UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR
(Approved by AICTE and recognized by UGC, Ministry of HRD, Govt. of INDIA)
'Gurukul', 6 Kms. from Chomu on Sikar Road, Udaipuria Mod, Chomu, Jaipur-303807 (Rajasthan)
Phone : 01423-205168, Fax : +91 8302542610, Email: vc@uem.edu.in, Website : www.uem.edu.in

Agenda Point – Meeting of Board of Studies – 09th July, 2024

The agenda for the meeting of the Board of Studies of Departments of Mathematics scheduled at 10:30 AM on 09th July, 2024 at the University of Engineering & Management, Jaipur as below mentioned:

Agenda point 1:

To confirm of minutes of the meeting held on 14th December, 2023.

Agenda point 2:

To read the action taken report on the Board of Studies meeting held on 14th December, 2023.

Agenda point 3:

To report on modification or restructuring of the syllabus for the current academic session because of the policy for a common syllabus for all the institutions of the IEM-UEM group.

Agenda point 4:

To report on course mapping for the current syllabus and online certifications from Infosys Springboard and LinkedIn Learning.

Agenda point 5:

Organize at least one international conference per department per year. Every department must bring out proposals to organize at least one international conference per year either in association with Springer/AIP/IEEE etc.

Agenda point 6:

To report each year faculty will have to publish at least 4 research papers in SCI/Scopus index Journal/Conference and at least one patent.

Agenda point 7:

Any suggestions:

City Office : 212, Apex Tower, Lal Kothi, Tonk Road, Jaipur - 302015 (Rajasthan) Tel.: 0141- 4063336
Kolkata Office : 'ASHRAM', GN-34/2, Sec.V, Salt Lake Electronics Complex, Kolkata - 700091 (W.B.) Website : www.iemcal.com
Phone : 033 - 2357 2059, Fax : 033 - 2357 2995 Email : admin@iemcal.com

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Minutes of Meeting of Board of Studies for

Department of Mathematics

University of Engineering & Management, Jaipur held on 09.07.2024

The Meeting of the Board of Studies for the Department of Mathematics was held on 09th July, 2024 at 10:30 AM at the University of Engineering & Management Jaipur.

The following members were present-

1. Dr. Rahul Sharma, Associate Professor and Head, Department of Mathematics, UEM Jaipur
2. Prof. Dr. Praphull Chhabra, Professor, Department of Mathematics, UEM Jaipur
3. Dr. Priyanka Chhaparwal, Associate Professor, Department of Mathematics, UEM Jaipur
4. Dr. Tarun Sharma, Associate Professor, Department of Mathematics, UEM Jaipur
5. Mrs. Pallavi Malik, Assistant Professor, Department of Mathematics, UEM Jaipur
6. Prof. (Dr.) K. C. Jain, Retd. Professor, Department of Mathematics, Malaviya National Institute of Technology, Jaipur
7. Nominee from Department of Higher Education, Government of Rajasthan, Rajasthan

Dr. Rahul Sharma, Head of the Department welcomed all the members of the Board of Studies before the commencement of the meeting. Thereafter agenda points of the meeting of the Board of Studies were taken up for discussion.

The Board of Studies of the Department of Mathematics, UEM Jaipur took the following agenda points:

Agenda point 1:

To confirm of minutes of the meeting held on 14th December, 2023

The minutes of the last meeting of the Board of Studies was circulated to all the members.

As there was no observation raised in the meeting, it was confirmed.

Agenda point 2:

To read the action taken report on the Board of Studies meeting held on 14th December, 2023

The agenda wise action taken report of the last meeting of the Board of Studies for the Department of Mathematics was circulated to all the members.

As there was no observation raised, it was confirmed.

Agenda point 3:

To report on modification or restructuring of the syllabus for the current academic session because of the policy for a common syllabus for all the institutions of the IEM-UEM group.

As per instruction modification or restructuring of the syllabus for the current batch of Engineering have a common syllabus. A few modifications have been made according to the needs of the organization and suggestions given by externals.

As there was no observation raised, it was confirmed.

Agenda point 4:

To report on course mapping for the current syllabi and online certifications from Infosys Springboard and LinkedIn Learning.

The online certification programs for students have been introduced concerning an MoU signed with the Infosys Springboard team to make them learn and interact directly with corporate trainers regarding the needs of the industry. A similar platform is also shared by LinkedIn Learning which includes similar courses where students are being encouraged by teachers to join and begin a new era of hybrid learning.

As there was no observation raised, it was confirmed.

Agenda point 5:

Organize at least one international conference per department per year. Every department must bring out proposals to organize at least one international conference per year either in association with Springer or IEEE etc.

The Basic Science department conducted an international conference (ICCASA-2024) on 21-22 November, 2024 with the association of the Scopus Index Journals/Proceeding. Faculty members of Basic Sciences submitted their articles in ICCASA-2023 were published.

As there was no observation raised, it was confirmed.

Agenda point 6:

To report each year faculty will have to publish at least 4 research papers in SCI/Scopus index Journal/Conference and at least one patent.

As per instruction, each year faculty will have to publish at least 4 research papers in the SCI/Scopus index Journal/Conference and at least one patent in a year.

As there was no observation raised, it was confirmed.

Agenda point 7:

Any suggestions:

The meeting ended with a vote of thanks to the Chair.

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Attendance Sheet for Meeting of Board of Studies
Department of Mathematics
University of Engineering & Management, Jaipur
09.07.2024

Sr. No.	Name	Designation	Signature
1	Dr. Rahul Sharma	Associate Professor and Head, Department of Mathematics, University of Engineering & Management, Jaipur (Chairman)	09/07/24
2	Prof. (Dr.) Praphull Chhabra	Professor, Department of Mathematics, University of Engineering & Management, Jaipur, Jaipur	09/07/24
3	Dr. Priyanka Chapparwal	Associate Professor, Department of Mathematics, University of Engineering & Management, Jaipur, Jaipur	09/07/24
4	Dr. Tarun Sharma	Associate Professor, Department of Mathematics, University of Engineering & Management, Jaipur, Jaipur	09/07/24
5	Mrs. Pallavi Malik	Assistant Professor, Department of Mathematics, University of Engineering & Management, Jaipur, Jaipur	09/07/24
6	Prof. (Dr.) K. C. Jain	Retd. Professor, Malaviya National Institute of Technology, Jaipur	
7	Nominee from State Higher Education Department	Government Representative, Department of Higher Education, Group-IV, Government of Rajasthan	

University of Engineering & Management, Jaipur

Syllabus for BCA Admission Batch-2024

Class : BCA **Year : Ist Year**

Subject Name : Discrete Structure **Credit : 4**

Subject Code : BCACC103 **Lecture Hours : 40**

Pre-requisite: Number System, Basic Geometry and Trigonometry.

Related links : Study Material LinkedIn Learning Infosys Springboard

Introduction:

It covers the topics and solution methodology of real-world problems of set theory, relation and function, theory of graphs and tree, graph and tree algorithms and propositional logic.

Course Outcomes (COs):

CO1 :

Definition and concept of set theory, relation and function, theory of graphs and tree, and propositional logics, and their use in real world problems.

CO2 :

Use the mathematical methods and algorithms to solve the problems pertaining to set theory, function and relation, theory of graph and tree, and propositional logics.

CO3 :

Evaluate the problems pertaining to theory of graph and tree, propositional logics. Also, analyze the best algorithms to solve the real-world problems of graphs and tree pertaining to shortest path and minimal spanning tree.

CO4 :

Choose an appropriate approach to design a problem related to graph and tree, propositional logics and their numerical solution.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	-	-	-	-	3	-	-	-	3	-
CO2	3	3	2	2	-	-	-	-	3	-	-	-	3	-
CO3	3	3	2	2	-	-	-	-	3	-	-	-	3	-
CO4	3	3	1	2	-	-	-	-	2	-	-	-	3	-

Syllabus for BCA Admission Batch-2024

Module number	Topic	Text Book as per Syllabus	Mapping with Industry and International Academia	Lecture Hours
1.	**Set Theory**			**12**
	Set Theory : Basic concepts of sets, terminology, and notation, subset, power set, operation of sets (union, intersection, symmetric difference of two sets)algebra of sets (idempotent law, associative law, commutative law, distributive law, identity law, involution law, complement law, De Morgan's law) universal Set, Venn-Euler diagram, principle of inclusion-exclusion	BCA Mathematics, Volume-I, B.K.Pal, K.Das, 3rd Edition Chapter- 1	International Standards: https://ocw.mit.edu/courses/hst-951j-medical-decision-support-fall-2005/resources/prologic_sets/ Industry Mapping: Neo4j, Tableau, Gephi, Microsoft Power BI,R and Python (with Pandas and NumPy)	6
	Relation: Definition, ordered pair, domain, and range, types of relations (identity, inverse, reflexive, irreflexive, symmetric, asymmetric, antisymmetric,transitive, equivalence relation, partial ordered relation. **Functions:** Definition, domain, co-domain and range, types of functions (one-one, onto, into, many-one etc.), inverse of function, composition of functions.			6
2.	**Graph Theory**			**12**
	Concept of Graph, Graph and Related Terms, Simple Graph, Regular Graph, Complete Graph, Spanning Sub-graph, Di- Graph (Directed Graph), Walk, Path, Circuit, Connected Graph, Disconnected Graph,	BCA Mathematics, Volume-I, B.K. Pal, K. Das, 4th Edition	International Standards: https://ocw.mit.edu/courses/18-217-graph-theory-and-additive-combinatorics-fall-2019/resources/lecture-2-forbidding-a-	12

	Theorems of Graph, Euler Graph, Hamiltonian Graph Incidence matrix, Adjacency Matrix	Chapter- 2.1, 2.3	subgraph-i-mantel2019s-theorem-and-turan2019s-theorem/ Industry Mapping: NetworkX graph in Python Programming, Amazon Neptune	
3.	**Trees and Fundamental Circuit**			**10**
	Trees and related Terms ,Binary Trees ,Theorems on Trees ,Theorems on Binary Trees ,Spanning Tree and Co-Tree ,Finding a Spanning Tree of a Connected Graph, Weight of an edge and Weighted Graph ,Minimal Spanning Tree , Kruskal's Algorithm of finding Minimal Spanning Tree ,Prim's Algorithm of finding Minimal Spanning Tree	BCA Mathematics, Volume-III, B.K. Pal, K. Das 4th Edition Chapter-2.2	International Standards: https://ocw.mit.edu/courses/18-217-graph-theory-and-additive-combinatorics-fall-2019/resources/lecture-2-forbidding-a-subgraph-i-mantel2019s-theorem-and-turan2019s-theorem/ Industry Mapping: NetworkX graph in Python Programming, Amazon Neptune	10
4.	**Propositional Logic**			**6**
	Introduction to Proposition or Statement, Truth Table, Logical Connectives, Propositional Formula, Tautology, Contradiction, Logical Equivalence, Algebraic laws of Connectives, Conjunctive Normal Form (CNF),Disjunctive Normal Form (DNF), Arguments	BCA Mathematics, Volume-III, B.K. Pal, K. Das 4th Edition	International Standard: https://ocw.mit.edu/courses/hst-951j-medical-decision-support-fall-2005/resources/proplogic_sets/	

		Chapter-1.1	https://ocw.mit.edu/courses/16-410-principles-of-autonomy-and-decision-making-fall-2010/resources/mit16_410f10_lec10/ Industry mapping: Siemens TIA Portal, Rockwell Studio 5000	

Textbook:

1. BCA Mathematics, Volume-I, B.K. Pal, and K. Das.
2. BCA Mathematics, Volume-III, B.K. Pal, and K. Das.

Reference books:

1. Graph theory with applications to engineering and computer science, Narsingh Deo.
2. A Textbook of Discrete Mathematics, 9th Edition, S.K. Sarkar, S.Chand.

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University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B. Tech Admission Batch 2023

Subject Name: Mathematics - III **Credit: 3**

Subject Code: BSM301 **Lecture Hours: 42**

Pre-Requisites: Permutation & Combination, Concept of Basic Probability, Evaluation of definite, improper and infinite integrals, Concept of β & Γ functions.

Relevant Links:

Coursera: Probability & Statistics https://www.coursera.org/learn/machine-learning-probability-and-statistics
NPTEL Advanced Engineering Mathematics https://onlinecourses.nptel.ac.in/noc24_ma03/preview

Study Material Link (BL 4, 5,6)

https://drive.google.com/drive/folders/19umqy3stib1-wuHy0h-p0arM0NkIzdxC?usp=sharing

COURSE OBJECTIVES:

1. The syllabus will prepare the learners for Engineering Exit Examinations, ESE and campus placements.

2. Students will apply concepts of various probability distributions to find probabilities.

3. Students will make estimations for a mean, variance, standard deviation and proportions for big data.

4. Students will be eligible to work in the Data domain which is the emerging technology of the future

and create more opportunities for creative work.

5. Students will be able to describe and quantify the uncertainty inherent in predictions made by machine learning models.

COURSE OUTCOMES:

CO	Course Outcomes
CO 1	Illustrate the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment that will make a bridge between elementary statistical tools and probability theory.
CO 2	Find the inter-relation between two or more phenomena with the help of curve fitting.
CO 3	Understand the basic components of sampling and have the knowledge on exact sampling distributions which are essential for estimating and testing hypothetical statements. Know the various sampling methodologies and their efficiencies in theoretical and practical aspects.
CO 4	Estimate and test the parameters associated with the relevant areas for forecasting and verification of economic theory
CO 5	Apply the statistical tools in business, economical and commercial areas for analyzing problems and to make better decisions for future in their fields.

Detailed Syllabus:

Module No.	Topic	Sub-topics	Mapping with Chapters of the Text Book	Mapping with Industry & International Academia	Lecture hour	Corresponding Lab Assignment
1	**Random Variables and Probability Distributions**	*Discrete Random Variable:* Discrete Probability Distribution, Expectation and Variance of random variables; Binomial and Poisson Distributions; Mean, Variance and Moment Generating Functions of Binomial and Poisson Variates; Convergence of Binomial to Poisson Variate. *Continuous Random Variable;* Continuous Probability Distributions, Expectation and Variance of random variables, Exponential, Normal Distributions; Mean, Variance and Moment Generating Functions of the corresponding variates.	Chapters 2 and 3/Text Book 1 Chapter 12 /Text Book 2	https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/	**12**	"R" software for statistical computing
2	**Method of Least Squares and Curve Fitting**	Principle of Least Squares, Curve fitting by the method of Least Squares - fitting of straight lines, second degree parabolas and exponential curves.	Chapter 9/Text Book 1 Chapter 8 /Text Book 2	https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/	**4**	"stata": statistical software for data science
3	**Sampling and**	Population and Sample, Sampling	Chapter 11	https://www.c	**8**	"stata":

	Sampling Distributions	With and Without Replacement (SRSWR and SRSWOR); Random Samples, Population Parameters, Sample Statistics, Sampling Distributions, Standard Error and Probable Error; Sample Mean, Sampling Distribution of Means; Sample Proportion, Sampling Distribution of Proportions, Sample Variances, Sampling Distribution of Variances; Case where Population Variance is unknown; Central Limit Theorem (Statement only); Degrees of freedom, Chi-square distribution, Mean & Variance of Chi-square variate.	/Text Book 1 Chapter 13/Text Book 2	l.cam.ac.uk/teaching/2021/IntroProb/materials.html		statistical software for data science
4	**Estimation of Parameters**	Point and Interval estimations, Biased and Unbiased estimators, Minimum Variance Unbiased Estimator (MVUE), Consistent Estimator, Maximum Likelihood Estimation of Parameters, Applications in populations following theoretical distributions (Binomial, Poisson and Normal), Calculation of confidence limits for population mean and population proportions.	Chapter 12 /Text Book 1 Chapters 14/ Text Book 2	https://ocw.mit.edu/courses/1-010-uncertainty-in-engineering-fall-2008/	**6**	"R" software for statistical computing
5	**Testing of Hypothesis**	*Large Sample Test***:** Statistical Hypotheses, Test Statistic, Best Critical Region, Test for single mean, difference of means, single proportion, difference of proportions, and difference of standard deviations. *Small Sample Test:* Test for single	Chapter 13/ Text Book 1 Chapter 14?Text Book 2	https://ocw.mit.edu/courses/6-041-probabilistic-systems-analysis-and-applied-	**12**	"R" software for statistical computing

		mean, difference of means and correlation coefficients, Test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.		probability-fall-2010/		

TEXT BOOK:

1. Saktipada Nanda and Sibashis Nanda , "A Course on Probability & Statistics", 2nd Edition (2024), Mindprobooks Academic Series [Available in flipkart.com/amazon.in]

2. N.G.Das, "Statistical Methods", Combined Edition Vol. 1 &2 (2017) McGraw Hill Education

REFERENCE BOOKS:

1. Sheldon M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 6th Edition (2020), Academic

2. Douglas C, Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, 7th edition (2018), John Wiley & Sons.

3. Murray R. Spiegel, John J. Schiller and R. Alu Srinivasan, "Schaum's Outline of Probability & Statistics" , 4th Edition (2012), McGraw Hill Education.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	1	1	1	2	1
CO2	3	3	3	3	2	1	1	1	1	1	2	1
CO3	3	3	3	3	2	1	1	1	1	1	2	1
CO4	3	3	3	3	2	1	1	1	1	1	2	1
CO5	3	3	3	2	2	2	1	2	2	2	3	2

3: Strong correlation
2: Medium correlation
1: Weak correlation

PSO	PSO Description
PSO1	**Technical knowledge and analysis:** Apprehend and analyze specific engineering problems of communication, networking, electrical & electronics circuits, signal processing, computer programming, embedded systems, VLSI design and semiconductor technology by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.
SO2	**Design and Implementation:** Ability to design and implement the acquired technical knowledge with proficiency in logical programming for applications in electronics & communication engineering.
SO3	**Development of professional skill and professional ethics:** Ability to communicate effectively with excellent professional proficiency, interpersonal skills and demonstrate the practice of professional ethics for societal benefit.

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech Admission Batch 2024

Subject Name: Mathematics-I **Credit: 4** **Lecture Hours: 48**

Subject Code: BSCM103

Pre-requisite: High School Mathematics

Relevant Links:

Study Material Coursera Coursera NPTEL NPTEL NPTEL Linkedin Learning Infosys Springboard

COURSE OBJECTIVES:

1. **To give an exposure to some advanced concepts related to differential and integral calculus for functions of single variable, matrices and determinants, sequence and series and also lay the concept of multivariable differentiation to the students enrolled in the first semester of B.Tech. program.**
2. **To lay the foundation of various applications of mathematics in their further course of study.**
3. **To solve and analyze various situations of interest in engineering.**
4. **To imbibe the idea of mathematical modeling with application to real life problems.**

COURSE OUTCOMES:

CO 1: Demonstrate the domain of applications of mean value theorems and apply the concepts and techniques of differential and integral calculus to determine curvature and evaluate different types of improper integrals.

CO 2: Develop the knowledge for addressing real-life problems that comprise several variables or attributes and identify extremum points of different surfaces of higher dimensions.

CO 3: Identify different types of matrices and relate the concept of rank for solving linear system of equations and apply the concept of eigenvalues, eigenvectors, and diagonalization of matrices.

CO 4: Use the tools of power series to analyze engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.

Module number	Topic	Sub-topics	Mapping with Textbooks	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Calculus (Differentiation)**	Rolle's Theorem, Mean Value Theorems, Taylor's and Maclaurin's Theorems with Remainders; Taylor's Series, Series for Exponential, Trigonometric and Logarithm Functions; Indeterminate forms and L' Hospital's Rule; Maxima and Minima; Evolutes and Involutes.	**T1: Chapter 4,** Secs. 4.3 - 4.5, 4.10 – 4.12, 4.14, 4.15	***International Academia:*** **https://ocw.mit.edu/courses/18-01-Calculus-I-Single-Variable-Calculus** **https://ocw.mit.edu/courses/18-01-Single-Variable-Calculus** ***AICTE-prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:*** MATLAB	8	1. Plotting of the following special graphs: • Sketch the graph of sine and cosine functions in $[-2\pi, 2\pi]$ • Plot a graph for e^{3x} on **R** • Draw [x], the greatest integer function in the interval [0, 5]. 2. Draw the graph of the evolute of a parabola.

2	**Calculus (Integration)**	Evaluation of Definite and Improper Integrals; Beta and Gamma Functions and their properties; Applications of Definite Integrals to evaluate surface areas and volumes of revolutions.	**T1: Chapter 6,** Secs. 6.8 – 6.13 **Chapter 7,** Secs. 7.14 – 7.16	**International Academia:** **https://ocw.mit.edu/courses/18-01-Calculus-I-Single-Variable-Calculus** **https://ocw.mit.edu/courses/18-01-Single-Variable-Calculus** ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:*** MATLAB	8	1. Evaluate definite integrals.

3	**Multivariable Calculus (Differentiation)**	Limit, Continuity and Partial Derivatives; Homogeneous Functions, Euler's Theorem of first and second order (Statement only); Change of variables, Composite function, Derivative of implicit functions, Total Derivative; Jacobian; Maxima, Minima and Saddle points; Method of Lagrange multipliers; Gradient, Directional Derivatives, Tangent Plane and Normal Line, Curl and Divergence.	**T1: Chapter 5** Secs. 5.1 – 5.8, 5.11, 5.12 **Chapter 8,** Secs. 8.4 – 8.9	***International Academia:*** Syllabus | Calculus of Several Variables | Mathematics | MIT OpenCourseWare Linear Algebra, Calculus, & Applications I Stanford Online ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:*** MATLAB	12	1. Find partial differentiation of any function of two or three variables. 2. Find gradient, divergence and curl of any vector valued function. 3. Find the directional derivative of any vector. 4. Write a code to find the tangent plane and draw the surface.

4	**Matrices and Determinants**	Matrices, Addition and Scalar Multiplication, Matrix Multiplication; Symmetric and Skew-symmetric Matrices; Hermitian and Skew-Hermitian Matrices; Determinants, Cramer's Rule; Inverse of a Matrix; Orthogonal Matrices; Gauss-Jordan Method to find the inverse of a matrix; Linear Systems of Equations, Rank of a Matrix. Eigenvalues and Eigenvectors; Eigenvalues of some special matrices; Cayley-Hamilton Theorem; Similarity Matrix, Diagonalization of matrices.	**T1: Chapter 2** Secs. 2.1 – 2.7(6), 2.9-2.10, 2.13 – 2.16	***International Academia:*** Syllabus | Engineering Math: Differential Equations and Linear Algebra | Mechanical Engineering | MIT OpenCourseWare Part III: Linear Algebra | Calculus Revisited: Complex Variables, Differential Equations, and Linear Algebra | Supplemental Resources | MIT OpenCourseWare Linear Algebra, Calculus, & Applications I Stanford Online ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:*** MATLAB	10	1. Write a function that takes a matrix, a row number and a column number. Beginning with the row number passed to the function, scroll down the column passed to the function and return the row number that contains the largest absolute value in the column. 2. Using MATLAB, find the determinant and rank of a matrix. 3. Compute eigenvalues and eigenvectors of a matrix A $\in \mathbf{R}^{n\times n}$. 4. Solve a linear system of equations.
5	**Sequences and Series**	Basic ideas on Sequence; Concept of Monotonic and Bounded sequence; Convergence and Divergence of Sequence; Algebra of Sequences (Statement only). Basic idea of an Infinite Series; Notion of Convergence and Divergence; Series of Positive	**T2: Chapter 18**	***International Academia:*** **https://ocw.mit.edu/courses/18-01-Calculus-I-Single-Variable-Calculus** ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:***	10	1. To evaluate the sum of an infinite series. 2. To check the convergence or divergence of an infinite series.

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		Terms - Convergence of infinite G.P. series and p-series (Statement only); Tests of Convergence [Statement only] – Comparison Test, Integral Test, D'Alembert's Ratio Test, Raabe's Test and Cauchy's Root test. Alternating Series - Leibnitz's test [Statement only], Absolute and Conditional Convergence.		MATLAB		

Text Books:

T1: B. S. Grewal, "Higher Engineering Mathematics", 44th Edition (2021), Khanna Publishers.

T2: B. K. Pal & K. Das, "Engineering Mathematics" - Vol. 1, 10th Edition (2021), U. N. Dhur & Sons.

Reference Books:

1. **Biswadip Basu Mallik & Krishanu Deyasi,** "Engineering Mathematics" – Vol. 1A, 2B, 1st Edition (2020), Cengage Learning.
2. **Erwin Kreyszig,** "Advanced Engineering Mathematics", 10th Edition (2017), John Wiley & Sons.
3. **R. K. Jain and S. R. K. Iyengar,** "Advanced Engineering Mathematics", 5th Edition (2016), Narosa Publication House

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4. **B. V. Ramana,** "Higher Engineering Mathematics", 11th Reprint (2017), Tata McGraw Hill.

5. **Amos Gilat,** "Matlab: An Introduction with Applications", 6th Edition (2016), John Wiley & Sons.

6. **Rudra Pratap,** "Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers", 7th Edition (2019), Oxford University Press.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	3	-	-	-	1	1	2	1
CO2	2	3	3	2	3	-	-	-	1	1	2	1
CO3	2	3	3	2	3	-	-	-	1	1	2	1
CO4	2	3	3	2	3	-	-	-	1	1	2	1

Subject Name: Statistics and Numerical Techniques Credit: 4 Lecture Hours: 48 Subject Code: MCA307

Name of the Course: Statistics and Numerical Techniques	
Course Code: MCA307	**Semester: 3rd**
Duration: One Semester	**Maximum Marks:100**
Teaching Scheme: Lecture method	**Examination Scheme**
Theory: 03 L	End Semester Exam:100
Tutorial: 01 L	Continuous Assessment:100
Credit: 4	
Aim:	
Sl.No.	
1	Equip students with the skills to collect, organize, and summarize data effectively, enabling them to understand the fundamentals of descriptive and inferential statistics.
2	Provide students with the knowledge of numerical techniques for solving complex mathematical problems, fostering proficiency in methods such as root finding, interpolation, and numerical integration.
3	Enable students to apply statistical and numerical methods to real-world scenarios across various disciplines, promoting critical thinking, problem-solving, and ethical data practices.
Objective:	
Sl.No.	
1	Develop students' understanding of different data types and the ability to collect, organize, and summarize data effectively, using descriptive statistics techniques.

2	Enable students to grasp the principles of statistical inference, including hypothesis testing, confidence intervals, and regression analysis, to draw meaningful conclusions from sample data about populations.
3	Equip students with proficiency in numerical techniques such as root finding, interpolation, and numerical integration, enabling them to solve complex mathematical problems encountered in various disciplines.
4	Foster the application of statistical and numerical methods in practical scenarios across diverse fields, through case studies and hands-on exercises, promoting critical thinking, problem-solving, and ethical data practices.
Pre-Requisite:	
Sl.No.	
1.	Basic knowledge of senior secondary and under graduate levels mathematics.
CourseOutcome:	
1.	Upon completion of the course, students will demonstrate proficiency in collecting, analyzing, and interpreting data using appropriate statistical techniques, enhancing their ability to make informed decisions based on empirical evidence.
2.	Students will be able to apply numerical techniques like interpolation and numerical integration to solve complex mathematical problems encountered in engineering, science, and other disciplines, effectively utilizing computational tools to address real-world challenges.
3.	Students will be able to apply numerical techniques like solution of equation and system of linear equations to solve complex mathematical problems.
4.	At the end of the course, students will be able to apply numerical methods like numerical solution of ODE to solve complex mathematical problems encountered in engineering, science, and other disciplines to address day-to-day life critical problems.
Relevant Links:	
Study Material	NPTELLINK CourseraLink LinkedInLearningLink

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	2	-	-	-	-	-	-	-			
CO2	3	2	-	2	3	-	-	-	-	-	-	-			
CO3	3	3	-	2	3	-	-	-	-	-	-	-			
CO4	3	3	-	2	3	-	-	-	-	-	-	-			

Module number	Topic	Sub-topics	MappingwithIndustry and International Academia	Lecture Hours
1	Statistics, Probability and Distribution	Statistics - measure of central tendency, dispersion (Moments, Skewness & Kurtosis). Least square curve fitting - linear & non-linear. Probability, introduction to mass function, density function, distribution function (Binomial, Poisson, Normal), estimation of parameters (unbiasedness-concept of noise/error, consistency).	**Industry Mapping:**https://www.sagemath.org/, MATLAB **International Academia:** https://ocw.mit.edu/courses/18-440-probability-and-random-variables-spring-2014/pages/lecture-notes/ , https://ocw.mit.edu/courses/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/pages/lecture-notes/	16

2	Interpolation and Numerical Integration	Interpolation-Newton's Forward, Backward, Sterling & Bessel's Interpolation formulae, Lagrange's Interpolation. Inverse Interpolation. Integration - Trapezoidal, Simpson's 1/3rd, Weddle's Rule, Romberg Integration, Gauss- Legendre two &three points formula, Newton Cotes Formula.	**Industry Mapping:** https://www.sagemath.org/ ,MATLAB **International Academia:** https://ocw.mit.edu/courses/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/pages/lecture-notes/	12
3		Solution of any equation - Method of Iteration, Method of Bisection, Newton-Raphson Method, Regula-Falsi method and Secant Method. Solution of system of linear equations- Gauss Elimination Method, Gauss-Jacobi, Gauss-Seidel, LU factorization and Tri-diagonalization.	**Industry Mapping:** https://www.sagemath.org/ , MATLAB **International Academia:** https://ocw.mit.edu/courses/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/pages/lecture-notes/	12
4		Solution of differential equations - Picard's method, Euler-modified method, Taylor's Series method, Runge-Kutta method, Milne's Predictor-Corrector method.	**Industry Mapping:**https://www.sagemath.org/ , MATLAB **International Academia:** https://ocw.mit.edu/courses/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/pages/lecture-notes/	8

List of Books/Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
B. S. Grewal	Higher Engineering Mathematics	44th Edition	Khanna Publishers
ReferenceBooks:			
Dr. Hari Arora	PROBABILITY AND STATISTICS	3rd Edition	S.K. KATARIA & SONS
K. DAS	NUMERICAL METHODS	2nd Edition	U.N.DHUR & SONS PRIVATE LTD.
B.K. PAL & K. DAS	ENGINEERING MATHEMATICS Volume - IIA	1st Edition (2021)	U.N.DHUR & SONS PRIVATE LTD.
Madhumangal Pal	Numerical Analysis for Scientists and Engineers: Theory and C Programs	1st Edition (2007)	Alpha Science International Ltd

University of Engineering & Management, Jaipur

Syllabus for MCA Admission Batch-2024

Class : **MCA** **Year** : **Ist Year**

Subject Name : **Discrete Mathematical Structure** **Credit** : **3**

Subject Code : **MCA104** **Lecture Hours** : **41**

Pre-requisite: Basic understanding of algebra and familiarity with mathematical reasoning and proof techniques.

Related links : Study Material NPTEL Coursera LinkedIn Learning

Introduction:

It covers the topics and solution methodology of real-world problems of set theory, relation, function, theory of graphs and tree, combinatorics, mathematics induction, theory of automata, formal languages, and propositional logics**.**

Course Outcomes (COs):

CO1 :

Definition and concept of set theory, relation, function, theory of graphs and tree, combinatorics mathematics induction, theory of automata, formal languages, and propositional logics, and their use in real world problems.

CO2 :

Use the mathematical methods and algorithms to solve the problems pertaining to set theory, relation, function, theory of graphs and tree, combinatorics mathematics induction, theory of automata and formal languages, and propositional logics.

CO3 :

Evaluate the problems pertaining to theory of graph and tree, propositional logics, combinatorics mathematics induction, and theory of automata. Also, analyze the best algorithms to solve the real-world problems of graphs and tree pertaining to shortest path and minimal spanning tree.

CO4 :

Choose an appropriate approach to design a problem related to graph and tree, propositional logics, automata, generating function and their numerical solution.

Syllabus for MCA Admission Batch-2024

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	-	-	-	-	3	-	-	-	3	-
CO2	2	3	2	2	-	-	-	-	3	-	-	-	3	-
CO3	3	3	2	2	-	-	-	-	3	-	-	-	3	-
CO4	3	3	1	2	-	-	-	-	2	-	-	-	3	-

Module number	Topic	Text Book as per Syllabus	Mapping with Industry and International Academia	Lecture Hours
1.	**Set Theory and Functions**			**4**
	Set Theory: Definitions and operations (union, intersection, complement), Power sets and Cartesian products.	Discrete Mathematics and Its Applications (SIE)| 7th Edition McGraw Hill	Industry: Data modeling, database management. Academia : Foundations of computer science, mathematical analysis	2
	Functions: Definitions and types (injective, surjective, bijective), Composition of functions and inverse functions.			2
2.	**Relations and Propositional Logic**			**8**
	Relations: Definitions and properties (reflexive, symmetric, transitive), Equivalence relations and partitions, Partial orders and Hasse diagrams	Discrete Mathematics and Its Applications (SIE)| 7th Edition McGraw Hill	Industry: Software development, logic circuits, artificial intelligence. Academia:	4

			Formal methods, logic in computer science	
	Propositional Logic: Propositions and logical connectives, Truth tables and logical equivalences, Normal forms (CNF, DNF).	Discrete Mathematics and Its Applications (SIE)| 7th Edition McGraw Hill	Industry: Software development, logic circuits, artificial intelligence. Academia: Formal methods, logic in computer science	4
3.	**Combinatorics and Mathematical Inductions**			**8**
	Combinatorics: Permutations and combinations, Binomial theorem and Pascal's triangle, Inclusion-exclusion principle.	Discrete Mathematics and Its Applications (SIE)| 7th Edition McGraw Hill	Industry: Cryptography, algorithm design, network security. Academia: Discrete mathematics, theoretical computer science.	4
	Mathematical Inductions: Principle of mathematical induction, Strong induction, Applications and examples.			4
4.	**Graph Theory and Algorithms**			**8**
	Graph Theory : Definitions and types of graphs, Sub-graphs, cyclic graphs, and trees, Spanning trees and binary trees.	Discrete Mathematics and Its Applications (SIE)| 7th Edition McGraw Hill	Industry: Network analysis, operations research, data science. Academia: Algorithm design, computational complexity.	4
	Graph Algorithms: Kruskal's and Prim's algorithms (minimum spanning trees), Dijkstra's algorithm (shortest path), Floyd-Warshall algorithm (all-pairs shortest paths), DFS and BFS (graph traversal).			4
5.	**Automata and Formal Languages**			**7**

	Automata: Definitions and differences between NFA and DFA, Conversion of NFA to DFA, State minimization techniques, Mealy and Moore machines.	Discrete Mathematics and Its Applications (SIE)| 7th Edition McGraw Hill	Industry: Compiler design, text processing, machine learning. Academia: Automata theory, formal language theory.	4
	Formal Languages: Grammar types (Type 0, 1, 2, 3), Chomsky hierarchy, Regular expressions and languages.			3
6.	**Advanced Topics**			**6**
	Generating Functions: Definitions and basic properties, Applications in counting and solving recurrences.	Discrete Mathematics and Its Applications (SIE)| 7th Edition McGraw Hill	Industry: Financial modeling, operations research. Academia: Discrete mathematics, combinatorial analysis, Soft computing, artificial intelligence	3
	Recurrence Relations : Linear recurrence relations with constant coefficients, Methods of solving recurrences (characteristic equation, generating functions).			2
	Fuzzy Sets: Definitions and basic properties, Operations on fuzzy sets (union, intersection, complement), Applications and examples			1

Textbook:

Discrete Mathematics and Its Applications (SIE)| 7th Edition, Rosen and Krithivasan, McGraw Hill.

Reference books:

1. Discrete Mathematical Structure, Somasundaram, PHI.
2. Discrete Mathematical Structure, Dubey, Excel books.

3. Discrete Structure and Graph Theory, Bhisma Rao, Scitech.
4. Discrete Mathematical Structure, G.S. Rao, New Age Publication.
5. Discrete Mathematics for Comp. Scientists & Mathematician, Mott. Kandel and Baker, PHI.
6. A Textbook of Discrete Mathematics, 9th Edition, S.K. Sarkar, S.Chand.

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University of Engineering & Management, Jaipur

Syllabus for BBA Admission Batch-2024

Class : BBA **Year : Ist Year**

Subject Name : Business Statistics & Logic **Credit : 4**

Subject Code : BBABB104 **Lecture Hours : 40**

Pre-requisite: Basic Mathematics

Related links : Study Material MIT Opencourse NPTEL LinkedIn Learning

Introduction:

It covers the topics and solution methodology of real-world problems of measures of central tendency, dispersion, moments, kurtosis and skewness.

Course Outcomes (COs):

CO1 :

Definition and concept of frequency distribution, measures of central tendency, dispersion, moments, kurtosis and skewness and their use in real world problems.

CO2 :

Understand the measures of central tendency, dispersion, moments, kurtosis and skewness and their use to solve the real-world problems.

CO3 :

Evaluate the problems pertaining to measures of central tendency, dispersion, moments, kurtosis, and skewness.

CO4 :

Choose an appropriate approach to design a problem related to measures of central tendency, dispersion, moments, kurtosis, and skewness.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	-	-	-	-	3	-	-	-	3	-
CO2	3	3	2	2	-	-	-	-	3	-	-	-	3	-
CO3	3	3	2	2	-	-	-	-	3	-	-	-	3	-
CO4	3	3	1	2	-	-	-	-	2	-	-	-	3	-

Syllabus for BBA Admission Batch-2024

Module number	Topic	Text Book as per Syllabus	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab/Case Study Assignment
1.	**Introduction to Statistics**			**12**	
	Introduction to Statistics; Collection, Editing and Presentation of Data: Primary Data and Secondary Data, Methods of Collection, Presentation of Data: Construction of a Table and the Different Components of a Table.	Managerial Statistics – S. Roychowdhury & D. Bhattachaya, U.N.Dhur Publication Chapter – 1,2,3	International Academia: MIT Open Course	6	Case study on data science opportunities & report writing
	Frequency Distributions- Attribute and variable; Frequency distribution of an attribute; Discrete and continuous variables; Frequency distributions of discrete and continuous variables. Different diagrammatic representation of a frequency distribution:	Managerial Statistics – S. Roychowdhury & D. Bhattachaya, U.N.Dhur Publication Chapter – 1,2,3	International Academia: MIT Open Course	6	
2.	**Measures of Central tendency**			**12**	
	Measures of Central Tendency- Introduction, Definition and utility; Different measures of average; Arithmetic Mean; Results on Arithmetic Mean; Merits and Demerits of Arithmetic Mean; Median; Mode; Other positional measures.	Managerial Statistics – S. Roychowdhury & D. Bhattachaya, U.N.Dhur Publication Chapter - 4	International Academia: MIT Open Course	12	Case study on data collection & its challenges Forming questionnaire
3.	**Measures of Dispersion**			**12**	
	Measures of Dispersion- Introduction; Meaning and objective of dispersion; Different measures of dispersion – Range, Quartile deviation, Mean deviation, Mean Absolute deviation, Standard deviation.	Managerial Statistics – S. Roychowdhury & D. Bhattachaya, U.N.Dhur Publication Chapter – 5 (5.1 to 5.8)	International Academia: MIT Open Course	12	Hands on EDA using Microsoft Excel
4.	**Measures of Moment, Skewness & Kurtosis**			**12**	

		Managerial Statistics – S. Roychowdhury & D. Bhattachaya, U.N.Dhur Publication Chapter - 6	International Academia: MIT Open Course	12	Hands on Application using Microsoft Excel

Textbook:

Managerial Statistics – S. Roychowdhury and D. Bhattacharya, U.N. Dhur Publication

Reference Book:

Business Mathematics and Statistics – Ranajit Dhar, Dishari Prakashan.

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