GOVERNMENT COLLEGE FOR WOMEN,
PARADE GROUND JAMMU-J & K (UT)
(Erstwhile Maharani Mahila College)
An Autonomous College Affiliated to the University of Jammu
College with Potential for Excellence, 2016 (Estd. 1944)

Syllabus for the Examinations to be held in 2022, 2023 and 2024

B. A/B.SC/B C A Semester-V (C B C S)

Discipline Specific Elective

Subject: Mathematics **Course No: UMATDSE-501**

Title: Linear Algebra **Credits: 06**

Duration of Examination: **Total Marks: 150**

Internal Assessment Test: 1 Hour **Internal Assessment: 30 Marks**
External Examination: 3 Hours **External Examination: 120 Marks**

Objectives: The objective of this course is to understand basic concepts of linear algebra such as vector spaces, subspaces, basis and dimensions of finite dimensional vector spaces, linear transformations, matrix representation of a linear transformation, eigen values and eigen vectors of a matrix and to solve computational problems of linear algebra.

Learning Outcomes: Upon the successful completion of this course the students will be able to do the following:

- Problems of vector spaces.
- Theorems and problems on vector subspaces and quotient spaces.

- Theorems and problems of linear combinations, linear span, linear independence and dependence of vectors.
- Theorems and problems on basis and dimensions of finite dimensional vector spaces.
- Range and Null space of a linear transformation, Rank- Nullity Theorem, algebra of linear transformations and problems based on these concepts.
- Isomorphism of vector spaces, Fundamental theorem of homomorphism, singular and non-singular linear transformations, inverse of a linear operator.
- Theorems and problems on dual spaces and dual basis.
- Matrix representation of a linear transformation.
- Problems on Hermitian, Skew-Hermitian, Orthogonal and Unitary matrices.
- Rank of a marrix
- Eigen values and eigen vectors of a matrix.
- Cayley- Hamilton theorem and its application to find inverse of a matrix.

SYLLABUS

UNIT- I

Definition and examples of vector spaces, Subspaces, Algebra of subspaces, Quotient spaces. Linear combination, linear span, linear dependence and Linear independence of vectors. Exercises and results based on these topics.

UNIT – II

Basis and Dimension of a vector space, Finite dimensional vector spaces, Existence theorem, Extension theorem, Dimension of Sum space and Quotient space. Exercises and results based on these topics.

UNIT – III

Linear transformation and its properties, Null Space, Range space of a linear transformation, Sylvester's law of nullity, Algebra of linear transformations, Linear Algebra. Exercises and results based on these topics.

UNIT – IV

Isomorphism of vector spaces, Fundamental theorem of vector space homomorphism. Singular and no-singular linear transformations. Inverse of a linear operator on a finite dimensional vector space. Dual spaces, basis and dimension of dual space of a finite dimensional vector space. Matrix representation of linear transformation. Exercises and results based on these topics.

UNIT – V

Matrices: Conjugate and tranjugate of a matrix, Hermitian, Skew- Hermitian, Orthogonal and Unitary matrices. Submatrix of a matrix, Rank of a matrix, Normal form of a matrix. Characteristic polynomial and characteristic equation of a matrix, Eigen values and Eigen vectors of a matrix. Cayley –Hamilton theorem and its applications to find inverse of a matrix. Exercises and results based on these topics.

BOOKS RECOMMENDED

1. S. Lang, Introduction to Linear Algebra, 2nd Edition Springer, 2005
2. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Edition, Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
3. Gilbert Strang, Linear Algebra and its Applications, Thomsons, 2007
4. David C. Lay, Linear Algebra and its Applications, 3rd Edition, Pearson Education Asia, Indian Reprint, 2007.
5. K. Hoffman and R. Kunze, Linear Algebra, Prentice Hall of India, 1971

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 40% (units I and II) of the syllabus and candidate will have to attempt any five questions

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Syllabus for the Examinations to be held in 2022, 2023 and 2024

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

Discipline Specific Elective

Subject: Mathematics **Course No: UMATDSE-502**

Title: Matrices **Credits: 06**

Duration of Examination: **Total Marks: 150**

Internal Assessment Test: 1 Hour **Internal Assessment: 30 Marks**
External Examination: 3 Hours **External Examination: 120 Marks**

Objectives: The objective of this course is to understand basic concepts of linear algebra and matrices such as R, R^2 and R^3 as vector spaces over R, linear dependence and linearly independence of vectors, basis and dimension, rank of a matrix, Eigen values and eigen vectors of a matrix, translation, dilation, rotation, refection of point, line and plane, matrix form of basic geometric transformations, solution of system of linear equations by rank method and Gauss-Elimination method.

Learning Outcomes: Upon the successful completion of this course the students will be able to do the following:

- R, R^2 and R^3 as vector spaces over R.
- Linear dependence and Linear independence of vectors.
- Different basis of R^2 and R^3.
- Rank of a matrix.
- Eigen values and eigen vectors of a matrix.
- Translation, dilation, rotation, refection of point, line and plane.
- Matrix form of basic geometric transformations.
- Augmented Matrix, solution of system of linear equations by rank method, Gauss-Elimination method.
- Cayley- Hamilton theorem and its application to find inverse of a matrix.

SYLLABUS

UNIT – I

R, R^2 and R^3 as vector spaces over R, the field of real numbers. Subspaces, Linear combination, linear span, linear dependence and Linear independence of vectors, concept of basis and dimension of a vector space, different basis of R^2 and R^3. Problems based on these concepts.

UNIT – II

Translation, dilation, rotation, refection of point, line and plane; matrix form of basic geometric transformations, interpretation of eigen values and eigen vectors for such transformations. Problems based on these concepts.

UNIT – III

Types of matrices: transpose and trace of a matrix, symmetric, skew-symmetric, hermitian, skew-hermitian, orthogonal and unitary matrices. Rank of matrix, elementary transformations, elementary matrices, inverse of a matrix by use of elementary transformation reduced to normal forms. Problems based on these concepts.

UNIT – IV

System of linear equations (Homogenous and non-homogenous), Augmented Matrix, solution of system of linear equations by rank method, Gauss-Elimination method, partitioning of matrices and inverse by partitioning. Examples of these methods.

UNIT – V

Cayley-Hamilton theorem, inverse of a matrix by Cayley-Hamilton theorem, Eigen values and Eigen vectors of a matrix, diagonalization of a 3x3 matrix.

BOOKS RECOMMENDED:

1. A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.
2. Richard Bronson, Theory and Problems of Matrix Operation. Tata McGraw Hill, 1989.
3. Anthony J. Pettafrezzo: Matrices and Transformations, Dover Publication revised Edition 1978.
4. Serre, Denis-Matrices, Theory and Applications, Springer Verlag New York Publication Edition 2002.
5. S.H. Friedberg, A.L. Insel and L. E. Spence, Linear Algebra Prentice Hall India Pvt. Ltd. New Delhi, 2004.

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 40% (units I and II) of the syllabus and candidate will have to attempt any five questions.

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

Discipline Specific Elective

Subject: Mathematics **Course No: UMATDSE-601**

Title: Numerical Methods **Credits: 06**

Duration of Examination: **Total Marks: 150**

Internal Assessment Test: 1 Hour **Internal Assessment: 30 Marks**
External Examination: 3 Hours **External Examination: 120 Marks**

Objectives: The objective of this course is to apply numerical methods to obtain approximate solutions of mathematical problems and derive numerical methods of various mathematical operations such as interpolation, differentiation, integration, the solution of linear and non-linear equations and the solutions of differential equations.

Learning Outcomes: Upon the successful completion of this course the students will be able to do the following:

- Problems based on forward difference, backward difference, shift and centrals operators.

- Newton's forward and backward interpolation, Lagrange's interpolation and inverse interpolation and problems based on these.
- Gauss's forward and backward interpolation formulae and their applications.
- Forward, backward and central differences formulae for numerical differentiation and their applications.
- Numerical integration formulae and their applications.
- Bisection method, false position method, direct iteration method and their applications.
- Newton-Raphson method, Secant method and problems based on these.

SYLLABUS

UNIT – I

Finite difference and operators, forward and backward difference, shift average and central difference operators, their properties and relations between them, factorial polynomial, Newton's forward and backward interpolation, missing terms, Lagrange's interpolation and inverse interpolation.

UNIT – II

Central difference interpolation. Gauss's forward and backward interpolation, Bessel, Stirling, Evertte formulae, problems based on these topics.

UNIT – III

Newton's divided difference interpolation, Numerical differentiation-Newton's forward and backward interpolation, Newton's divided difference interpolation. Bessel and Striling formulae. Exercises based on these concepts.

UNIT – IV

Numerical integration: Newton-cotes Quadrature formula, Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's and Weddle's rule. Solving differential equations with particular integral for a^n, n^p, Sinkn, Coskn and a^n n^p. Problems based on these concepts

UNIT – V

Solution of algebraic and transcendental equations-Descarte's rule of signs, bisection method, false position method, direct iteration method. Newton-Raphson method, Secant method.

BOOKS RECOMMENDED:

1. Dr. B.S. Grewal – Numerical method, Khanna Publication, 42th Edition, 2012.
2. Dr. Sudhir k. Pundir- Finite difference and Numerical Analysis, 1st Edition.
3. B. Bradie, A friendly Introduction to Numerical Analysis, Pearson Education, India 2007.
4. M.K. Jain, S.R. K. Iyengar and R.K. Jain, Numerical methods for scientific and Engineering computation, 5th Ed, New Age International publisher, India, 2007.
5. E. Balagurusamy, Numerical methods, McGraw Hill Education (India) Pvt. Ltd. 2013.

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 40% (units I and II) of the syllabus and candidate will have to attempt any five questions.

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

Discipline Specific Elective

Subject: Mathematics **Course No: UMATDSE-602**

Title: Complex Analysis **Credits: 06**

Duration of Examination: **Total Marks: 150**

Internal Assessment Test: 1 Hour **Internal Assessment: 30 Marks**
External Examination: 3 Hours **External Examination: 120 Marks**

Objectives: The objective of this course is to introduce the fundamental ideas of the functions of complex variables and developing a clear understanding of fundamental concepts of complex Analysis such as analytic functions, complex integrals, power series, singularities, residues and a range of skills which will allow students to work effectively with these concepts.

Learning Outcomes: Upon the successful completion of this course the students will be able to do the following.

- Polar representation of a complex number.
- Applications of De Moivre's theorem such as roots of complex numbers, expansion of powers of sine and cosine in terms of series of sine or cosine of multiples of angle and vice- versa.
- Functions of complex variables and relation between circular and hyperbolic functions.
- Limit, continuity and differentiability of complex functions.
- Analytic functions, Cauchy- Riemann equations and Harmonic functions.
- Theorems and problems on complex integration.
- Power series, Taylor's series and Laurent's series.
- Theorems and problems on singularities and residues.

SYLLABUS

UNIT – I

Algebra of complex numbers, polar representation of a complex number, De Moivre's theorem and its applications in finding roots of a complex number, in expressing $\sin^n\theta$, $\cos^n\theta$ and their products in terms of sines and cosines of multiple of θ and in expressing $\sin n\theta$, $\cos n\theta$ in terms of powers of sinθ and cosθ . Exercises based on these topics.

UNIT – II

Functions of a complex variable, Exponential function, Logarithmic function, Circular functions and Hyperbolic functions of a complex variable. Relation between hyperbolic and circular functions. Regions in the complex plane, Limits, Limits at infinity and Continuity of a function of complex variable. Exercises and results based on these topics.

UNIT – III

Differentiability, Cauchy Riemann equations, sufficient conditions for differentiability, Cauchy Riemann equations in polar coordinates. Analytic functions with examples of exponential functions, logarithmic functions, trigonometric

functions and hyperbolic functions. Harmonic functions, Harmonic Conjugate, Exact differential method and Milne-Thomson's method to determine analytic function *f(z) = u+iv,* when *u* (or *v*) is given. Exercises and results based on these topics.

UNIT – IV

Complex integration, Definite integrals, Contour integrals, Cauchy's theorem, Cauchy-Goursat's theorem, Cauchy's integral formula, Cauchy's integral formula for derivatives, Cauchy's inequality, Liouville's theorem, Fundamental theorem of algebra. Exercises based on these topics.

UNIT – V

Convergence of a series in complex form, Radius and circle of convergence of power series, Taylor's series theorem, Laurent's series theorem. Singularities and its types, Residues and methods of calculation of residues. Cauchy's Residue theorem. Simple exercises based on these topics.

BOOKS RECOMMENDED

1. S. Ponnusamy, Foundations of Complex Analysis, Narosa Publications House, 1997
2. Conway, J. B., Functions of one complex Variable. 2nd Edition, Springer, Berlin, Heidelberg, New York, 1978.
3. L. V. Ahlfors, Complex Analysis, McGraw Hill New York, 3rd Edition 1979.
4. Theodore W, Gamelin, Complex Analysis, Springer, Berlin, Heidelberg, New York, 2001.
5. James Ward Brown and Ruel V. Churchil, Complex Variables and Applications, 8th Edition, McGraw Hill, International Edition, 2009.
6. Joseph Bak and Donald J. Newman, Complex Analysis, 2nd Edition, Undergraduate Texts in Mathematics, Springer, Verlag New York, Inc., New York, 1997.

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 40% (units I and II) of the syllabus and candidate will have to attempt any five questions.

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B. A/B.SC/B C A Semester-V (C B C S)

Skill Enhancement Course

Subject: Mathematics **Course No: UMATS-501**

Title: Probability & Statistics **Credits: 02**

Duration of Examination: **Total Marks: 50**

Internal Assessment Test: 30 min **Internal Assessment: 10 Marks**

External Examination: 2 Hours **External Examination: 40 Marks**

Objectives: This course aims to provide an understanding of the basic concepts in probability as random experiment, sample space, events etc. It also focuses on providing knowledge about the random variables (both discrete as well as continuous), Mathematical expectations for a discrete and continuous random variables, moments and moment generating functions and different types of distributions.

Learning Outcomes: After doing this course, students will be able to:

1) Define the principal concepts of probability.
2) Express the probability definitions.
3) Define sample space.
4) Explain the concept of random variable and differentiate between discrete and continuous random variable.
5) Construct probability distribution tables
6) Formulate probability functions and distribution functions.
7) Calculate the expected values of a random variable.
8) Find the mean, variance and moment generating function of a random variable.
9) Calculate the moments of a random variable about any point.
10) Express the moment generating function as a sum of moments.
11) Identify the characteristics of different discrete and continuous distributions such as Binomial distribution, Poisson distribution, Normal distributions, Gamma- distribution and their features.
12) Solve the problems related to different distributions.

Syllabus:

Theory

Unit I: Probability Distribution

Basic definitions of probability, Random variable (continuous and discrete), Probability function and probability density function, Distribution function and its properties, types of distribution: Discrete, continuous, construction of a probability distribution, Bernoulli distribution, conditions to be satisfied by a certain function in order that it may be a probability function or a probability density function of a certain distribution.

Unit II: Expectations and moments
Expectation of a random variable (continuous and discrete), Expectations $E[X-a]^r$ and $E\left[X-E[X]\right]^r$ (r=1,2,3) where a is any arbitrary point, moment of a random variable , Relation between the moments about the mean in terms of any point and vice versa, moment generating function m.g.f. and its properties, addition and multiplication theorem of expectation for two random variables, mean, variance and m.g.f. of Bernoulli distribution.

Project/ Practical

, Variance of a random variable, Moment of a random variable about origin, Moment of

Course No: UMAPS-501 Credits: 02

Total Marks: 50

Internal: 25

External: 25

Binomial distribution

Mean, variance, m.g.f. and mode of the binomial distribution, measure of skewness and kurtosis, mean, variance and m.g.f. of standard binomial variate $z=\frac{X-np}{\sqrt{(npq)}}$.

Poisson distribution

Definition, Mean, variance and m.g.f., Poisson distribution as a limiting case of binomial distribution, measure of skewness and kurtosis, mean, variance and m.g.f. of standard poisson variate $z=\frac{X-\lambda}{\sqrt{\lambda}}$.

Normal Distribution

Definition, mean, variance and m.g.f., properties of normal curve, mean, variance and m.g.f. of standard normal variate $z=\frac{X-\mu}{\sigma}$, Normal distribution as a limiting case of binomial and poisson distribution, simple problems, Distribution of mean and 95% confidence interval.
Gamma distribution: Mean, variance and m. g. f.

Recommended Books

1. Sharma, H.S. sharma, G.C and Choudhary SS, A text book of numerical analysis, Ratan Prakasham Mandir, Agra.
2. Kapoor J. N. Saxsena, H. C., Mathematical Statistics, S. Chand and Co.
3. S. C. Gupta and K Kapoor Fundamentalof Statistics, S. Chand and Co. Edition 1.
4. Bajaj, C. P. And Gupta, P. N. Elements of Statistics, R. Hand and Co.
5. Hoel, P. G. , Introduction to Mathematical Statistics, John Wiley and Sons.

SCHEME OF EVALUATION AND PAPER SETTING :-

A) Internal assessment

Internal assessment (10 marks) as per the adopted procedure for other courses.

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.

B) **External end semester Examination**

Maximum marks= 40

Question paper shall have three (A, B, and C) sections:

Section A shall comprise of 4 questions of 2 marks each. 2 questions shall be set from each unit of the prescribed course content. All questions shall be compulsory.

Section B shall comprise of 4 questions of 5 marks each. 2 questions shall be set from each unit of the prescribed course content. All questions shall be compulsory.

Section C shall comprise of3 questions of 12 marks each. 1.5 questions shall be set from each unit of the prescribed course content. Students shall be asked to attempt only one question of 12 marks from this section.

Skill Practical Course

Guidelines for design:-

1. Total credits = 2
2. Maximum marks 50 (Internal 25, External 25)
3. The course content (Practical/ Projects/ Field survey etc.) shall be set as per the requirements of the course/ or as adopted in other practical Courses.

Evaluation Strategy

A) Internal assessment

1. Internal assessment (25 marks) as per the adopted procedure for other courses.

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B. A/B.SC/B C A Semester-VI (C B C S)

Skill Enhancement Course

Subject: Mathematics **Course No: UMATS-601**

Title: Analytic Geometry **Credits: 02**

Duration of Examination: **Total Marks: 50**

Internal Assessment Test: 30 min **Internal Assessment: 10 Marks**

External Examination: 2 Hours **External Examination: 40 Marks**

Objectives: Conic section is a particular type of shape formed by the intersection of a plane and a right circular cone. This course is aiming to introduce the students with these four types of conic sections: Circle, Parabola, Ellipse, Hyperbola. Students will be introduced with the features of each of these conics and made to write algebraic equations of these conics with some of the given features.

Learning Outcomes: Upon the successful completion of this course the students will be able to:

1) Identify conic section based on the given equations.
2) Write the equation of circle when some of the features are given.
3) Find and write the equation of a tangent to any point on the circle.
4) Calculate the length of tangent to a given circle.
5) Understand the features that generate the different conics.
6) Write the equations of other conic sections for some given features.
7) Differentiate between different conic sections.
8) Find the focus, directrix, Latus Rectum of the conic sections when its equation is given.
9) Formulate the equations of the tangents and normals at a point on the conic section.

10) Trace the conic section as per the given equation of the conic.

Syllabus:
Theory:

Unit I Circle

Radius and centre, Standard form, general form, parametric form, equation of a circle when the end points of its diameter are given, point of intersection of a line and a circle with centre at origin, condition for a line to be tangent to the given circe, equation of a tangent to the circle at a point on the circle , Parametric form of equation of tangent, Equation of tangent in slope form and its point of contact with the circle, and length of the tangent from a point to a circle.

Unit II: Parabola

Focus, Directrix, Eccentricity, Axis, Vertex, Centre, End points of Latus Rectum, Length of Latus-rectum, Standard form of Parabola, equations of Parabola when vertex and directrix/focus are given and vice- versa, equation of normal and tangent at a point to a parabola, curve tracing of a parabola.

Project/ Practical

Course No: UMAPS- 601 Credits: 02
Total Marks: 50
Internal: 25
External: 25

Ellipse

Vertices, foci, major and minor axes, Directrices, Centre, eccentricity, Latus- Rectum, End points of Latus Rectum, Length of Latus- rectum, Standard equation of Ellipse, Equation of Ellipse when its focus, vertices, directrix and eccentricity are given and vice- versa, equation of normal and tangent to an ellipse, curve tracing.

Hyperbola

Hyperbola and its transvere and conjugate axes, Foci, Derectrices, eccentricity, derivation of the standard equation of hyperbola, finding equation of hyperbola when some of its parts are given and vice- versa, curve tracing.

Books Recommended:

1. Dr. Ravi Dutt Sharma Mathematics XI, Dhanpat Rai Publication(P).

2. G. B. Thomas and R. L. Finney, Calculus, 9th Ed., Pearson education, Delhi, 2005.
3. S. L. Loney, The Elements of Co- ordinate Geometry, Mc Millan and company, London.
4. H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons (Asia) Pvt.Ltd.2002
5. M. R. Puri, Co-ordinate Geometry, Malhotra Brother, Education Publisher Edition 1989.
6. A. K. Roy XI Mathematics Volume I Published in Coperation with J & K Board of School Education.

SCHEME OF EVALUATION AND PAPER SETTING :-

A) Internal assessment

Internal assessment (10 marks) as per the adopted procedure for other courses.
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.

B) **External end semester Examination**

Maximum marks= 40

Question paper shall have three (A, B, and C) sections:-

Section A shall comprise of 4 questions of 2 marks each. 2 questions shall be set from each unit of the prescribed course content. All questions shall be compulsory.

Section B shall comprise of 4 questions of 5 marks each. 2 questions shall be set from each unit of the prescribed course content. All questions shall be compulsory.

Section C shall comprise of3 questions of 12 marks each. 1.5 questions shall be set from each unit of the prescribed course content. Students shall be asked to attempt only one question of 12 marks from this section.

Skill Practical Course

Guidelines for design:-

1. Total credits = 2
2. Maximum marks 50 (Internal 25, External 25)
3. The course content (Practical/ Projects/ Field survey etc.) shall be set as per the requirements of the course/ or as adopted in other practical Courses.

Evaluation Strategy

A) Internal assessment

1. Internal assessment (25 marks) as per the adopted procedure for other courses.

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B. A/B.SC/B C A Semester-V (C B C S)

Generic Elective Course

Subject: Mathematics **Course No: UMATGE-501**

Title: Numerical Ability - I **Credits: 04**

Duration of Examination: **Total Marks: 100**

Internal Assessment Test: 1Hour **Internal Assessment: 20 Marks**

External Examination: 3 Hours **External Examination: 80 Marks**

Objectives: This course is introduced with an objective to provide the students with an ability to raise their "Quantitative Aptitude" by applying the mathematical reasoning, developing their conceptual understanding by supporting them in making connections between concepts and applying previously learned material to new context.

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

2) Understand the basics of number system, highest common factor and least common divisor.
2) Understand and perform basic computations.
3) Develop and maintain problem solving skills in Ratio and proportion, equations, Average etc.
4) Demonstrate the ability to apply analytical and theoretical skills to solve mathematical problems.
5) Find roots of numbers.
6) Apply different methods to solve linear equations in two variable.
6) Know how to solve quantitative problems that a person is likely to encounter at home or at work.
7) Evaluate trigonometric identities and apply these to find length, distance or depth of some object.
8) Solve trigonometric equations and to apply.
9) Get a solution of arithmetic series.

SYLLABUS:

Unit I: Decimal fraction and simplification, number system, square and square roots, cube and cube roots, HCF and LCM.

Unit II: Indices and surds, theory of equations, Ratio and proportion, Average.

Unit III: Ratio and proportion, Average, Linear equations in two variables(four methods, Graphical method, Substitution method, Comparison method,Cross multiplication method), Arithmetic Progression.

Unit IV: Introduction to trigonometry, Trigonometric identities, Application of trigonometry in finding heights and distances.

Books Recommended:

1. R. S. Aggarwal, Quantitative Aptitude, 2001.
2. Rakesh Yadav, Advanced Maths for General Competitions.

Instructions for paper setters and candidates

For External Examination

The question paper for semester end examination will be of 100 marks and consists of three sections:

Section A (16 marks).
Four short answer type questions of 4 marks each, one from each unit. All questions will be compulsory.

Section B (28 marks)

Four medium answer type questions of 7 marks each, one from each unit. All questions will be compulsory.

Section C (36 marks)

Four long answer type questions of 18 marks each, one from each unit. Each question will have two parts. The students will have to attempt any two questions.

For Internal Examination

The internal assessment will be of 20 marks in which five marks are for attendance and 15 marks for internal test.
The test will comprise of 8 questions of 3 marks each from 50% of the syllabus covered and candidate have to attempt any five

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Syllabus for the Examinations to be held in 2022, 2023 and 2024

B. A/B.SC/B C A Semester-VI (C B C S)

Generic Elective Course

Subject: Mathematics **Course No: UMATGE-601**

Title: Numerical Ability - II **Credits: 04**

Duration of Examination: **Total Marks: 100**

Internal Assessment Test: 1 Hour **Internal Assessment: 20 Marks**
External Examination: 3 Hours **External Examination: 80 Marks**

Objectives: This course is introduced with an objective to provide the students with an ability to raise their "Quantitative Aptitude" by applying the mathematical reasoning, developing their conceptual understanding by supporting them in making connections between concepts and applying previously learned material to new context.

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

1) Learn methods and techniques used in number theory.
2) Learn to find percentages.
3) Apply analytical and theoretical skills to solve mathematical problems
4) Compute simple as well as compound interest on their own for given time period.
5) Analyse characteristics and properties of two-dimensional and three dimensional geometrical shapes and find their surface area and volume.
6) Analyse data and draw appropriate conclusion.
7) Define the principal concepts about probability.
8) Think critically, research and reason.
9) Gain a more profound understanding of measurement and geometry.
10) Solve problems in daily life or in competitive exams related to time and work, profit loss, time and distance etc.
11) Organise, manage and interpret data.
12) Analyse statical data graphically.

SYLLABUS:

Unit I: Percentage, Profit and Loss, Simple and Compound Interest.

Unit II: Unitary method, time and work, time and distance.

Unit III: Surface area and Volume, Co-ordinate Geometry (Section formula, Distance formula, Area of Triangle).

Unit IV: Probability, Statistics (Bar graph, Histogram, Pie chart), Data interpretation.

Books Recommended:

1. R. S. Aggarwal, Quantitative Aptitude, 2001
2. Rakesh Yadav, Advanced Maths for General Competitions.

Instructions for paper setters and candidates

For External Examination

The question paper for semester end examination will be of 100 marks and consists of three sections:

Section A (16 marks).
Four short answer type questions of 4 marks each, one from each unit. All questions will be compulsory.

Section B (28 marks)

Four medium answer type questions of 7 marks each, one from each unit. All questions will be compulsory.

Section C (36 marks)

Four long answer type questions of 18 marks each, one from each unit. Each question will have two parts. The students will have to attempt any two questions.

For Internal Examination

The internal assessment will be of 20 marks in which five marks are for attendance and 15 marks for internal test.
The test will comprise of 8 questions of 3 marks each from 50% of the syllabus covered and candidate have to attempt any five.