Unit - IV

Q.4 A. Write definition of the integral of a 2-form. **(2)**

Q.4 B. Write statement of Stoke's theorem. **(2)**

Q.4 C. State and prove the partitions of unity. **(4)**

OR

Find the largest and smallest distances from $(0,0,0)$ to the ellipsoid

, .

Q.4 D. Show that the greatest rectangular parallopiped inscribed in the ellipsoid

is **(12)**

OR

Prove that the rectangular solid of maximum volume that can be inscribed in a sphere is a cube.

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Roll No......................

Total No. of Units : 04
Total No. of Printed Pages : 04

Code No. : 01/203

First Semester Examination, Dec. 2018

M.Sc. MATHEMATICS

Paper - II

REAL ANALYSIS

Time : 3 Hrs. **Max. Marks : 80**

- Part A and B of each question in each unit consist of very short answer type questions which are to be answered in one or two sentences.
  Part C (Short answer type) of each question will be answered in 200-250 words.
- Part D (Long answer type) of each question should be answered within the word limit 400-450.

$\frac{\cos 2x}{2^p} + \frac{\cos 3x}{3^p} + \frac{\cos nx}{n^p} + - - -$

Unit - I

Q.1 A. Write the definition of uniform convergence of series of functions. **(2)**

Q.1 B. Show that the series **(2)**

converges uniformly on R for .

Q.1 C. Test the series for uniform convergence in any interval. **(4)**

P.T.O.

OR

Prove that the series is uniformly convergent in any finite interval.

Q.1 D. State and prove the Cauchy's general principle of uniform convergence. **(12)**

OR

State and prove the Abel's test for uniform convergence.

Unit - II

Q.2 A. Write statement of Riemann's theorem. **(2)**

Q.2 B. Find the radius of convergence of the series $1+2x+3x^2+4x^3+\cdots\cdots$ **(2)**

Q.2 C. Prove that the series **(4)**

OR

Determine the radius of convergence of the following power series :

i) $\sum_{n=1}^{\infty} \frac{\lfloor 2n}{(\lfloor n)^2} x^n$ ii) $\sum_{n=0}^{\infty} \frac{\lfloor n}{n^n} x^n$

Q.2 D. State and prove the Abel's theorem (second form) for power series. **(12)**

OR

Prove that the sum of an absolute convergent series does not alter with any rearrangement of terms.

Unit - III

Q.3 A. Write definition of linearly independent and linearly dependent. **(2)**

Q.3 B. Write statement of inverse function theorem. **(2)**

Q.3 C. Let $f:[a,b]\to R^m$ and let f be differentiable at . If for and as $n\to\infty$ then prove that : **(4)**

OR

be an open set in R^n, f maps E into R^m and and

holds with and with $A=A_2$. Then prove that .

Q.3 D. State and prove the implicit function theorem. **(12)**

OR

(a) Explain derivatives of higher order.

(b) Let be a function on an open set E of R^2 into R. If the partial derivatives $D_1 f$ and exist in an open ball and both are differentiable at then prove that

$$i.e.\ \ D_1 D_2 f(x) = D_2 D_1 f(x).$$