, ध्रुवीय अधःस्पर्शी रेखा और अधोलम्ब, ध्रुव से स्पर्शरेखा पर लंब. एक वक्र का पदिक समीकरण, कार्तीय और ध्रुवीय निर्देशांक में चाप की लंबाई का व्युत्पन्न। वक्रता, वक्रता की त्रिज्या और विभिन्न रूपों में इसका सूत्र। वक्रता केंद्र, वक्रता जीवा .

Unit-IV

Ellipse : standard equation, auxiliary circle, eccentric angle, tangent, normal, two tangents from point, chord of contact, pole, polar, chord whose mid point given, diameter, conjugate diameters and four normals from a point.

Hyperbola : Standard equation, parametric co-ordinates, asymptotes, equation referred to asymptotes as axes, conjugate diameters and rectangular hyperbola

दीर्घवृत्त: मानक समीकरण, सहायक वृत्त, उत्केन्द्र कोण, स्पर्श रेखा, अभिलम्ब, बिंदु से दो स्पर्श रेखाएं, स्पर्शजीवा, ध्रुव, ध्रुवी, जीवा जिसका मध्य बिंदु दिया गया है, व्यास, संयुग्मी व्यास और एक बिंदु से चार अभिलम्ब

अतिपरवलय: मानक समीकरण, प्राचलिक निर्देशांक, अनंतस्पर्शी, समीकरण जिसके अक्ष अनंत्स्पर्शी हों, संयुग्मी व्यास और आयताकार अतिपरवलय

Unit-V

Cone : Homogeneous equation in x, y, z, cone with a given vertex and given base, enveloping cone, condition for the general equation to represent a cone, tangent plane, reciprocal cone, angle between the two lines, in which a plane cuts a cone, three mutually perpendicular generators and right circular cone.

Cylinder : Right circular cylinder and enveloping cylinder.
शंकु: x, y, z में सजातीय समीकरण, एक दिए गए शीर्ष और दिए गए आधार के साथ शंकु, आवरण शंकु, एक शंकु का प्रतिनिधित्व करने के लिए सामान्य समीकरण की स्थिति, स्पर्श समतल विमान, व्युत्क्रम शंकु, दो रेखाओं के बीच का कोण, जिसमें एक समतल एक शंकु को काटता है, तीन परस्पर लंबवत जनक रेखाएं और लंब वृत्तीय शंकु।
बेलन : लम्ब वृतीय बेलन और अन्वालोप बेलन।

MAT102- Mathematics Practical

Duration 2 hrs. **Min. Pass Marks 25** **Max. Marks 50**

Practical Marks-50
B.A/B.Sc. Semester I (Total Marks- 50)

Record	-	10
Practical -1	-	15
Practical -II	-	15
Viva-Voce	-	10

1. Application of Gauss Theorem.
2. Application of Stokes Theorem
3. Problems related to Pedal Equations
4. Problem related to permutation group.
5. Applications of Lagrange's Theorem
6. Problem related to Normal Subgroups.
7. Problem related to Ellipse.
8. Problem related to Hyperbola.
9. Problem related to Cone.
10. Problem related to Cylinder.

1. गॉस प्रमेय का अनुप्रयोग.
2. स्टोक्स प्रमेय का अनुप्रयोग
3. पेडल समीकरण से संबंधित समस्याएं
4. क्रमचय समूह से संबंधित समस्या।
5. लैग्रेंज प्रमेय के अनुप्रयोग
6. सामान्य उपसमूहों से संबंधित समस्या।
7. दीर्घवृत से सम्बंधित समस्या.
8. अतिपरवलय से सम्बंधित समस्या.
9. शंकु से सम्बंधित समस्या.
10. बेलन से जुड़ी समस्या.

SEM-II
MAT201- MATHEMATICS-2

Duration 3 hrs. **Max. Marks:70**

Note: The question paper will contain three sections as under –
Section-A : One compulsory question with 10 parts, having 2 parts from each unit.
Total marks:20
Section-B : 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit. Total marks: 50

Lecture- Sixty Lectures including diagnostic and formative assessments during lecture hours.

Unit I

Group homomorphism with its kernel and properties. Isomorphism, Cayle's theorem, automorphism, Fundamental theorem of homomorphism. Rings, Zero divisors, integral domains and fields. Characteristic of a ring, Subrings. Ideals and their properties.

अष्टि और गुणों के साथ समूह समाकारिता । तुल्यकारिता, केली का प्रमेय, स्वकारिता , समाकारिता की मूल प्रमेय । वलय, शून्य भाजक, पूर्णाकीय प्रान्त और क्षेत्र। वलय का अभिलक्षण, उपवलय । गुणजावली और उनके गुण.

Unit-II

Partial differential coefficients of a function of two or more variables. Total differential coefficient. Composite function, Euler's theorem on homogeneous functions of two, three and more variables. First and second differential coefficients of an implicit function. Taylor's theorem for a function of two variables. Asymptotes, envelopes. Test for points of inflexion and multiple points. Test for concavity and convexity. Tracing of curves in cartesian and polar coordinates.

दो या दो से अधिक चर वाले फलन के आंशिक अवकलन, पूर्ण अवकलन, समग्र फलन, दो, तीन और अधिक चरों के समघातीय फलनों पर आयलर का प्रमेय। किसी अस्पष्ट फलन का पहला और दूसरा अवकलन । दो चरों के एक फलन के लिए टेलर का प्रमेय। अनंत स्पर्शी, अन्वालोप । नति परिवर्तन बिंदुओं और बहुल बिंदुओं के लिए परीक्षण। अवतलता और उत्तलता के लिए परीक्षण. कार्तीय और ध्रुवीय निर्देशांक में वक्रों का अनुरेखण।

Unit-III

Quadrature, Rectification, Volumes and surfaces of solids of revolution. Differentiation under the sign of integration. Beta and Gamma functions. Double integrals and their evaluation by change of order and changing into polar coordinates. Triple integrals, Dirichlet's double and triple integrals with their Liouville's extension.

क्षेत्रकलन, चापकलन, परिक्रमण- ठोसों के आयतन एवं पृष्ठ । समाकलन चिन्ह के अंतर्गत अवकलन। बीटा और गामा फलन, द्विसमाकलन और क्रम परिवर्तन के उपरांत हल तथा ध्रुवीय निर्देशांक में परिवर्तन द्वारा उनका हल । त्रिसमाकल , डिरिचलेट के द्वि और त्रि समाकल उनके लिओविले विस्तार

Unit-IV

Polar Equation of conic : Standard equation, directrix, tangent, normal, polar and asymptotes.
Sphere : standard equations in various forms, plane section, sphere through the circle of intersection of two spheres, power of a point, tangent plane, polar plane, polar line, angle of intersection of two spheres, length of tangent, radical plane, radical axis, co-axial system of spheres and limiting points.

शांकव का ध्रुवीय समीकरण: मानक समीकरण, नियता, स्पर्शरेखा, अभिलम्ब, ध्रुवी और अनंतस्पर्शी। गोला: विभिन्न रूपों में मानक समीकरण, समतल परिच्छेद , दो गोलों के प्रतिच्छेदन वृत्त के माध्यम से गोला, बिंदु की शक्ति, स्पर्श तल, ध्रुवीय तल, ध्रुवीय रेखा, दो गोले के प्रतिच्छेदन का कोण, स्पर्शरेखा की लंबाई, ध्रुवीय तल, रेडिकल अक्ष, गोले की सम-अक्षीय प्रणाली और सीमान्त बिंदु

Unit-V

Central Conicoid : Standard equation, tangent plane, condition of tangency, director sphere, polar plane, polar lines, section with a given center, enveloping cone, enveloping cylinder. Ellipsoid :

Normal, six normals from a point, cone through six normals, conjugate diameters and their properties.

केंद्रीय शांकवज: मानक समीकरण, स्पर्शरेखा तल, स्पर्शरेखा की स्थिति, निदेशक क्षेत्र, ध्रुवीय तल, ध्रुवीय रेखाएं, दिए गए केंद्र के साथ परिच्छेद , आवरण शंकु, अन्वालोप बेलन।दीर्घवृत्तज: अभिलम्ब, एक बिंदु से छह अभिलम्ब , छह अभिलम्ब से शंकु, संयुग्म व्यास और उनके गुणधर्म।

MAT202P - MATHEMATICS PRACTICAL

Duration 2 hrs. **Min. Pass Marks 25** **Max. Marks 50**

Practical Marks-50

B.A/B.Sc. Semester II (Total Marks- 50)

Record	-	10
Practical -1	-	15
Practical -II	-	15
Viva-Voce	-	10

1. Application of fundamental theorem of Homomorphism
2. Problem related to Spheres.
3. Problem related to co axial system of spheres.
4. Problem related to Asymptotes.
5. Problem related to differentiations of composite functions.
6. Application of Euler's theorem.
7. Problem related to curve tracing.
8. Applications of Beta and Gamma function.
9. Problems related to Number Theory and its applications.

1. समरूपता के मौलिक प्रमेय का अनुप्रयोग
2. **गोले** से संबंधित समस्या.
3. गोले की सह-अक्षीय प्रणाली से संबंधित समस्या।
4. अनंत्स्पर्शी से सम्बंधित समस्या।
5. समग्र फलनों के विभेदन से संबंधित समस्या।
6. आयलर प्रमेय का अनुप्रयोग.
7. कर्व ट्रेसिंग से जुड़ी समस्या.
8. बीटा और गामा फ़ंक्शन के अनुप्रयोग।
9. संख्या सिद्धांत और उसके अनुप्रयोगों से संबंधित समस्याएं।

SEMESTER I & II - Suggested Books

1. Shanti Narayan, A text book of Modern Abstract Algebra, S. Chand and Co. New Delhi.
2. A, R, Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut
3. Pundir and Pundir, Theory of numbers , Pragati Prakashan, Meerut.
4. J. N. Sharma & A. R. Vasishtha, Vector Calculus, Krishna Prakashan Mandir, Meerut.
5. S. L. Loney, the elements of coordinate Geometry, Macmillan and Company, London
6. R. J. T. Bell, Elementary Treatise on Coordinate Geometry of Three dimension Macmillan
7. M. Ray & S. S. Seth, Differential calculus, students, friends & Co. Agra
8. M. Ray & S. S. Seth, Integral calculus, students, friends & Co. Agra.
9. Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.

SEM-III
MAT301- MATHEMATICS-3

Duration 3 hrs. **Max. Marks: 70**

Note: The question paper will contain three sections as under –
Section-A: One compulsory question with 10 parts, having 2 parts from each unit.
(Total marks : 10 x 2 = 20)
Section-B: 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit (Total marks : 10 x 5 = 50)
Lecture- Sixty Lectures including diagnostic and formative assessments during lecture hours.

Unit-I

The set of real numbers as a complete ordered field, incompleteness of Q, Archimedean and denseness properties of R , Modulus, Intervals , Equivalent sets. Finite and infinite sets, denumerable sets, Countable and uncountable sets. Interior point of a set, open set, limit point of a set, Bolzano-Weierstrass theorem. Closed set. Dense in itself and perfect sets. Cantor's ternary set

वास्तविक संख्याओं का समुच्चय एक पूर्ण क्रमित क्षेत्र के रूप में। Q की अपूर्णता। R की आर्किमिडियन और घनत्व गुण। मापांक, अंतराल, तुल्य समुच्चय। सीमित और असीमित समुच्चय। गणनीय समुच्चय और अगणनीय समुच्चय। किसी समुच्चय का आंतरिक बिंदु, विवृत समुच्चय , सीमा बिंदु, बोल्ज़ानो-वायसट्रास प्रमेय। संवृत समुच्चय, स्वयं में सघन और संपूर्ण समुच्चय । कैंटर का टर्नरी समुच्चय।

Unit-II

Definition of limit of a function. Continuity of function - Cauchy's and Heine's definitions with their equivalence. Types of discontinuities. Properties of continuous functions defined on closed intervals. Uniform continuity. Differentiability, Rolle's theorem, Lagrange's and Cauchy's mean value theorems and their geometrical interpretations. Taylor's theorem with various forms of remainders. Darboux's intermediate value theorem for derivatives.

किसी फलन की सीमा की परिभाषा। फलन की सान्त्यता - कोशी और हाइनी की परिभाषाएँ और उनकी तुल्यता। असान्तत्य के प्रकार। संवृत अंतराल पर सान्तत्य फलनों के गुण। समान सान्तत्यता। अवकलनीयता। रोल के प्रमेय, लैग्रेंज और कौशी के माध्य मान प्रमेय और उनके ज्यामितीय अर्थ। टेलर का प्रमेय विभिन्न शेषांकों के रूपों के साथ। डारबॉ का मध्य मान प्रमेय अवकलजों के लिए।

Unit-III

Differential equations of first order and first degree, variables separable, homogeneous equations. Linear equations and equations reducible to linear form. Exact differential equations and equations reducible to exact forms. Differential equations of first order but not of first degree. Solvable for x, y, p Clairaut's form, singular solutions. Geometrical meaning of a differential equation, orthogonal trajectories

प्रथम कोटि और प्रथम श्रेणी के अवकल समीकरण, चरों का पृथक्करण , समजातीय समीकरण। रैखिक समीकरण और रैखिक रूप में समानीत होने वाले समीकरण। यथातथ अवकल समीकरण और यथातथ रूप में किये जा सकने वाले समीकरण। प्रथम कोटि के लेकिन प्रथम श्रेणी के नहीं अवकल समीकरण। x,y,p के साधनीय क्लेरेट रूप , विचित्र हल। अवकल समीकरण का ज्यामितीय अर्थ, लंबवृत्तीय प्रक्षेप पथ।

Unit- IV

Linear differential equations with constant coefficients, Homogeneous linear differential equations, Total differential equations. Linear differential equations of second order. Transformation by changing the dependent / independent variable. Method of variation of parameters, Exact differential equations and certain particular forms of equations.

अचर गुणांक वाले रैखिक अवकल समीकरण। समघात रैखिक अवकल समीकरण। सम्पूर्ण अवकल समीकरण।द्वितीय श्रेणी के रैखिक अवकल समीकरण। स्वतंत्र/परतंत्र चर को बदलकर रूपांतरण। प्राचल वितरण विधि यथार्थ अवकल समीकरण और कुछ विशेष रूप।

Unit- V

Analytical Conditions of equilibrium of a rigid body under coplanar forces. Friction. Centre of Gravity, Common Catenary

समतल बलों के तहत पिंड की साम्यवस्था की विश्लेषणात्मक शर्तें। घर्षण। गुरुत्व केंद्र। साधारण केटेनरी।

MAT302P - MATHEMATICS PRACTICAL

Duration 2 hrs. **Min. Pass Marks 25** **Max. Marks 50**

Practical Marks-50
B.A/B.Sc. Semester III (Total Marks- 50)

Record	-	10
Practical -1	-	15
Practical -II	-	15
Viva-Voce	-	10

List of Practical:

1. Solution of differential equations using Picard's method and comparison with exact solution.
2. Solution of differential equations using Euler's method and comparison with exact solution.
3. Formation of the ordinary differential equation.
4. Singular solution of differential equations.
5. Solution of differential equations using variation of parameters method
6. Application of differential equations to solve LCR-circuits and harmonic motions.
7. Solution of differential equation using series solution
8. Applications of Rolles Mean Value Theorem
9. Applications of Cauchy's Mean Value Theorem
10. Applications of Centre of Gravity

1. पिकार्ड की विधि से अवकल समीकरण का हल और यथार्थ हल से तुलना
2. आयलर की विधि से अवकल समीकरण का हल और यथार्थ हल से तुलना
3. सामान्य अवकल समीकरण का गठन।
4. विशेष अवकल समीकरण का हल।
5. चर मान पद्धति का उपयोग करके अवकल समीकरण का हल।
6. अवकल समीकरणों का उपयोग करके LCR-सर्किट और हार्मोनिक गति को हल करना।
7. श्रेणी हल का उपयोग करके अवकल समीकरण का हल।
8. रोल्स के माध्य मान प्रमेय का अनुप्रयोग
9. कॉशी के माध्य मान प्रमेय का अनुप्रयोग
10. गुरुत्व केंद्र का अनुप्रयोग

SEM-IV
MAT402- MATHEMATICS-4

Duration 3 hrs. **Max. Marks: 70**

Note: The question paper will contain three sections as under –
Section-A: One compulsory question with 10 parts, having 2 parts from each unit.
(Total marks : 10 x 2 = 20)
Section-B: 10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit (Total marks : 10 x 5 = 50)
Lecture- Sixty Lectures including diagnostic and formative assessments during lecture hours.

Unit-I

Definition of a sequence, Theorems on limit of sequence, bounded and monotonic sequences, nested interval theorem, Cauchy's sequence, Cauchy's convergence criterion. Convergence of series of non-negative terms, their various tests (Comparison; D'Alembert's ratio, Cauchy's n^{th} root, Raabe's, Gauss, Logarithmic, De-morgan and Bertand's, Cauchy's condensation, proof of tests not required) for convergence, Alternating series, Leibnitz's test, Series of arbitrary terms, absolute and conditional convergence.

अनुक्रम की परिभाषा। अनुक्रम की सीमा पर प्रमेय। परिबद्ध और एकदिष्ट अनुक्रम। नीडित अंतराल प्रमेय। कौशी अनुक्रम। कौशी का अभिसरण सिध्धांत ।अऋणात्मक पदों के श्रेणियों का अभिसरण। अभिसरण के लिए विभिन्न परीक्षण (तुलना; डी'अलेम्बर्ट का अनुपात, कौशी का n^{th} मूल राबे, गॉस, लघुगणकीय डी-मॉर्गन और बर्ट्रेंड का, कौशी का संघनन, (परीक्षण का प्रमाण आवश्यक नहीं) एकांतर श्रेणी। लेबनीज का परीक्षण। याद्रक्षिक पदों की श्रेणियां। निरपेक्ष और सप्रतिबन्ध अभिसरण।

Unit-II

Darboux sums and their properties. Riemann integral, Integrability of continuous and monotonic functions. Mean value theorems of integral calculus, The fundamental theorem of integral calculus.Improper integrals and their convergence comparison tests. Abel's and Dirichlet's tests.method.

डारबॉ योगफल और उनके गुण। रीमान समाकल। सांतत्य और एकदिष्ट फलनों की समाकलनीयता। समाकल गणित के मध्य मान प्रमेय। समाकल गणित का मूलभूत प्रमेय। अनंत समाकल और उनका अभिसरण परीक्षण। एबल एवं डिरीचलेट परीक्षण विधि

Unit-III

Partial differential equations of first order, Lagrange's solution. Charpit's general method of solution. Partial differential equations of second and higher orders. Classification of linear partial differential equations of second order. Homogeneous and non-homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficients. Monge's method.

प्रथम कोटि के आंशिक अवकल समीकरण। लैग्रेंज का हल । चारपिट की व्यापक विधि। द्वितीय और उच्चतर श्रेणियों के आंशिक अवकल समीकरण। द्वितीय श्रेणी के रैखिक आंशिक अवकल समीकरणों का वर्गीकरण। अचर गुणांक वाले समघात और विषम घात समीकरण। अचर गुणांक वाले समीकरणों में समानीत आंशिक अवकल समीकरण। मॉन्गे की विधि।

Unit- IV

Simple harmonic motion. Motion under repulsion varying as the distance from a point, motion under inverse square law. Motion under earth's attraction. Hooke's Law, Horizontal and vertical elastic strings rectilinear motion in a resisting medium. Velocity and acceleration along radial and transverse directions and along tangential and normal directions.

सरल आवर्त गति। बिंदु से दूरी के रूप में विभिन्न प्रतिकारक गतियाँ। प्रतिलोम वर्ग नियम के तहत गति। पृथ्वी के आकर्षण के तहत गति। हुक का नियम। क्षैतिज और ऊर्ध्वाधर प्रत्यास्थ डोरी, प्रतिरोधक माध्यम में सरल रेखीय गति।ध्रुवान्तर और अनुप्रस्थ दिशाओं में वेग और त्वरण। स्पर्शरेखा और अभिलम्ब दिशा में गति।

Unit- V

Projectiles: Motion on horizontal and inclined planes. Direct and oblique impact. Constrained Motion- Circular and Cycloidal.

प्रक्षेप्य: क्षैतिज और नत तल पर गति। समक्ष एवं तिर्यक संघट्ट, प्रतिबंधित गति- वर्तुल एवं चक्रीय

MAT402P - MATHEMATICS PRACTICAL

Duration 2 hrs. Min. Pass Marks 25 Max.Marks 50

Practical Marks-50

B.A/B.Sc. Semester IV (Total Marks- 50)

Record	-	10
Practical -1	-	15
Practical -II	-	15
Viva-Voce	-	10

List of Practical:

1. Applications of Charpit methods
2. Applications of Monges Methods
3. Problems on Damped Simple Harmonic Motion
4. Motion of a particle under resisting medium (Rectilinear motion in resistance varies as velocity and square of velocity)
5. Problems on Projectiles: Motion on horizontal and inclined planes
6. Solve heat equation by separation of variable method (one dimensional)
7. Solve wave equation by separation of variable method (one dimensional)
8. Find convexity and concavity of the plane curve
9. Applications of D'Almbert's Ratio
10. Applications of Abel's and Dirichlet's tests

1. चारपिट विधियों के अनुप्रयोग।
2. मॉन्गे की विधियों के अनुप्रयोग।
3. मंदित सरल आवर्त गति पर समस्याएँ।
4. प्रतिरोधक माध्यम में कण की गति (वेग और वेग के वर्ग के समानुपाती प्रतिरोधित एक रेखीय गति)।
5. प्रक्षेप्य पर समस्याएँ: क्षैतिज और नत तल पर गति।
6. विभाजन चर पद्धति द्वारा ऊष्मा समीकरण को हल करना (एक-आयामी)।
7. विभाजन चर पद्धति द्वारा तरंग समीकरण को हल करना (एक-आयामी)।
8. समतल वक्र की उत्तलता और अवतलता ज्ञात करना
9. डालम्बर्ट के अनुपात का अनुप्रयोग
10. एबेल और डिर्चलिट् परीक्षणों का अनुप्रयोग

SEM-V
MAT-501 -Mathematics -5 (A)

Time duration : 3 Hrs **Max Marks : 70**

Note : Each question paper will contain two sections as under –

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total marks : 20

Section-B :10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total marks : 50

Unit I

Definition and examples of a vector space, Subspace of a vector space, Linear combination and Linear span, Linear dependence and independence of vectors, direct sums of subspaces.

सदिश समिष्टि (परिभाषा एवं उदाहरण) उपसदिश समिष्टि, सदिशों का एकघात संचय, रैखिक विस्तरती, रैखिक आश्रितता, रैखिक स्वतंत्रता, उपसमिष्टियों का सरल योग |

Unit II

Basis and dimension of finitely generated spaces. Quotient space, Linear transformation, Rank and nullity of linear transformation.

आधार एवं विमा, विभाग समिष्टि, रैखिक रूपांतरण, रैखिक रूपांतरण की कोटि एवं शुन्यता |

Unit III

Characteristic values and characteristic vectors of matrices and Linear transformation and their properties.

मेट्रिक्स एवं रैखिक रूपांतरण के अभिलाक्षणिक मान एवं अभिलाक्षणिक सदिश तथा उनके गुणधर्म |

Unit IV

Complex numbers as ordered pairs. Geometric representation of complex numbers. Stereographic projection, Limit, Continuity and differentiability of a complex valued function. Analytic functions. Cauchy-Riemann equations. Harmonic functions. Determination of conjugate function.

क्रमित युग्म में सम्मिश्र संख्याएँ, सम्मिश्र संख्याओं का ज्यामितीय निरूपण, त्रिविम प्रक्षेपण. सम्मिश्र चरों के सम्मिश्र मान के फलनों की सीमा, सांतत्यता, अवकलनीयता, विश्लेषिक फलन, कोशी-रीमन समीकरण, प्रसंवादी फलन, संयुग्मी फलन का निर्धारण|

Unit V

Mapping or Transformation, Isogonal and conformal mappings neccessary and sufficient conditions for a conformal mapping. Mobious Transformation, Fixed points, Cross ratio, Inverse points, Mapping by elementary function.

प्रतिचित्रण या रूपांतरण, तुल्यकोणीय तथा अनुकोण प्रतिचित्रण, अनुकोण प्रतिचित्रण के लिए आवश्यक एवं प्रयाप्त प्रतिबन्ध, मोबियस रूपांतरण, निश्चर बिंदु, बज्रानुपात, प्रतिलोम बिंदु, प्रारंभिक फलनों का रूपांतरण.

References:

1. Shanti Narayan : A course of Mathematical Analysis, S.Chand & Co., New Delhi
2. Shanti Narayan : Theory of functions of a complex variable, S.Chand & Co., New Delhi
3. Malik, Arora: Mathematical Analysis, New Age Publications Delhi
4. Churchill & Brown - Complex Analysis, Tata Mcgraw Hill
5. I. N. Herstien, Topics in Linear Algebra, Wiley Eastern.
6. S. Lang, Linear Algebra
7. Sharma & Vashistha, Linear Algebra, Krishna Prakashan Mandir, Meerut.

SEM-V
MAT-502 -Mathematics -5 (B)

Time duration : 3 Hrs **Max Marks : 70**

Note : Each question paper will contain two sections as under –

Non programmable scientific calculator is allowed in this paper.

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : 20

Section-B :10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 50

Unit I

Central moments, First four central moments in terms of raw moments and vise-versa. Karl-Pearson's Beta and Gamma coefficients. Measure of skewness and kurtosis. Random experiment. Sample space, Event, Types of events

केंद्रीय आघूर्ण: प्रथम चार केंद्रीय आघूर्ण, मूल आघूर्ण एवं इनके परस्पर सम्बन्ध. कार्ल पियर्सन के बीटा एवं गामा गुणांक, विषमतता का मापन एवं ककुदता: याद्रछिक प्रयोग, नमूना समिष्टि, घटना, घटनाओं के प्रकार |

Unit II

Probability and Conditional probability of an event. Independent events, Theorems of compound and total probabilities, Baye's Theorem and its applications.

प्रायिकता एवं सहप्रतिबंध प्रायिकता, स्वतंत्र घटनाए, युग्म एवं सम्पूर्ण प्रायिकता के प्रमेय, बेय का प्रमेय एवं इसके सरल अनुप्रयोग |

Unit III

Random variable, discrete and continuous random variables, Probability distribution of a discrete random variable, Probability density function of a continuous random variable. Distribution functions

याद्रछिक चर-विविक्त एवं संतत चर, विविक्त चर के लिए प्रायिकता बंटन, संतत चर के लिए प्रायिकता घनत्व फलन, बंटन फलन

Unit IV

Mathematical expectation of a random variable and of a function of random variable, Moments and Moment generating function, Cumulant generating function and cumulants, Characteristic functions.

याद्रछिक चरों एवं फलन की गणितीय प्रत्याशा, आघूर्ण एवं आघूर्ण जनक फलन, संचयी एवं संचयी जनक फलन, अभिलाक्षणिक फलन

Unit V

Discrete and continuous distributions with properties : Bernouli, Binomial, Poisson and Normal distributions.

विविक्त एवं संतत बंटन एवं उनके गुणधर्म : बरनौली, द्विपद, प्वांसो एवं प्रसामान्य बंटन

References:

1. S.C.Gupta & V.K.Kapoor: Elementary mathematical statistics, Sultan Chand &Sons, N.Delhi
2. M.Ray & HS Sharma: Mathematical Statistics, Ramprasad & Sons, Agra
3. P.N.Chatterjee & R.Pundir, Mathematical statistics, Pragati Prakashan, Meerut.

MAT502P - MATHEMATICS PRACTICAL

Practical Marks-50
B.A/B.Sc. Semester V (Total Marks- 50)
Record - 10
Practical -1 - 15
Practical -II - 15
Viva-Voce - 10

LIST OF PRACTICAL

1. Theorems on Linear dependence and independence of vectors and applications.
   सदिशों की रैखिक आश्रितता एवं रैखिक स्वतन्त्रता पर आधारित प्रमेय एवं उनके अनुप्रयोग।
2. Problem related to Rank and Nullity of a Linear Transformation.
   रैखिक रूपान्तरण की कोटि एवं शून्यता से सम्बन्धित समस्याऐं।
3. Eigen value of Linear transformation vectors.
   सदिस के लिए रैखिक रूपान्तरण के अभिलाक्षणिक मान।
4. Analytic functions and Application of Cauchy-Riemann equations.
   विश्लेषिक फलन एवं कॉशी रीमान समीकरण के अनुप्रयोग।
5. Problems related to the necessary and sufficient conditions for a conformal mapping.
   अनुकोण प्रतिचित्रण के लिए आवश्यक एवं पर्याप्त प्रतिबंधों से सम्बन्धित समस्याऐं।
6. Mapping by elementary functions.
   प्रारंभिक फलनों के द्वारा प्रतिचित्रण
7. Problem related to measures of Skewness and Kurtosis..
   विषमता का मापन एवं ककुदता से सम्बंधित समस्याऐं।
8. Theorems of compound & total probabilities and applications.
   मिश्र एवं सम्पूर्ण प्रायिकता के प्रमेय तथा उनके अनुप्रयोग।
9. Probability density function and mathematical expectation of random variables and of a function of random variable.
   यादृच्छिक चर एवं उसके फलन के लिए प्रायिकता घनत्व फलन एवं प्रत्याशा प्राप्त करना।
10. Problems related to moments and moment generating function.
    आघूर्ण एवं आघूर्ण जनक फलन सम्बन्धी समस्याए।
11. Problems on properties of Binomial distributions.
    द्विपद बंटन के गुणधर्म आधारित समस्याए।
12. Problems on Normal distribution.
    प्रसामान्य बंटन सम्बन्धी समस्याऐं।

SEM-VI
MAT-601 -Mathematics -6 (A)

Time duration : 3 Hrs **Max Marks : 70**

Note : Each question paper will contain two sections as under –

Non programmable scientific calculator is allowed in this paper.

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : 20

Section-B :10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 50

Unit I

Linear Programming Problems, Variables, Objective function, Constraints and Mathematical form of a Linear Programming Problem. Graphical method of solution of Linear Programming Problems in two variables.

रैखिक प्रोग्रामन: चर, इष्ट फलन, प्रतिबंध एवं रैखिक प्रोग्रामन समस्या का गणितीय रूप, द्विचरिय रैखिक प्रोग्रामन समस्या का लेखाचित्र विधि द्वारा हल

Unit II

Line and line segment in the Euclidean space R^n, Convex set, Hyperplane convex combination, Convex polyhedron, Extreme point of a convex set. Basic solution of system of linear equations. Slack and surplus variables. Standard form of Linear Programming Problem.

युक्लिड R^n तल में रेखा एवं रेखाखंड, अवमुख समुच्चय, अधिसमतल अवमुख संचय, अवमुख बहुभुज, अवमुख समुच्चय के चरम बिंदु, रैखिक युगपत-समीकरणों का आधारी हल, न्यूनता एवं अधिक्य पूरक चर, रैखिक प्रोग्रामन समस्या का मानक रूप

Unit III

Feasible solution, Basic Feasible Solution (BFS) and optimal BFS of a Linear Programming Problem. Replacement of basis vector. Improved BFS. Unbounded solutions, Conditions of optimality. Simplex algorithm, Artificial variable, Charne's Big M-method.

रैखिक प्रोग्रामन समस्या का सुसंगत हल, आधारी सुसंगत हल एवं इष्टतम हल, आधारी सदिश का प्रतिस्थापन, उन्नयित आधारी सुसंगत हल, अप्रतिबंधित हल, इष्टतमत्व के लिए प्रतिबंध, सिम्पलेक्स कलन, कृत्रिम चर, चार्ने की बडे –M विधि द्वारा हल

Unit IV

Dual and primal Problem: Standard form of a primal problem. Formation of dual of a standard primal problem. Fundamental theorem of duality. Solution of a Linear Programming Problem by solving its dual by simplex method.

आद्य एवं द्वैती समस्या: आद्य समस्या का मानक रूप, आद्य समस्या का द्वैती में निरूपण, द्वैती का मूल प्रमेय, रैखिक प्रोग्रामन समस्या का द्वैती द्वारा हल

Unit V

Assignment problems, Transportation problems

नियतन समस्यांए, परिवहन समस्यायें

References:

1. RK Gupta: Linear Programming, Krishna Prakashan, Meerut.
2. Kanti Swaroop : Operation Research, S.Chand & Co., New Delhi
3. P.P.Gupta operation research, Krishana Mandir Prakashan, Meerut.
4. B.S.Goyal & S.K.Mittal: Operation Research Pragati Prakashan, Meerut

SEM-VI
MAT-602 -Mathematics -6 (B)

Time duration : 3 Hrs **Max Marks : 70**

Note : Each question paper will contain two sections as under –

Non programmable scientific calculator is allowed in this paper.

Section-A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part.

Total marks : 20

Section-B :10 questions, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words.

Total marks : 50

Unit - I

Operators : forward difference , backward difference, Shift (E), Inverse shift (E^{-1}), Differentiation (D), Central - Difference , Mean difference , Central sum Operator.

संकारक : अग्रांतर, पश्चांतर, विस्थापित, प्रतिलोम, अवकलन, केन्द्रीय अंतर, माध्य अंतर, केंद्रीय योग संकारक

Unit - II

Operators : Divided difference, Inter relation between various operators, Forward and backward difference table. Factorials notation. Interpolation with equal and unequal intervals

संकारक : विभाजित अंतर, विभिन्न संकारकों में अंतर सम्बन्ध, अग्रांतर व पश्चांतर सरणियाँ, क्रमगुणित संकेत, समान व असमान अंतराल अंतर्वेशन

Unit - III

Central difference interpolation, inverse interpolation.

केंद्रीय अंतर अंतर्वेशन, प्रतिलोम अंतर्वेशन

Unit - IV

Numerical differentiation and Numerical –Integration: Trapezoidal rule, Weddle rule, Simpson's rules, Gauss quadrature formula.

संख्यात्मक अवकलन एवं संख्यात्मक समाकलन: ट्रपेजोइडल नियम, वैडल का नियम, सिम्पसन्स के नियम, गॉस क्षेत्रकलन सूत्र

Unit - V

Solution of equations : Bisection method, regula-falsi method and Newton- Raphson method. Numerical solution of ordinary differential equations : Picard's method and Euler's method.

समीकरणों का हल: द्विभाजन विधि, रेगुला-फाल्सी विधि एवं न्यूटन-राफ्सन विधि, साधारण अवकल समीकरणों का संख्यात्मक हल: पिकार्ड विधि, ऑयलर विधि

References:

1. Saxena H.C. - Finite Difference And Numerical Analsis, S.Chand And Company, New Delhi
2. Jain, Iyenger & Jain Numerical Analysis, New age international Ltd. Delhi.
3. S.S.Sastry: Introductory methods of Numerical Analysis, PHI Learning Pvt. Ltd, New Delhi

MAT602 P - MATHEMATICS PRACTICAL

Practical Marks-50
B.A/B.Sc. Semester VI (Total Marks- 50)
Record - 10
Practical -1- 15
Practical -II- 15
Viva-Voce - 10

LIST OF PRACTICAL

1. Solution of two variables Linear Programming Problem by Graphical method.
   द्विचर–रैखिक प्रोग्रामन समस्या का लेखाचित्र विधि से हल।
2. Solution of Linear Programming Problem by Simplex method.
   सिम्प्लेक्स कलन विधि से रैखिक प्रोग्रामन समस्या का हल।
3. Convex Set and related theorems.
   अवमुख समुच्चय एवं सम्बंधित प्रमेय।
4. Formation of Dual of Standered Primal Problem and Fundamental theorems of Duality.
   मानक आद्य समस्या का द्वैती में निरूपण एवं द्वैती का मूल प्रमेय
5. Assignment problems and their solutions.
   नियतन समस्याऐं एवं उनके हल।
6. Transportation problems and their solution.
   परिवहन समस्याऐं एवं उनके हल।
7. To construct forward and backword difference table for given problem.
   दी गई समस्या के लिए अग्रान्तर एवं पश्चान्तर सारणियों का निर्माण करना।
8. Interpolation with equal and inequal intevals related problems.
   समान व असमान अन्तराल अन्तर्वेशन पर आधारित समस्याऐं।
9. Problems on central difference interpolations.
   केन्द्रीय अन्तर अन्तर्वेशन पर आधारित समस्याऐं।
10. Numerical differential/integration by Trapizoidal rule/Simpson's rules.
    संख्यात्मक अवकलन/संख्यात्मक समाकलनः ट्रपजोइडल नियम/सिम्पसन्स नियम।
11. Solution of equation by Bisection method/Regula-Falsi method
    द्विभाजन विधि/रेगुला–फालसी विधि से समीकरणों का हल करना
12. Solution of ODE by Picard's method.
    साधारण अवकल समीकरण का पिकार्ड–विधि से हल।