KAAMADHENUARTS AND SCIENCE COLLEGE

Affiliated to BharathiarUniversity, Coimbatore

Sathyamangalam, Erode District – 638 503

CONTENT OF THE COURSE FILE – THEORY

Name of the Faculty : Hemalatha D **Department : Mathematics**

Course Name : Real Analysis- II **Course Code : 63A**

Academic Year : 2019-2020 **Semester : VI**

Class : III B.Sc Mathematics

S.No.	Particulars	Mode of Submission (Hard/Soft (CD))	Available* (√)
1	Syllabus copy of the course	Soft Copy	√
2	Time Table Particular Course	Soft Copy	√
3	Student Name List (with Register No.)	Soft Copy	√
4	Course Information and Lesson Plan	Soft Copy	√
5	Lesson Plan Execution	Soft Copy	√
6	Course Material Notes	Hard copy	√
7	Assignment – I		
	a) Topics	Soft Copy	√
8	CIA – I		
	a) Question Paper	Soft Copy	√
9	Assignment – II		
	a) Topics	Soft Copy	√
10	CIA – II		
	a) Question Paper	Soft Copy	√
11	Model Examination		
	a) Question Paper	Soft Copy	√
12	Statements of marks for Internal and Assignments	Soft Copy	√

* Enter NA if Not Applicable

D. Hema

V.J.NIRMALA M.Sc.,M.Phil.,B.Ed
Head & Assistant Professor
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1. <u>SYLLABUS</u>

REAL ANALYSIS - II

Subject Description:

This course presents nature of functions and mappings like continuity, connectivity, and derivative. It also includes the concept of monotonic functions with properties and Riemann - Stieltjes integral.

Goal:

To introduce the concepts which provide a strong base to understand and analysis mathematics.

Objective:

On successful completion of this course the students should gain the knowledge about the nature of functions mappings.

UNIT I

Examples of continuous functions –continuity and inverse images of open or closed sets – functions continuous on compact sets –Topological mappings –Bolzano's theorem.

UNIT II

Connectedness –components of a metric space – Uniform continuity: Uniform continuity and compact sets –fixed point theorem for contractions –monotonic functions.

UNIT III

Definition of derivative –Derivative and continuity –Algebra of derivatives – the chain rule –one sided derivatives and infinite derivatives –functions with non-zero derivatives –zero derivatives and local extrema –Roll's theorem –The mean value theorem for derivatives – Taylor's formula with remainder.

UNIT IV

Properties of monotonic functions –functions of bounded variation –total Variation –additive properties of total variation on (a, x) as a function of x – functions of bounded variation expressed as the difference of increasing functions –continuous functions of bounded variation.

UNIT V

The Riemann - Stieltjes integral : Introduction –Notation –The definition of Riemann –Stieltjes integral –linear properties –Integration by parts –change of variable in a Riemann –stieltjes integral – Reduction to a Riemann integral.

Treatment as in

Tom. M. APOSTOL, Mathematical Analysis, 2nd ed., Addison-Wisely. Narosa Publishing Company, Chennai, 1990.

Unit I Chapter 4 Sections 4.11 to 4.15

Unit II Chapter 4 Sections 4.16, 4.17, 4.19, 4.20, 4.21, 4.23

Unit III Chapter 5 Sections 5.2 to 5.10 and 5.12

Unit IV Chapter 6 Sections 6.2 to 6.8

Unit V Chapter 7 Sections 7.1 to 7.7

References

1. R.R.Goldberg, Methods of Real Analysis, NY, John Wiley, New York 1976.
2. G.F.Simmons, Introduction to Topology and Modern Analysis, McGraw – Hill, New York, 1963.
3. G.Birkhoff and MacLane, A survey of Modern Algebra, 3rd Edition, Macmillian, NewYork, 1965.
4. J.N.Sharma and A.R.Vasistha, Real Analysis, Krishna Prakashan Media (P) Ltd, 1997.

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2. TIMETABLE (Course TimeTable)*

DayOrder/ Hour	1	2	3	4	5	6
I					RA-II III BSC(M)	
II		RA-II III BSC(M)				
III				RA-II III BSC(M)		
IV			RA-II III BSC(M)			
V				RA-II III BSC(M)		
VI		RA-II III BSC(M)				

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3. STUDENT NAME LIST

S.No	Reg.No	Name
1	1722A0964	AJITHKUMAR N
2	1722A0966	ANNAPOORANI S
3	1722A0967	BARANIDHARAN K
4	1722A0969	BLESSY B
5	1722A0971	CHANDRIKA B
6	1722A0973	DIVYA P
7	1722A0974	ELANSURIYAN R
8	1722A0975	GANDHIMATHI K
9	1722A0976	GOKILA N
10	1722A0977	HINDHUMATHI V
11	1722A0978	INDIRANI R
12	1722A0979	JAYASUDHA J
13	1722A0980	JEEVITHA S
14	1722A0981	JOTHI N
15	1722A0982	KANIMOZHI P
16	1722A0983	KAVIPRIYA G
17	1722A0984	KAVITHA R
18	1722A0985	KAVYA C
19	1722A0986	KEERTHANA P
20	1722A0988	LOGESHWARI P(31.05.2000)
21	1722A0989	LOGESWARI P(25.07.2000)
22	1722A0990	MANIMEKALAI M
23	1722A0991	MANJU E
24	1722A0994	MOHANSUNDARAM S
25	1722A0995	MOHANAPRIYA P
26	1722A0996	NANDHAKUMAR M
27	1722A0997	NANDHINI N
28	1722A0999	NOBLE STEPHEN S
29	1722A1000	PAVITHRA E
30	1722A1001	PAVITHRA V
31	1722A1002	PRADHEEPKUMAR N
32	1722A1003	PRAKASH K
33	1722A1004	PRASANTH P
34	1722A1005	PRIYANGA S
35	1722A1006	RAGUNATH M

36	1722A1007	RAMYA C
37	1722A1008	RAMYA SRI A
38	1722A1010	ROHINI P
39	1722A1011	SAJIN IMMANUEL S
40	1722A1012	SANTHIYA K
41	1722A1013	SANTHIYA P
42	1722A1014	SATHYA N
43	1722A1015	SAVITHA C
44	1722A1016	SHANTHINI A
45	1722A1017	SHARMILA P
46	1722A1018	SHIPRABHADRA A
47	1722A1019	SHOBANA K
48	1722A1020	SONIYA M
49	1722A1021	SOUNDAR RAJAN R
50	1722A1022	SOWMIYA S.K
51	1722A1023	SUGANYA D
52	1722A1024	TAMILARASI B
53	1722A1025	VANITHA M
54	1722A1026	YOGASRI G
55	1722A01569	SUBARNA R

VJ Nirmala

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4. **COURSE INFORMATION**

<table>
<tr><td>Course Title</td><td colspan="2">REAL ANAYSIS - II</td><td>No.of Credits</td><td>4</td></tr>
<tr><td>Course Code</td><td colspan="2">63A</td><td>Total Hours</td><td>68</td></tr>
<tr><td>Department</td><td colspan="2">MATHEMATICS</td><td>Faculty Name</td><td>Hemalatha . D</td></tr>
<tr><td>Course Type</td><td colspan="4">☐CORE</td></tr>
<tr><td>Semester</td><td colspan="4">VI .</td></tr>
<tr><td rowspan="5">CIA</td><td>S.NO</td><td colspan="2">REAL ANAYSIS - II</td><td>Distributionof Marks</td></tr>
<tr><td>1</td><td colspan="2">Tests(one best test out of 2 tests of 2 hours each)</td><td>10</td></tr>
<tr><td>2</td><td colspan="2">End semester model test (3 hours)</td><td>10</td></tr>
<tr><td>3</td><td colspan="2">Assignments – 2Nos.</td><td>5</td></tr>
<tr><td colspan="3">TOTAL MARKS</td><td>25</td></tr>
<tr><td>COURSE OBJECTIVES</td><td colspan="4">On successful completion of this course the students should gain the knowledge about the nature of functions mappings</td></tr>
<tr><td>COURSE OUTCOMES</td><td colspan="4">On successful completion of this subject the students should have
-Understood the concept of continuity
- Understood the concept of connectivity
-Understood the concept of derivative
- Understood the concept of monotonic functions with properties
-Understood the concept of Riemann - Stieltjes integral.</td></tr>
</table>

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LESSON PLAN

Name of the Faculty : HEMALATHA D
Class & Semester : III B.Sc Mathematics & VI Semester
Batch : 2017-2020
Subject Title & Code : Real analysis -II & 63A
Credit : 4
Total Hours : 68

AIM : To develop the concepts which provide a strong base to understand and analysis mathematics.

COURSE OBJECTIVE : On successful completion of this course the students should gain the knowledge about the nature of functions mappings

COURSE OUTCOMES : On successful completion of this subject thestudents should have

-Understood theconcept of continuity
- Understood the concept of connectivity
-Understood the concept of derivative
- Understood the concept of monotonic functions with properties
-Understood the concept of Riemann - Stieltjes integral.

TOPIC	DELIVERABLES	ACTIVITY	DURATION IN HRS
UNIT I (12)			
Examples of continuous functions	• Definition • Examples	• Lecture • Discussion	2
Continuity and inverse images of open or closed sets	• Definition • Theorems	• Lecture • Discussion	2
Functions continuous on compact sets	• Definition • Theorems	• Lecture • Discussion	3
Topological mappings	• Definition • Theorems	• Lecture • Discussion	3

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Bolzano's theorem.	• Definition • Theorems	• Lecture • Discussion	2
UNIT II(12)			
Connectedness	• Definition • Theorems	• Lecture • Discussion	2
components of a metric space	• Definition • Theorems	• Lecture • Discussion	2
Uniform continuity : Uniform continuity and compact sets	• Definition • Theorems	• Lecture • Discussion	3
Fixed point theorem for contractions	• Definition • Theorems	• Lecture • Discussion	3
Monotonic functions	• Definition • Theorems	• Lecture • Discussion	2
UNIT III(15)			
Definition of derivative	• Definition	• Lecture • Discussion	1
Derivative and continuity	• Definition • Theorems • Problems	• Lecture • Discussion • Problem solving	2
Algebra of derivatives	• Definition • Theorems • Problems	• Lecture • Discussion • Problem solving	2
The chain rule	• Definition • Theorems	• Lecture • Discussion	2
One sided derivatives and infinite derivatives	• Definition	• Lecture • Discussion	1

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	• Theorems		
Functions with non-zero derivatives	• Definition • Theorems	• Lecture • Discussion	1
Zero derivatives and local extrema	• Definition • Theorems	• Lecture	1
Roll's theorem	• Definition • Theorems	• Lecture • Discussion	1
The mean value theorem for derivatives	• Definition • Theorems	• Lecture • Discussion	1
Taylor's formula with remainder	• Definition • Theorems	• Lecture • Discussion	3
UNIT IV (14)			
Properties of monotonic functions	• Definition • Theorems	• Lecture • Discussion	2
Functions of bounded variation	• Definition • Theorems • Problems	• Lecture • Discussion	3
Total Variation	• Definition • Theorems	• Lecture • Discussion	2
Additive properties of total variation on (a, x) as a function of x	• Definition • Theorems	• Lecture • Discussion	2
Functions of bounded variation expressed as the difference of increasing functions	• Definition • Theorems	• Lecture • Discussion	2
Continuous functions of bounded variation.	• Definition	• Lecture	3

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	• Theorems	• Discussion	
UNIT V(15)			
The Riemann- Stieltjes integral : Introduction – Notation	• Definition	• Lecture • Discussion	1
The definition of Riemann – Stieltjes integral	• Definition • Theorems	• Lecture • Discussion	2
Linear properties	• Definition • Theorems	• Lecture • Discussion	3
Integration by parts	• Definition • Theorems	• Lecture • Discussion	3
Change of variable in a Riemann –stieltjes integral	• Definition • Theorems	• Lecture • Discussion	3
Reduction to a Riemann integral	• Definition • Theorems	• Lecture • Discussion	3

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LESSON PLAN-EXECUTION

Name of the Faculty : D.Hemalatha
Class &Semester : III B.sc Maths& VI
Subject code : 63A
Title : Real Analysis-II
Credit : 4
Total Hours : 68

Date	Day Order	Hour	Topic	Contents Delivered	Activities
			UNIT-I		
27.11.19	II	2	Examples of continuous functions	Definition	Lecture & Discussion
28.11.19	III	4	Examples of continuous functions	Examples	Lecture & Discussion
29.11.19	IV	3	Continuity and inverse images of open or closed sets	Definition	Lecture & Discussion
30.11.19	II	2	Continuity and inverse images of open or closed sets	Theorems	Lecture & Discussion
2.12.19	V	4	Functions continuous on compact sets	Definition	Lecture & Discussion
3.12.19	VI	2	Functions continuous on compact sets	Theorems	Lecture & Discussion
4.12.19	I	5	Functions continuous on compact sets	Theorems	Lecture & Discussion
5.12.19	II	2	Topological mappings	Definition &Theorem	Lecture & Discussion
6.12.19	III	4	Topological mappings	Theorems	Lecture & Discussion
7.12.19	IV	3	Topological mappings	Theorems	Lecture & Discussion
9.12.19	V	4	Bolzano's theorem.	Theorems	Lecture & Discussion
10.12.19	VI	2	Bolzano's theorem.	Theorems	Lecture & Discussion
			UNIT-II		
11.12.19	I	5	Connectedness	Definition	Lecture & Discussion
12.12.19	II	2	Connectedness	Theorems	Lecture & Discussion
13.12.19	III	4	components of a metric space	Definitions	Lecture & Discussion
14.12.19	IV	3	components of a metric space	Theorems	Lecture & Discussion

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16.12.19	V	4	Uniform continuity : Uniform continuity and compact sets	Definitions	Lecture & Discussion
17.12.19	VI	2	Uniform continuity and compact sets	Theorems	Lecture & Discussion
18.12.19	I	5	Uniform continuity and compact sets	Theorems	Lecture & Discussion
19.12.19	II	2	Fixed point theorem for contractions	Definitions	Lecture & Discussion
20.12.19	III	4	Fixed point theorem for contractions	Theorems	Lecture & Discussion
21.12.19	IV	3	Fixed point theorem for contractions	Theorems	Lecture & Discussion
27.12.19	V	4	Monotonic functions	Definitions	Lecture & Discussion
31.12.19	I	5	Monotonic functions	Theorems	Lecture & Discussion
UNIT-III					
3.1.2020	I	5	Definition of derivative	Definitions	Lecture & Discussion
4.1.2020	VI	2	Derivative and continuity	Definitions& Theorems	Lecture & Discussion
6.1.2020	I	5	Derivative and continuity	Problems	Lecture ,Discussion& problem solving
8.1.2020	II	2	Algebra of derivatives	Definitions& Theorems	Lecture & Discussion
9.1.2020	III	4	Algebra of derivatives	Problems	Lecture ,Discussion& problem solving
10.1.2020	IV	3	The chain rule	Theorems	Lecture & Discussion
11.1.2020	V	4	The chain rule	Theorems	Lecture & Discussion
13.1.2020	VI	2	One sided derivatives and infinite derivatives	Definitions& Theorems	Lecture & Discussion
20.1.2020	I	5	Functions with non-zero derivatives	Definitions& Theorems	Lecture & Discussion
22.1.2020	III	4	Zero derivatives and local extrema	Definitions& Theorems	Lecture & Discussion
24.1.2020	V	4	Roll's theorem	Definitions& Theorems	Lecture & Discussion
27.1.2020	I	5	The mean value theorem for derivatives	Definitions& Theorems	Lecture & Discussion

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28.1.2020	II	2	Taylor's formula with remainder	Definitions& Theorems	Lecture & Discussion
29.1.2020	III	4	Taylor's formula with remainder	Theorems	Lecture & Discussion
31.1.2020	V	4	Taylor's formula with remainder	Theorems	Lecture & Discussion
UNIT-IV					
3.2.2020	VI	2	Properties of monotonic functions	Definitions& Theorems	Lecture & Discussion
4.2.2020	I	5	Properties of monotonic functions	Theorems	Lecture & Discussion
5.2.2020	II	2	Functions of bounded variation	Definitions& Theorems	Lecture & Discussion
6.2.2020	III	4	Functions of bounded variation	Theorems	Lecture & Discussion
7.2.2020	IV	3	Functions of bounded variation	Problems	Lecture ,Discussion& problem solving
8.2.2020	IV	3	Total Variation	Definitions& Theorems	Lecture & Discussion
10.2.2020	V	4	Total Variation	Theorems	Lecture & Discussion
11.2.2020	VI	2	Additive properties of total variation on (a, x) as a function of x	Definitions& Theorems	Lecture & Discussion
12.2.2020	I	5	Additive properties of total variation on (a, x) as a function of x	Theorems	Lecture & Discussion
13.2.2020	II	2	Functions of bounded variation expressed as the difference of increasing functions	Definitions& Theorems	Lecture & Discussion
14.2.2020	III	4	Functions of bounded variation expressed as the difference of increasing functions	Theorems	Lecture & Discussion
17.2.2020	IV	3	Continuous functions of bounded variation	Definitions& Theorems	Lecture & Discussion
18.2.2020	V	4	Continuous functions of bounded variation	Theorems	Lecture & Discussion
19.2.2020	VI	2	Continuous functions of bounded variation	Theorems	Lecture & Discussion

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UNIT-V					
20.2.2020	I	5	The Riemann- Stieltjes integral : Introduction – Notation	Definitions	Lecture & Discussion
21.2.2020	II	2	The definition of Riemann – Stieltjes integral	Definitions& Theorems	Lecture & Discussion
22.2.2020	III	4	The definition of Riemann – Stieltjes integral	Theorems	Lecture & Discussion
25.2.2020	V	4	Linear properties	Definitions& Theorems	Lecture & Discussion
27.2.2020	I	5	Linear properties	Theorems	Lecture & Discussion
29.2.2020	V	4	Linear properties	Theorems	Lecture & Discussion
2.3.2020	III	4	Integration by parts	Definitions& Theorems	Lecture & Discussion
3.3.2020	IV	3	Integration by parts	Theorems	Lecture & Discussion
4.3.2020	V	4	Integration by parts	Theorems	Lecture & Discussion
5.3.2020	VI	2	Change of variable in a Riemann –stieltjes integral	Definitions& Theorems	Lecture & Discussion
10.3.2020	IV	3	Change of variable in a Riemann –stieltjes integral	Theorems	Lecture & Discussion
11.3.2020	V	4	Change of variable in a Riemann –stieltjes integral	Theorems	Lecture & Discussion
12.3.2020	VI	2	Reduction to a Riemann integral	Definitions& Theorems	Lecture & Discussion
13.3.2020	I	5	Reduction to a Riemann integral	Theorems	Lecture & Discussion
14.3.2020	VI	2	Reduction to a Riemann integral	Theorems	Lecture & Discussion

6. COURSE MATERIAL

Hard copy

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7. ASSIGNMENT – 1

S.NO	STUDENT NAME	TOPIC	DATE OF SUBMISSION
1	AJITHKUMAR N	UNIT I & II THEOREMS	10.01.2020
2	ANNAPOORANI S		
3	BARANIDHARAN K		
4	BLESSY B		
5	CHANDRIKA B		
6	DIVYA P		
7	ELANSURIYAN R		
8	GANDHIMATHI K		
9	GOKILA N		
10	HINDHUMATHI V		
11	INDIRANI R		
12	JAYASUDHA J		
13	JEEVITHA S		
14	JOTHI N		
15	KANIMOZHI P		
16	KAVIPRIYA G		
17	KAVITHA R		
18	KAVYA C		
19	KEERTHANA P		
20	LOGESHWARI P (31.05.2000)		
21	LOGESWARI P (25.07.2000)		
22	MANIMEKALAI M		
23	MANJU E		
24	MOHANSUNDARAM S		
25	MOHANAPRIYA P		
26	NANDHAKUMAR M		
27	NANDHINI N		
28	NOBLE STEPHEN S		
29	PAVITHRA E		
30	PAVITHRA V		
31	PRADHEEPKUMAR N		
32	PRAKASH K		
33	PRASANTH P		
34	PRIYANGA S		
35	RAGUNATH M		
36	RAMYA C		
37	RAMYA SRI A		
38	ROHINI P		
39	SAJIN IMMANUEL S		
40	SANTHIYA K		
41	SANTHIYA P		
42	SATHYA N		
43	SAVITHA C		
44	SHANTHINI A		
45	SHARMILA P		

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46	SHIPRABHADRA A		
47	SHOBANA K		
48	SONIYA M		
49	SOUNDAR RAJAN R		
50	SOWMIYA S.K		
51	SUGANYA D		
52	TAMILARASI B		
53	VANITHA M		
54	YOGASRI G		
55	SUBARNA R		

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8. CIA-I

a) Internal Question Paper

KAAMADHENU ARTS AND SCIENCE COLLEGE

I Internal Examinations – Jan 2020

Class : III BSc Maths **Course Name : Real Analysis – II**

Time: 2Hrs Max. Marks : 50

Section A

Answer all questions (6 x 1 = 6)

1	$f(z) = z, z \in c$ is ___			
	A	continuous	B	connected
	C	bounded	D	None of these
2	_____ function is an example of continuous function			
	A	constant	B	identity
	C	Both(a) and(b)	D	Not (c)
3	Every open interval in R is ___			
	A	connected	B	disconneted
	C	continuous	D	None of these
4	$\underset{x \to 0}{lt} e^x =$ ___			
	A	0	B	1
	C	$\frac{\pi}{2}$	D	2π
5	If $x_n = 1 - \frac{1}{n}$, the sequence $\{f(x_n)\}$ converges to $f(0)$ then $\{x_n\}$ ___			
	A	converges	B	divergenes
	C	continuous	D	none
6	If $f: S \to T$ and if $X \subseteq S$ and $Y \subseteq T$ then $X = f^{-1}(y)$ implies $f(x)$ ___ y			
	A	$=$	B	$\neq$
	C	$\subseteq$	D	$\supseteq$
	Section B **Answer All questions (4 x 5 = 20)**			
7	A	State and prove Bolzano's theorem		
		OR		
	B	Let $f: S \to T$ be a function from one metric space (S,d_s) to another (T,d_T) prove that f is continuous on S. if and only if for every closed set y in T, the inverse image $f^{-1}(y)$ is closed in S.		
8	A	prove that every arc wise connected set S in R^n is connected		
		OR		
	B	Define uniform continuous functions and give an example Define monotonic function		

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9	A	Let $f:(S,d_s)\rightarrow(T,d_T)$ prove that f is continuous on S. if and only if for every open set y in T, the inverse image $f^{-1}(y)$ is open in S.
		OR
	B	State and prove fixed point theorem
10	A	State and prove intermidate –value theorem
		OR
	B	Let $f:S\rightarrow T$ is a function from S to T such that $x\subseteq S$ and $y\subseteq T$ prove that (i) $x=f^{-1}(y)\Rightarrow f(x)\subseteq y$ (ii) $y=f(x)\Rightarrow x\subseteq f^{-1}(y)$
		Section C **Answer All questions (3 x 8 = 24)**
11	A	Let $f:S\rightarrow T$ be a continuous. 1-1 function from (S,d_s) to (T,d_T) and if f is compact on S. prove that f^{-1} is continuous on f(S)
		OR
	B	A metric space S is connected if and only if every two-valued function on S is constant
12	A	State and prove Heine theorem
		OR
	B	Let f be a strictly increasing on a set S in R. then f^{-1} exists and is strictly increasing on f(S)
13	A	Prove that f is defined on [a,b] and f is bounded variation on [a,b] iff f can be expressed as the difference of two increasing function
		OR
	B	If $f:(S,d_s)\rightarrow(T,d_T)$ and f is continuous on a compact subset X of S , prove that f(x) is a compact subset of T

///END///

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9. ASSIGNMENT – II

S.NO	STUDENT NAME	TOPIC	DATE OF SUBMISSION
1	AJITHKUMAR N	UNIT III&IV THEOREMS	21.2.2020
2	ANNAPOORANI S		
3	BARANIDHARAN K		
4	BLESSY B		
5	CHANDRIKA B		
6	DIVYA P		
7	ELANSURIYAN R		
8	GANDHIMATHI K		
9	GOKILA N		
10	HINDHUMATHI V		
11	INDIRANI R		
12	JAYASUDHA J		
13	JEEVITHA S		
14	JOTHI N		
15	KANIMOZHI P		
16	KAVIPRIYA G		
17	KAVITHA R		
18	KAVYA C		
19	KEERTHANA P		
20	LOGESHWARI P (31.05.2000)		
21	LOGESWARI P (25.07.2000)		
22	MANIMEKALAI M		
23	MANJU E		
24	MOHANSUNDARAM S		
25	MOHANAPRIYA P		
26	NANDHAKUMAR M		
27	NANDHINI N		
28	NOBLE STEPHEN S		
29	PAVITHRA E		
30	PAVITHRA V		
31	PRADHEEPKUMAR N		
32	PRAKASH K		
33	PRASANTH P		
34	PRIYANGA S		
35	RAGUNATH M		
36	RAMYA C		
37	RAMYA SRI A		
38	ROHINI P		
39	SAJIN IMMANUEL S		
40	SANTHIYA K		
41	SANTHIYA P		
42	SATHYA N		
43	SAVITHA C		
44	SHANTHINI A		
45	SHARMILA P		

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46	SHIPRABHADRA A		
47	SHOBANA K		
48	SONIYA M		
49	SOUNDAR RAJAN R		
50	SOWMIYA S.K		
51	SUGANYA D		
52	TAMILARASI B		
53	VANITHA M		
54	YOGASRI G		
55	SUBARNA R		

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10. CIA- II

a) Internal Question Paper

KAAMADHENU ARTS AND SCIENCE COLLEGE

II Internal Examinations – Feb 2020

Class: III BSc Maths **Course Name : Real Analysis – II**

Time : 2 Hrs Max. Marks : 50

Section A
Answer all questions (6 x 1 = 6)

1	$\underset{x \to c}{Lt} \frac{f(x)-f(c)}{x-c} =$ ___			
	A	$f''(c)$	B	$f'(c)$
	C	$f'''(c)$	D	None of these
2	If f and g are differentitate at c then $f \pm g$ is _____ at c			
	A	Differentiable	B	Bounded
	C	Continuous	D	None
3	If f is bounded variation on [a,b]. then f is difference of two ___			
	A	Increasing function	B	Decreasing function
	C	Constant function	D	None of these
4	$\lim_{x \to c} \frac{g[f(x)]-g[f(c)]}{x-c} =$ ___			
	A	$g'[f(c)]f'(c)$	B	G[f'(c)]f(c)
	C	$f'[g(c)]g'(c)$	D	$(f \circ g)'(c)$
5	If $V_f(a,b) =$ __			
	A	$\sup\{\sum(\rho) : \rho \in p[a,b]\}$	B	$\{\sum(\rho) : \rho \in p[a,b]\}$
	C	$\inf\{\sum(\rho) : \rho \in p[a,b]\}$	D	None
6	If $\sum_{k=1}^{n} \Delta a_k =$ ___			
	A	$\alpha(b)+\alpha(a)$	B	$\alpha(b)-\alpha(a)$
	C	$\alpha(a)-\alpha(b)$	D	$\alpha(a).\alpha(b)$

Section B
Answer All questions (4 x 5 = 20)

7	A	State and prove Taylor's theorem.
		OR
	B	If f is bounded variation on [a,b] and $\sum\lvert\Delta f_k\rvert \le M$, prove that f is bounded on [a,b]. i.e. $\lvert f(x)\rvert \le \lvert f(a)\rvert + M \quad \forall x \in [a,b]$.
8	A	State and prove mean value theorem.
		OR
	B	State and prove Rolle's theorem.

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9	A	State and prove chain rule
		OR
	B	Prove that if f is monotonic on [a,b]. then the set of discontinuous of f is countable
10	A	Prove that it f is differentiable at c, then f is continuous at c.
		OR
	B	If f and g are defined on (a,b) and differentiable at c, show that $\left(\frac{f}{g}\right)(c) = \{g(c)f'(c)g'(c)\}/\{g'(c)\}^2$
		Section C **Answer All questions (3 x 8 = 24)**
11	A	State and prove additive property of total variation
		OR
	B	If f is bounded variation on [a,b] and assume that $c \in (a,b)$.prove that f is bounded variation on [a,c] and on [c,b] and $V_f(a,b) = V_f(a,c) + V_f(c,b)$.
12	A	State and prove intermediate value theorem for derivative.
		OR
	B	Let f be of bounded variation on [a,b] and V be defined on [a,b] as $V(x) = V_f(a,x)\ if\ a < x \le b, V(a) = 0$.Then prove that (i) V is an increasing function on [a,b] (ii) V-f is an increasing function on [a,b].
13	A	Let f be of bounded variation on [a,b] and $V(x) = V_f(a,x)\ if\ x \in [a,b] and, V(a) = 0$. Prove that every point of continuity of f is also point of continuity of V. Also prove that the converse istrue.
		OR
	B	Let f be defined on closed interval [a,b]. then f is of bounded variation on [a,b] iff can be expressed as the difference of two increasing functions.

///END///

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11. Model Examinations

a) Question paper

KAAMADHENU ARTS AND SCIENCE COLLEGE

Model Examinations – March 2020

Class : III BSc Maths **Course Name : Real Analysis – II**

Time : 3 Hrs Max. Marks : 7

Section A

Answer all questions (10 x 1 = 10)

1	$f(z) = z, z \in c$ is ___			
	A	continuous	B	connected
	C	bounded	D	none
2	$\underset{x \to 0}{lt} e^x =$ ___			
	A	0	B	1
	C	$\frac{\pi}{2}$	D	2π
3	Every open interval in R is ___			
	A	connected	B	disconnected
	C	continuous	D	none
4	If A and B are connected subsets of a metric space M then □ ∪ □ is connected if			
	A	□ ∪ □ = □	B	□ ∩ □ = □
	C	□ ∩ □ = □	D	□ ∩ □ ≠ □
5	If f and g are differentiable at c then □ ± □ is ___ at c			
	A	differentiable	B	bounded
	C	continuous	D	none
6	$\underset{x \to c}{lt} f(x)g'(x) + f'(x)g(x) =$ ___			
	A	(fg)'(c)	B	(fg)''(c)
	C	(f/g)'(c)	D	none
7	$\Delta_{fk} =$ __			
	A	$f(x_k) - f(x_{k-1})$	B	$f(x_k) + f(x_{k-1})$
	C	$f(x_{k+1}) - f(x_{k-1})$	D	none
8	$V_{f-g} - V_f - V_g$			
	A	≤	B	≥
	C	=	D	≠
9	$p' \geq p \Rightarrow \|p'\| - \|p\|$			
	A	≤	B	≥
	C	≠	D	none
10	If $\sum_{k=1}^{n} \Delta a_k =$ ___			
	A	α(b)-α(a)	B	α(b)+α(a)
	C	α(a)-α(b)	D	α(a)+α(b)

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	Section B **Answer All questions (5 x 5 = 25)**	
11	A	State and prove Bolzano's theorem.
		OR
	B	Let $f: S \to T$ be a function from one metric space (S,d_s) to another (T,d_T) prove that f is continuous on S. if and only if for every closed set y in T, the inverse image $f^{-1}(y)$ is closed in S.
12	A	Let f be strictly increasing on a set S in R. Then f^1 exsists and its strictly increasing on f(s).
		OR
	B	prove that every arc wise connected set S in R^n is connected
13	A	State and prove taylor's theorem
		OR
	B	State and prove mean-value theorem for derivatives
14	A	If f is bounded variation on [a,b] and assume that $c \in (a,b)$.prove that f is bounded variation on [a,c] and on [c,b] and $V_f(a,b) = V_f(a,c) + V_f(c,b)$.
		OR
	B	If f and g are differentiable at [a,b]. prove that f+g ,fg are differentiable at C on [a,b]
15	A	if $f \in R(\alpha)$ on [a,b] then $\alpha \in R(f)$ on [a,b]. prove that $\int_a^b f(x)d\alpha(x) + \int_a^b f(x)df(x) = f(b)\alpha(b) - f(a)\alpha(a)$
		OR
	B	If $\int_a^c fd\alpha, \int_c^b fd\alpha$ exists for $c \in [a,b]$ .prove that $\int_a^b fd\alpha = \int_a^c fd\alpha + \int_c^b fd\alpha.$
		Section C **Answer All questions (5 x 8 = 40)**
16	A	State and prove Heine Borel theorem
		OR
	B	Let $f: S \to T$ be a continuous. 1-1 function from (S,d_s) to (T,d_T) and if f is compact on S. prove that f^{-1} is continuous on f(S)
17	A	State and prove fixed point theorem
		OR
	B	Prove that f is defined on [a,b] and f is bounded variation on [a,b] iff f can be expressed as the difference of two increasing function
18	A	State and prove intermediate value theorem for derivative.
		OR
	B	State and prove chain rule for derivatives

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19	A	Let f be of bounded variation on [a,b] and V be defined on [a,b] as $V(x)=V_f(a,x)\ if\ a<x\le b, V(a)=0$. Then prove that (i) V is an increasing function on [a,b] (ii) V-f is an increasing function on [a,b].
		OR
	B	Let f be of bounded variation on [a,b] and $V(x)=V_f(a,x)\ if\ x\in[a,b] and, V(a)=0.$ Prove that every point of continuity of f is also point of continuity of V. Also prove that the converse istrue.
20	A	If $f,g\in R(\alpha)$ on [a,b]. show that $c_1 f+c_2 g\in R(\alpha)$ on [a,b] and $\int_a^b (c_1 f+c_2 g)d\alpha = c_1\int_a^b f d\alpha + c_2\int_a^b f d\alpha$
		OR
	B	Assumethat $f\in R(\alpha)$ on [a,b] and assume that α has a continuous derivative α ' on [a,b] .prove that the Riemann integral $\int_a^b f(x)\alpha'(x)dx$ exists and we have $\int_a^b f(x)\alpha(x)dx=\int_a^b f(x)\alpha'(x)dx$

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Subject Mark Report

Subject : 63A/Core Paper XIII Real Analysis-II

Staff : 1039/HEMALATHA D

#	Roll No	Name	T1 (50)	T2 (50)	Best 1 out of 2 (10)	MT (100)	10 out of 100 (10)	A1 (10)	A2 (10)	Avg of 2 (5)	Internal(25)
1	171MA001	AJITHKUMAR N	30	34	7	56	6	10	10	5	18
2	171MA003	ANNAPOORANI S	46	48	10	98	10	10	10	5	25
3	171MA004	BARANIIDHARAN K	30	35	7	68	7	10	10	5	19
4	171MA006	BLESSY B	45	48	10	96	10	10	10	5	25
5	171MA008	CHANTHIRIKA B	40	42	8	95	10	10	10	5	23
6	171MA011	DIVYA P	40	38	8	88	9	10	10	5	22
7	171MA012	ELANSURIYAN R	35	30	7	75	8	10	10	5	20
8	171MA013	GANDHIMATHI K	48	48	10	98	10	10	10	5	25
9	171MA014	GOKILA N	48	50	10	98	10	10	10	5	25
10	171MA015	HINDHUMATHI V	35	35	7	70	7	10	10	5	19
11	171MA016	INDIRANI R	42	42	8	88	9	10	10	5	22
12	171MA017	JAYASUDHA J	44	42	9	86	9	10	10	5	23
13	171MA018	JEEVITHA S	42	43	9	87	9	10	10	5	23
14	171MA019	JOTHI N	46	44	9	90	9	10	10	5	23
15	171MA020	KANIMOZHI P	44	42	9	90	9	10	10	5	23
16	171MA021	KAVIPRIYA G	46	42	9	88	9	10	10	5	23
17	171MA022	KAVITHA R	44	41	9	90	9	10	10	5	23
18	171MA023	KAVYA C	48	45	10	96	10	10	10	5	25
19	171MA024	KEERTHANA P	46	44	9	90	9	10	10	5	23
20	171MA026	LOGESHWARI P	44	45	9	88	9	10	10	5	23
21	171MA027	LOGESWARI P	46	45	9	86	9	10	10	5	23
22	171MA028	MANIMEKALAI M	40	42	8	80	8	10	10	5	21
23	171MA029	MANJU E	35	35	7	75	8	10	10	5	20
24	171MA032	MOHANSUNDARAM S	35	36	7	80	8	10	10	5	20
25	171MA033	MOHANAPRIYA P	44	42	9	86	9	10	10	5	23
26	171MA034	NANDHAKUMAR M	46	40	9	88	9	10	10	5	23
27	171MA036	NANDHINI N	45	42	9	89	9	10	10	5	23
28	171MA038	NOBLE STEPHEN S	30	30	6	60	6	10	10	5	17
29	171MA039	PAVITHRA E	46	45	9	92	9	10	10	5	23
30	171MA040	PAVITHRA V	45	45	9	94	9	10	10	5	23
31	171MA042	PRAKASH K	35	35	7	65	7	10	10	5	19
32	171MA043	PRASANTH P	48	48	10	98	10	10	10	5	25
33	171MA044	PRIYANGA V	45	40	9	95	10	10	10	5	24
34	171MA045	RAGUNATH M	40	40	8	88	9	10	10	5	22
35	171MA046	RAMYA C	40	38	8	80	8	10	10	5	21
36	171MA047	RAMYA SRI A	50	46	10	98	10	10	10	5	25
37	171MA049	ROHINI P	46	46	9	96	10	10	10	5	24
38	171MA050	SAJIN IMMANUEL S	35	30	7	60	6	10	10	5	18
39	171MA051	SANTHIYA K	42	40	8	86	9	10	10	5	22
40	171MA052	SANTHIYA P	44	42	9	89	9	10	10	5	23
41	171MA053	SATHYA N	35	35	7	75	8	10	10	5	20

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42	171MA054	SAVITHA C	46	46	9	90	9	10	10	5	23
43	171MA055	SHANTHINI A	42	44	9	91	9	10	10	5	23
44	171MA056	SHARMILA P	38	42	8	82	8	10	10	5	21
45	171MA057	SHIPRABHADRA A	46	46	9	98	10	10	10	5	24
46	171MA058	SHOBANA K	48	46	10	98	10	10	10	5	25
47	171MA059	SONIYA M	45	40	9	96	10	10	10	5	24
48	171MA060	SOUNDARARAJAN R	40	35	8	80	8	10	10	5	21
49	171MA061	SOWMIYA K S	48	48	10	98	10	10	10	5	25
50	171MA062	SUGANYA D	43	40	9	86	9	10	10	5	23
51	171MA063	TAMILARASI B	45	46	9	94	9	10	10	5	23
52	171MA064	VANITHA M	44	42	9	90	9	10	10	5	23
53	171MA066	YOGASRI G	48	50	10	98	10	10	10	5	25
54	171MA068	PRADHEEP KUMAR N	30	30	6	65	7	10	10	5	18
55	171MA069	SUBARNA R	46	40	9	95	10	10	10	5	24

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