B.A./B.Sc. SECOND YEAR MATHEMATICS SYLLABUS PAPER-IV
(SEMESTER – IV) - W.E.F. 2016-17
REAL ANALYSIS

UNIT – I (12 hrs) : REAL NUMBERS :

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of supreme property; intervals. No. Question is to be set from this portion.

Real Sequences : Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence.

The Cauchy's criterion, properly divergent sequences, Monotone sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences and the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchey's general principle of convergence theorem.

UNIT –II (12 hrs) : INFINITIE SERIES :

Series : Introduction to series, convergence of series. Ceanchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Canchy's n^{th} root test or Root Test.
3. D'-Alemberts' Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence, semi convergence.

UNIT – III (12 hrs) : CONTINUITY :

Limits : Real valued Functions, Boundedness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits. Limits at infinity. No. Question is to be set from this portion.

Continuous functions : Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

UNIT – IV (12 hrs) : DIFFERENTIATION AND MEAN VALUE THEORMS :

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Role's Theorem, Lagrange's Theorem, Cauchhy's Mean value Theorem - Generalized Mean value Theorems - Taylor's Theorem, Maclaurin's Theorem, Expansion of functions with different forms of remainders, Taylor's Maclaurins Seriess, power series representation of functions.

UNIT – V (12 hrs) : RIEMANN INTEGRATION :

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems. Deletion,

TEXT BOOK :-

REAL NUMBERS

"Introduction to Real Analysis" by RABERT g BARTELY and .D.R. SHERBART Published by John Wiley. (Chapters 3.1 to 3.7, 5.1 to 5.4, 6.1 to 6.4, 7.1 to 7.3, 9.1 to 9.3)

REFERENCE TEXT BOOKS :

1. A Text Book of B.Sc mathematics by B.V.S.S. Sarma and Published by . S. Chand & Company Pvt. Ltd., New Delhi.
2. Elements of Real Analysis on per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingkania Published by S. Chand & Company Pvt. Ltd., New Delhi.

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S.V.UNIVERSITY, MODEL PAPER.

THREE YEAR B.A/B.Sc DEGREE EXAMINATIONS.

CHOICE BASED CREDIT SYSTEM

SEMESTER- IV

PART II : MATHEMATICS

Paper IV :REAL ANALYSIS

(New Syllabus w.e.f 2015-16)

Time: 3 hours **Max Marks :75**

SECTION - A

Answer any FIVE of the following questions. Each question carries 5 marks (5X5 = 25).

1. Test the convergence of the sequence $S_n = \frac{3n-1}{n+1}$

2. Define Cauchy Sequence and give an example.

3. Test the convergence $\sum_{n=1}^{\propto} \frac{1}{2^n+3^n}$

4. Test the convergence $\sum_{n=0}^{\propto} \frac{(-1)^n}{n!}$

5. Define continuity of a function at point and give an example for discontinuous function.

6. Test the differentiability of the function f(x) = $|x|$ at x = 0

7. If $f(x)=x^2 :[0,1] \rightarrow R$ and partition set is $P=\{0, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, 1\}$, then compute L(P,f).

8. Show that $\lim_{n\to\propto} \sum_{r=1}^{n} \frac{n}{n^2+r^2} = \frac{\pi}{4}$

(P.T.O)

SECTION - B

Answer ALL of the five questions. Each question carries 10marks (5X10 = 50).

9a. State and prove Bolzano-Weierstrass theoremfor sequences.

OR

b. Applying Cauchy's general principle of convergence show that the sequence $\{a_n\}$is convergent.

where $a_n = 1+\frac{1}{2^2}+\frac{1}{3^2}+\dots\dots\dots+\frac{1}{n^2}$

10a. Test the convergence of series $\sum \frac{2^n-2}{2^n+1}x^n \quad , \; x > 0$

OR

State and prove Leibnitz test for alternating series.

11a. If f:R→ R is defined as f(x) =$\frac{e^{\frac{1}{x}} - e^{\frac{-1}{x}}}{e^{\frac{1}{x}} + e^{\frac{-1}{x}}}$ $x \neq 0$, and f(0)=1,then test the continuity at x=0.

OR

b. If f(x) is continuous on $[a,b]$, Then prove that f(x) is uniformly continuous on $[a,b]$.

12a. State and prove Rolle's theorem.

OR

b. Show that $\frac{\pi}{6}+\frac{\sqrt{3}}{15} < \sin^{-1} 0.6 < \frac{\pi}{6}+\frac{1}{8}$

13a. Prove that f(x) = x^2 is integrable on [0,a] and hence show that $\int_0^a x^2 = \frac{a^3}{3}$

OR

b. State and prove Fundamental theorem of Integral Calculus.

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