

# **Course Information Sheet**



## B.P.PODDAR INSTITUTE OF MANAGEMENT AND TECHNOLOGY

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### COURSE DATA SHEET

<b>PROGRAM:</b> Electronics and Communication Engineering(secA)	DEGREE: B-Tech(U.G)
<b>COURSE:</b> Mathematics IB	<b>SEMESTER:</b> 1st <b>CREDITS:</b> 4
<b>COURSE CODE:</b> BS-M102 C102B	<b>COURSE TYPE:</b> <del>CORE</del> / <del>ELECTIVE</del> / <b>BREADTH/ S&amp;H</b>
<b>COURSE AREA/DOMAIN:</b> Basic Engineering	<b>CONTACT HOURS:</b> 3+1 (Tutorial) hours/Week.
<b>CORRESPONDING LAB COURSE CODE (IF ANY):</b> nil	<b>LAB COURSE NAME (IF ANY):</b> nil

### SYLLABUS:

Module No.	Description of Topic	Hours
<b>I</b>	<b>Calculus (Integration):</b> Evolutes and involutes; 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.	<b>8</b>
<b>II</b>	<b>Calculus (Differentiation):</b> Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.	<b>6</b>
<b>III</b>	<b>Sequence and Series:</b> Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.	<b>11</b>
<b>IV</b>	<b>Multivariate Calculus:</b> Limit, continuity and partial derivatives, Directional derivatives, Total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, Curl and Divergence.	<b>9</b>
<b>V</b>	<b>Matrices:</b> Inverse and rank of a matrix, Rank-nullity theorem; System of linear equations; Symmetric, Skew-symmetric and Orthogonal matrices; Determinants; Eigen values and Eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.	<b>8</b>
	<b>Total Hours</b>	<b>42</b>

**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T-1	Engineering Mathematics, Volume-I, B.K.Pal, K.Das, U.N.Dhur & Sons pvt
T-2	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons India
R-1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
R-2	Kanti B. Dutta, Mathematical Methods of Science and Engineering, Cenage Learning.
R-3	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi
R-4	S.K. Mapa, Higher Algebra: Abstract and Linear, Sarat Book House Pvt.Ltd.
R-5	Hoffman and Kunze: Linear algebra, PHI.
R-6	Reena Garg, Engineering Mathematics-I, Khanna Publishers.l

**COURSE PRE-REQUISITES:** High School Mathematics**COURSE OBJECTIVES:**

1	To provide an overview of Integral Calculus
2	To provide an overview of Differential Calculus
3	To provide an overview of Sequence and Series
4	To provide an overview of Multivariate Calculus
5	To provide an overview of Matrices

**COURSE OUTCOMES:**

After completing the course the student will be able to

SNO	DESCRIPTION	PO(1..12) MAPPING	PSO MAPPING	Bloom's Level
CO1	Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals	PO1, PO2, PO3, PO4, PO12	-	L3
CO2	Understand the domain of applications of mean value theorems to	PO1, PO2, PO3, PO12	PSO1	L2

	engineering problems			
<b>CO3</b>	Learn the tools of power series and Fourier series to analyze engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.	PO1, PO2, PO3, PO12	PSO1	L3
<b>CO4</b>	Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions.	PO1, PO2, PO3, PO4,PO12	PSO1	L3
<b>CO5</b>	Understand different types of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems.	PO1, PO2, PO3, PO4,PO12	PSO1,PSO2	L3

**COURSE OUTCOMES VS POS MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):**

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

\* For Entire Course, PO /PSO Mapping; 1 (Low); 2 (Medium); 3 (High) Contribution to PO/PSO

PO1	Engineering Knowledge	PO7	Environment & Sustainability	PSO1	Domain Skills 1
PO2	Problem Analysis	PO8	Ethics	PSO2	Domain Skills 2
PO3	Design & Development	PO9	Individual & Team Work		
PO4	Investigations	PO10	Communication Skills		
PO5	Modern Tools	PO11	Project Mgt. & Finance		
PO6	Engineer & Society	PO12	Life Long Learning		

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**COURSE OUTCOMES VS PSOS MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1)**

COURSE	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	2	2
CO4	1	1
CO5	1	1

**Program Specific Outcomes (PSO)**

**PSO1:** Students will acquire knowledge in Advance Communication Engineering, Signal and Image Processing, Embedded and VLSI System Design.

**PSO2:** Students will qualify in various competitive examinations for successful employment, higher studies and research.

**Bloom's Level**

L-1	L-2	L-2	L-3	L-4	L-5
Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

### JUSTIFICATION FOR MAPPING COS- POS

SNO	PO MAPPED	JUSTIFICATION
<b>CO1</b>	PO1	Concept of differential and integral calculus is a medium level mapping with “Engineering Knowledge” because student can use it to learn the subject Electrical Engineering.
	PO2	Concept of differential and integral calculus is a low level mapping with “Problem Analysis” because student can use it to develop algorithm only .
	PO3	Concept of differential and integral calculus is a low level mapping with “Design and development of solution” because student can use it to design network model of real life problem only.
	PO12	Concept of differential and integral calculus is a low level “Life long learning” for computer engineering.
<b>CO2</b>	PO1	Concept of mean value theorems is a medium level mapping with “Engineering Knowledge” because student can use it to form mathematical model.
	PO2	Concept of mean value theorems is a medium level mapping with “Problem Analysis” because student can use it to form mathematical model.
	PO3	Concept of mean value theorems is a low level mapping with “Design and development of solution” because student can use it rarely .
	PO12	Concept of mean value theorems is a low level mapping with because student can use it rarely .
<b>CO3</b>	PO1	Concept of power series and Fourier series is a medium level mapping with “Engineering Knowledge” because student can use it to form mathematical model.
	PO2	Concept of power series and Fourier series is a low level mapping with “Problem Analysis” because student can use it to form mathematical model.
	PO3	Concept of power series and Fourier series is a low level mapping with “Design and development of solution” because student can use it rarely .
	PO12	Concept of power series and Fourier series is a low level mapping with “Life long learning” because student can use it rarely .

<b>CO4</b>	PO1	Concept of several variables ,identification of extremum points of different surfaces of higher dimensions is a medium level mapping with “Engineering Knowledge” because student can use it to form mathematical model.
	PO2	Concept of several variables ,identification of extremum points of different surfaces of higher dimensions is a low level mapping with “Problem Analysis” because student can use it to form mathematical model.
	PO3	Concept of several variables ,identification of extremum points of different surfaces of higher dimensions is a low level mapping with “Design and development of solution” because student can use it rarely .
	PO12	Concept of several variables ,identification of extremum points of different surfaces of higher dimensions is a low level mapping with because student can use it rarely.
<b>CO5</b>	PO1	Concept of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems is a low level mapping with “Engineering Knowledge” because student can use it to form mathematical model.
	PO2	Concept of of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems .is a low level mapping with “Problem Analysis” because student can use it to form mathematical model.
	PO3	Concept of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems is a low level mapping with “Design and development of solution” because student can use it rarely.
	PO12	Concept of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems is a low level mapping with because student can use it rarely .

**JUSTIFICATION FOR MAPPING COS-PSO S**

<b>SNO</b>	<b>PSO MAPPED</b>	<b>JUSTIFICATION</b>
<b>CO1</b>	<b>PSO1,PSO2</b>	Concept of differential and integral calculus maps to both because student can apply to electrical and allied interdisciplinary engineering fields
<b>CO2</b>	<b>PSO1,PSO2</b>	Concept of mean value theorems maps to both because student can apply to circuits.
<b>CO3</b>	<b>PSO1,PSO2</b>	Concept of power series and Fourier series maps to both because student can apply to electrical and interdisciplinary research.
<b>CO4</b>	<b>PSO1,PSO2</b>	Concept of several variables ,identification of extremum points of different surfaces of higher dimensions maps to both because student can apply to measurement, electromagnetic field theory.
<b>CO5</b>	<b>PSO1,PSO2</b>	Concept of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems maps to both because student can apply to measurement, electromagnetic field theory.

**JUSTIFICATION FOR MAPPING COS-BLOOM'S LEVEL**

<b>SNO</b>	<b>Bloom's Level</b>	<b>JUSTIFICATION</b>
<b>CO1</b>	<b>L-3</b>	Concept of differential and integral calculus will be applied by the learner.
<b>CO2</b>	<b>L-2</b>	Concept of mean value theorems will be understood by the learner.
<b>CO3</b>	<b>L-3</b>	Concept of power series and Fourier series will be applied by the learner.
<b>CO4</b>	<b>L-3</b>	Concept of several variables ,identification of extremum points of different surfaces of higher dimensions will be

		applied by the learner.
<b>CO5</b>	<b>L-3</b>	Concept of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems will be applied by the learner.

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS, POs:**

<b>SNO</b>	<b>DESCRIPTION</b>	<b>PROPOSED ACTIONS</b>
1	Limit, Continuity and Derivative of vector valued function	Will be addressed by Dr. Rikhiya Dhar , Applied Science and Humanitie, Mathematics division on 27.09.2018; 28.09.2018; 29.09.2018

*PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC*

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN**

1	Inner Product Space	PO1, PO2, PO3	PSO1, PSO2
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**WEB SOURCE REFERENCES**

1	<a href="http://www.maths.ed.ac.uk/~aar/papers/matrices.pdf">http://www.maths.ed.ac.uk/~aar/papers/matrices.pdf</a>
2	<a href="http://nptel.ac.in/courses/122104018/1">http://nptel.ac.in/courses/122104018/1</a>
3	<a href="http://home.iitk.ac.in/~psraj/mth101/lecture_notes/lecture6.pdf">http://home.iitk.ac.in/~psraj/mth101/lecture_notes/lecture6.pdf</a>
4	<a href="http://nptel.ac.in/courses/122101003/9">http://nptel.ac.in/courses/122101003/9</a>
5	<a href="http://nptel.ac.in/courses/122101003/downloads/Lecture-9.pdf">http://nptel.ac.in/courses/122101003/downloads/Lecture-9.pdf</a>
6	<a href="http://home.iitk.ac.in/~psraj/mth101/lecture_notes.html">http://home.iitk.ac.in/~psraj/mth101/lecture_notes.html</a>
7	<a href="http://nptel.ac.in/courses/122104017/">http://nptel.ac.in/courses/122104017/</a>
8	<a href="http://home.iitk.ac.in/~psraj/mth101/lecture_notes/lecture26.pdf">http://home.iitk.ac.in/~psraj/mth101/lecture_notes/lecture26.pdf</a>
9	<a href="http://nptel.ac.in/courses/111104092/">http://nptel.ac.in/courses/111104092/</a>

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

<input checked="" type="checkbox"/> CHALK & TALK	<input checked="" type="checkbox"/> STUD. ASSIGNMENT	<input checked="" type="checkbox"/> WEB RESOURCES	<input checked="" type="checkbox"/> NPTEL/OTHERS
<input checked="" type="checkbox"/> LCD/SMART BOARDS	<input checked="" type="checkbox"/> STUD. SEMINARS	ADD-ON COURSES	<input type="checkbox"/> WEBNIARS

**ASSESSMENT METHODOLOGIES-DIRECT**

<input checked="" type="checkbox"/> ASSIGNMENTS	<input checked="" type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
<input type="checkbox"/> STUD. LAB PRACTICES	<input checked="" type="checkbox"/> STUD. VIVA	<input checked="" type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
ADD-ON COURSES	<input type="checkbox"/> OTHERS		

**ASSESSMENT METHODOLOGIES-INDIRECT**

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS

**INNOVATIONS IN TEACHING/LEARNING/EVALUATION PROCESSES:**

Prepared by Dr. Kakali Karmakar(Sur)

Approved by HOD