Enclosure-BMTI

Shree Manibhai Virani and Smt. Navalben Virani Science College, Rajkot (Autonomous)
Affiliated to Saurashtra University, Rajkot
Department of Mathematics
B.Sc. Mathematics

Vision of the Department:

To be recognized for excellence in Teaching – Learning adjunct by empowering graduating students to compete in and contribute to the developing needs of the society.

Mission of the Department:

To provide quality teaching-learning, research and service opportunities leading to holistic development of students through collegial exchange of ideas, independent thought, and the highest ethical standards.

Goals:

a. Provide high quality academic experiences through comprehensive & relevant curriculum at all UG & PG levels.

b. Foster problem solving ability and research aptitude by extending instructional and infrastructural support and research guidance.

c. Inculcate the values of multi-disciplinary approach and innovative thinking by facilitating learning experiences in the field of mathematics and its allied fields

d. Produce graduates with ability to solve real life problems and ability to face the emerging challenges for careers in academia, industry and GOs/NGOs.

e. Promote ethical and professional environment amongst faculties and students of the department.

GRADUATE ATTRIBUTES

- **Academic excellence**: Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) FOR B. Sc. MATHEMATICS

Our programme will produce Graduates who will attain following PEOs after few years of graduation

PEO 1 : **Core competency:** will develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of mathematics and allied sciences.

PEO 2 : **Breadth of knowledge:** will show capabilities of independently designing, executing and interpreting mathematical problems by integrating the interdisciplinary knowledge of Mathematics and other domains.

PEO 3 : **Preparedness:** will reflect professional behaviour and have the potential to show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.

PEO 4 : **Professionalism:** will reflect values and responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.

PEO 5 : **Learning environment:** will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

PROGRAM OUTCOMES (POs) FOR B. Sc. MATHEMATICS

After completion of the programme the Graduate will be able to:

PO 1 : **Domain knowledge:** Demonstrate the knowledge of concepts, principles and applications of Mathematics in various fields.

PO 2 : **Problem analysis:** Acquire critical thinking skills to understand and solve contemporary problems with knowledge and skills.

PO 3 : **Design/development of solutions:** Make decisions to develop solutions to given situations/questions, formulate strategies to identify, define and solve problems including, as necessary, global perspectives.

PO 4 : **Conduct investigations of complex problems:** Gain ability to design, conduct experiments, analyse and interpret data for investigating problems in Mathematics and allied sectors

PO 5 : **Modern tool usage:** The ability to acquire, develop, employ and integrate a range of technical, practical and professional skills, in appropriate and ethical ways within a professional context, autonomously and collaboratively and across a range of disciplinary and professional areas.

PO 6 : **The Mathematics Professional and society:** An awareness of the role of science within a global culture and willingness to contribute to the shaping of community views on complex issues where the methods and findings of science are relevant.

PO 7 : **Environment and sustainability:** Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development

PO 8 : **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities and norms.

PO 9 : **Individual and team work:** Able to function effectively as individual and as a member in multidisciplinary settings.

PO 10 : **Communication:** Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.

PO 11 : **Project management and finance:** Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12 : **Life-long learning:** Able to recognize the need to undertake life-long learning and acquire the capacity to do so.

PROGRAMME SPECIFIC OUTCOME (PSOs) FOR B. Sc. MATHEMATICS PROGRAMME

After completion of the programme the Graduate will:

PSO 1 : Understand the advanced concepts of mathematics and demonstrate the ability to apply the knowledge of mathematics at an advanced level.

PSO 2 : Collect, organize and adapt contemporary knowledge effectively and utilize appropriate computational tools independently and analyse and perform a broad variety of mathematical experiments using mathematical software and internet.

PSO 3 : Develop and apply new theories of mathematics to solve a broad variety of problems involving mathematics.

PSO 4 : Apply critical thinking skills for the sustainable development and develop the knowledge and skills to secure employment.

PSO 5 : Exhibit the capacity to identify, formulate, and solve problems pertaining to mathematics through research and critically evaluate the theoretical results and recognize the need for, and an ability to engage in life−long learning.

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SCHEME OF LEARNING AND EVALUATION
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Semester I									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
Part-I		**T**	**Tu**	**P**					
21ULCEN101	Development of Functional English	3	-	-	3	40	60	100	3
	Part-I Total	**3**	**0**	**0**		**40**	**60**	**100**	**3**
Part-II									
21UMTCC101	**Core 1:** Differential Calculus (F)	3	-	-	3	30	70	100	3
21UMTCC102	**Core 2:** Matrix Algebra (F)	3	-	-	3	30	70	100	3
21UMTID101	**IDC 1:** Electricity & Modern Physics	3	-	-	3	30	70	100	3
21UMTCC103	**Core Practical 1**: Practical on Differential Calculus and Matrix Algebra including mathematical software	-		12#	3	40	60	100	6
21UMTID102	**IDC 1 Practical**: Electricity & Modern Physics	-		6@	3	40	60	100	3
	Core Enrichment 1: Concept to Practice	-	1	-	-	(20)	Evaluation at the end of semester - 4		
	Part-II Total	**9**	**1**	**18**		**190**	**330**	**500**	**18**

Semester I									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
		T	**Tu**	**P**					
Part-III: Ability Enhancement Courses									
21AESD101	**AECC I:** Introduction to SDG (online course)	-	-	-	-	Remarks			Audit course
-	**AECC II:** Environmental Conservation and Sustainable Development	1	-	-	-	Evaluation at the end of 2nd Semester			-
-	**AECC III:** Human Values for Holistic Living	1	2*	-	-	Evaluation at the end of 2nd Semester			-
	FS 3: Career Acceleration Program	2*	-	-	-	Cumulative evaluation at the end of Semester V			
	Part-III Total	**2**	**2***	**0**		**0**	**0**	**0**	**0**
	Total (Part-I to Part-III)	**14+2***	**1+2***	**18**		**230**	**390**	**600**	**21**
		33+2*+2*				**600**			

*Out of working Hours. | # 3 hours each on Day 1, 2 3 and 4. | @ 3 hours each on Day 1 and 2
( ) Final evaluation for 100 marks be made at the end of Semester IV which includes 20 marks CIA in Semester I, II, III each and 40 marks in Semester IV.

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Semester II									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
Part-I		**T**	**Tu**	**P**					
21ULCEN201	Functional English	3	-	-	3	40	60	100	3
	Part-I Total	**3**	**0**	**0**	**3**	**40**	**60**	**100**	**3**
Part-II									
21UMTCC201	**Core 3**: Differential Equations (Ap)	4	-	-	3	30	70	100	4
21UMTCC202	**Core 4:** Advanced Calculus (Ad)	4	-	-	3	30	70	100	4
21UMTID201	**IDC 2:** Physics: Electronics, sound and modern physics	3	-	-	3	30	70	100	3
21UMTCC203	**Core Practical 2**: Practical on Differential equations and Advanced Calculus including mathematical software	-	-	8#	3	40	60	100	4
21UMTID202	**IDC 2 Practical:** Physics Practical: Electronics, sound and modern physics	-	-	6@	3	40	60	100	3
	Core Enrichment 1: Concept to Practice	-	1	-	-	(20)	Evaluation at the end of semester - 4		
	Part-II Total	**11**	**1**	**14**		**190**	**330**	**500**	**18**

Semester II									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
		T	**Tu**	**P**					
Part-III: Ability Enhancement Courses									
21AEES201	**AECC II:** Environmental Conservation and Sustainable Development	1	-	-	-	Remarks			2
21AEVE202	**AECC III:** Human Values for Holistic Living	1	2*	-	-	Remarks			3
	FS 3: Career Acceleration Program	2*	-	-	-	Cumulative evaluation at the end of Semester V			
	Part-III Total	**2+ 2***	**2***	**0**	**-**	**0**	**0**	**0**	**5**
	Total (Part-I to Part-III)	**16+ 2***	**1+ 2***	**14**		**230**	**390**	**600**	**26**
		31+2*+2*				**600**			

*Out of working Hours. | # 2 hours each on Day 1, 2, 3 and 4. | @ 3 hours each on Day 1 and 2

( ) Final evaluation for 100 marks be made at the end of Semester IV which includes 20 marks CIA in Semester I, II, III each and 40 marks in Semester IV.

Minimum one-month internship pertaining to learning for concept to practice/prototype or product development for start-up/mini and final semester project/skilling in the summer vacation/combination of semester break and summer vacation in industry/premier research institute/NGO, etc.

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Semester III									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
Part-I		**T**	**Tu**	**P**					
21ULCEN03	Advanced English & Correspondence	3	-	-	3	40	60	100	3
	Part-I Total	**3**	**-**	**-**	**3**	**40**	**60**	**100**	**3**
Part-II		**T**	**Tu**	**P**					
21UMTCC301	**Core 5:** Fundamentals of Mathematical Analysis (F)	3	-	-	3	30	70	100	3
21UMTCC302	**Core 6:** Introduction to Complex Analysis (F)	3	-	-	3	30	70	100	3
21UMTCC303	**Core 7:** Discrete Mathematics (Ad)	3	-	-	3	30	70	100	3
	DSE 1 C1:	3	-	-	3	30	70	100	3
21UMTCC304	**Core Practical 3: Practical on Computer Aided Mathematics**	-	-	8#	3	40	60	100	4
21UMTDA301	**DSE 1 Practical 1:**	-	-	6@	3	40	60	100	3
	Core Enrichment 1: Concept to Practice	-	1	-	-	(20)	Evaluation at the end of semester - 4		
21UMTCC305	**Core Enrichment 2:** Internship 1/ Training/ Project	-	-	-		100	-	100	1
	Part-II Total	**12**	**1**	**14**		**320**	**400**	**700**	**20**

Semester III									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
		T	**Tu**	**P**					
Part-III: Ability Enhancement Courses									
-	**FS III:** Career Acceleration Program	-	2*	-					Audit course
	Part-III Total		**2***			**0**	**0**	**0**	
	Total (Part-I to Part-III)	**15**	**1+ 2***	**14**		**360**	**460**	**800**	**23**
						800			

2 hours each on Day 1, 2, 3 and 4.

( ) Final evaluation for 100 marks be made at the end of Semester IV which includes 20 marks CIA in Semester I, II, III each and 40 marks in Semester IV.

DSE 1: DSE Cluster course offered by the department to other departments for all B.Sc. Program – Sem-3

Semester III									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
Part-I		**T**	**Tu**	**P**					
21UMTDC301	Basic Mathematics	3	-	-	3	30	70	100	3
21UMTDC302	Practical on Basic Mathematics	-	-	6@	3	40	60	100	3

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Semester IV									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
Part-I		**T**	**Tu**	**P**					
21ULCEN04	Effective Communicative Skills	3	-	-	3	40	60	100	3
	Part-I Total	**3**	**-**	**-**	**3**	**40**	**60**	**100**	**3**
Part-II		**T**	**Tu**	**P**					
21UMTCC401	**Core 8:** Fundamentals of Linear Algebra (F)	4	-	-	3	30	70	100	4
21UMTCC402	**Core 9:** Integral and Vector Calculus (Ad)	3	-	-	3	30	70	100	3
21UMTDA401 21UMTDA402	**Core Elective 1:** Introduction to Graph Theory / Number Theory	3	-	-	3	30	70	100	3
	DSE 2: C2	3	-	-	-	30	70	100	3
	TDE 1:	2	-	-		100	-	100	2
21UMTCC404	**Core Practical 4:** Practical on Numerical Methods and Plotting including Mathematical Software	-	-	8#	3	40	60	100	4
	DSE 2 Practical: C2	-	-	6@	3	40	60	100	3
21UMTCC406	**Core Enrichment 1:** Concept to Practice	-	1	-	-	40	-	100	1
	Part-II Total	**14**	**1**	**14**		**340**	**400**	**800**	**23**

Part-III: Ability Enhancement Courses									
-	**FS III:** Career Acceleration Program	-	2*	-					Audit course
	Part-III Total		**2***			**0**	**0**	**0**	
	Total (Part-I to Part-III)	**17**	**1+ 2***	**14**		**380**	**460**	**900**	**26**
						900			

Minimum one month internship pertaining to learning for concept to practice/prototype or product development for start-up/mini and final semester project/skilling in the summer vacation/combination of semester break and summer vacation in industry/premier research institute/NGO etc.

DSE 2: DSE Cluster course offered by the department to other departments for all B.Sc. Program – Sem-4

Semester IV									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
Part-I		**T**	**Tu**	**P**					
21UMTDC 401	DSE 2: Mathematics for Scientific Calculation and Analysis	3	-	-	3	30	70	100	3
21UMTDC 402	DSE 2 Practical: Practical on Mathematics for Scientific Calculation and Analysis	-	-	6@	3	40	60	100	3
21UMTDC 403	DSE 2: Advance Mathematics	3	-	-	3	30	70	100	3
21UMTDC 404	DSE 2 Practical: Advanced Mathematics Practical	-	-	6@	3	40	60	100	3

TDE 1: Transdisciplinary Elective Course offered by the department to other departments for all B.Sc. Program – Sem-4

Semester IV									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**Total**	
Part-I		**T**	**Tu**	**P**					
21UMTTD401	TDE 1: Fundamentals of Statistics	2	-	-	-	100	-	100	2

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Semester V									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**TOTAL**	
Part-II		**T**	**Tu**	**P**					
21UMTCC501	**Core 10:**	3	-	-	3	30	70	100	3
21UMTCC502	**Core 11:**	4	-	-	3	30	70	100	4
21UMTCC503	**Core 12:**	4	-	-	3	30	70	100	4
21UMTCC504	**Core 13:** (Self-Study Course)	1	-	-	3	30	70	100	4
21UMTCC505	**Core 14:** Concept Recapitulation Test (CRT)	-	-	-	3	100		100	1
21UMTCC506	**Core Elective 2:**	3	-	-	3	30	70	100	3
21UMTTD501	**TDE 2:**	2	-	-		100		100	2
21UMTCC507	**Core Practical 5:**	-	-	12#	3	40	60	100	6
21UMTCC508	**Core Enrichment 3:** Internship /Training	-	-	-		100		100	1
21UMTCC509	**Core Enrichment 4:** Mini Project	-	-	2	-	100	-	100	4
	Part-II Total	**17**	**0**	**14**		**590**	**410**	**1000**	**32**
Part-III: Ability Enhancement Courses									
21AEFS501	**FS III:** Career Acceleration Program	-	2*	-		Remarks			Audit course
	Part-III Total	**0**	**2***	**0**	**-**	**0**	**0**	**0**	
	Total	**17**	**2***	**14**		**590**	**410**	**1000**	**32**
	(Part-I to Part-III)					**1000**			

2 hours each on day of the week.

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Semester VI									
Course Code	**Course**	**Contact Hrs/ week**			**SEE Duration (Hours)**	**Maximum Marks**			**Credits**
						CIA	**SEE**	**TOTAL**	
Part-II		**T**	**Tu**	**P**					
21UMTCC601	**Core 15:**	4	-	-	3	30	70	100	4
Core Enrichment 5:									
	Project / Skill training / Start-up/ OR Two Advanced Applied Theory courses & One practical (Core 16, Core 17 & Core Practical 6)	-	20	-				300	14
21UMTCC602	**Core 16:**	4	-	-	3	30	70	100	4
21UMTCC603	**Core 17:**	4	-	-	3	30	70	100	4
21UMTCC604	**Core Practical 6:**	-	-	12 #	3	40	60	100	6
	Part-II Total	**12**		**12**	**-**	**130**	**270**	**400**	**18**
Part-III: Ability Enhancement Courses									
-	**FS III:** Career Acceleration Program	-	2*	-		Remarks			Audit course
	Part-III Total	**0**	**2***	**0**	**-**	**0**	**0**	**0**	
	Total (Part-I to Part-III)	**12**	**2***	**12**		**130**	**270**	**400**	**18**
		26				**400**			

Formation of Part-III

Course Code	Semester	Course / Component	Contact Hrs	No. of Courses	Credit/ Course	Total Credits
A. Ability Enhancement Course (AEC)						
(i) Ability Enhancement Compulsory Course (AECC)						
	I	**AECC I :** Introduction to SDG (online course)	-	1	Remarks	Audit Course
	I & II	**AECC II:** Environmental Conservation and Sustainable Development	1 Hr / Week / Semester	1	1+1	2
	I & II	**AECC III:** Human Values for Holistic Living	1 T + 2 Tu /Week /Semester	1	1+1+1	3
					Sub Total	**5 + Audit course**
(ii) ***Skill Enhancement Course (SEC)***						
As per common list	Any Semester between II – V/VII	**SEC-I** *Value Added Courses	40 Hrs	1	1	1
	Any Semester between III – V/VII	**SEC-II** **Co-Curricular Course	80 to 120 Hrs	1	2	2
					Sub Total	3
B. Finishing School						
		FS I *to* FS IV *Compulsory to Earn Degree.*				
	I	**FS I:** Student Induction Program	3 weeks Phase 1, Phase 2, Phase 3	-	Remark	Audit course
	Across I & II Semesters	**FS II:** Fundamentals of Design Thinking (Online/Offline)	40 to 60 Hrs	1	Remark	Audit course
	Semesters I to V / VII	**FS III:** Career Acceleration Program **(CAP)** (Placement training)	2 Hrs / Week /Semester	As per syllabus	Remarks	Audit course

	Semester V (3 yrs program) Semester VI (4 yrs program)	**FS IV:** Community Engagement	Twice a month	1	Remarks	Audit course
		FS V *to* FS VIII *Options for Advanced Learners*				
	Any semester from II to V/VII	**FS V:** Indian & Foreign Languages	-	Any number of courses	Remarks	Audit course
	Any semester from II to V/VII	**FS VI:** Any number of Online course(s) from select MOOC platforms	-	Any number of courses	Remarks	Credit as per provider/ audit course
	Any semester from III to V/VII	**FS VII:** Advanced Design Thinking	-	1	Remarks	Audit course
	Any semester from I to VI/VIII	**FS VIII: #Extra Credit Course** Any number of courses from any UG program across the College.	Self-Study	Any number of courses	As per course offered	As per credit(s) earned across all courses opted
					Grand Total	

***Value Added Courses** - Option to student to choose at least 1 from a list of courses offered by any department across the College.

****Co-Curricular Courses** - Option to students to choose 1 from a list of courses offered by any department across the College.

Student may opt for any course of the odd/even prevailing semester from any UG program across the College with the following guidelines:

a. Attending class not mandatory.
b. May be mentored by the course teacher.
c. Preparation through self-study.
d. CIA not mandatory; evaluated for total marks at the end of the semester.
e. Indicates options to appear for the course through examination application and payment of examination fees of that course.
f. Credits earned through each course indicated in the consolidated mark sheet as extra credits; not included for CGPA, percentage marks and classification.

TOTAL MARKS & CREDIT DISTRIBUTION TO EARN THE DEGREE

S. No	PART	Total Marks	Total Credits
1.	**PART I:** Language Course	400	12
2.	**PART II:** Core, IDC, DSE, TDE	3900	128
3.	**PART III:** AECC-I, II & III SEC- I & II FS I, II, III & IV	Remarks	8+ audit course
	TOTAL	**4300**	**148**

DSE CLUSTER COURSES OFFERED BY THE DEPARTMENT FOR OTHER PROGRAMS

Sr. No.	Semester	Course Code	Course Title	Contact Hrs/Week	Credits
1.	III	**21UMTDC301**	Basic Mathematics	**3**	**3**
2.	III	**21UMTDC302**	Practical on Basic Mathematics	**3**	**1**

VALUE ADDED COURSES (VAC) COURSES OFFERED BY THE DEPARTMENT

Sr. No.	Course Code	Course Title	Course Duration	Credits
1		Vedic Mathematics	40	1

CO-CURRICULAR COURSES (CoC) COURSES OFFERED BY THE DEPARTMENT

Sr. No.	Course Code	Course Title	Course Duration	Credits
1.		Quantitative Aptitude & logical reasoning for industrial placement	80 to 120	2
2.		Preparation for Gujarat State Competitive Exams	100 Hours	2