

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi, Abuja.**

**FACULTY OF SCIENCES**

**DEPARTMENT OF MATHEMATICS**

**JULY 2017\_1 EXAMINATION**

**Course Code: MTH341**

**Course Title: REAL ANALYSIS II**

**Credit Unit: 3**

**Time Allowed: 3 HOURS**

**Total: 70 Marks**

**Instruction: ATTEMPT QUESTION ONE (1) AND ANY OTHER FOUR (4) QUESTIONS**

1. (a) State the Rolle’s theorem (3 Marks)

(b) Verify Rolle’s theorem for the functions in;

 (i)  in (0,2) (5 Marks)

(ii) in (0,a) (5 Marks)

(c) (i) Find a root of the equation  lying in (1,2). (5 Marks)

 (ii)  as x tends to zero. (4 Marks)

1. (a) State the Langrange’s Mean Value theorem. (3 Marks)

(b) (i) Verify the Langrange’s Mean Value theorem for in (1,5) (5 Marks)

 (ii) Show that  when  and  (4 Marks)

1. Verify Cauchy’s mean value theorem for the functions:
2. ,  in the interval [a,b] (6 Marks)
3. ,  in [1,e] (6 Marks)
4. Evaluate the following limits

(i)  as x tends to 2 (ii)  as x tends to 2

(iii)  as x tends to zero (iv)  as x tends to zero

 (3Marks Each)

**MTH 341**

1. (a) Find the first 3 terms in the Taylor series for:

 (i)  (3 Marks)

(ii)  at x =1 (3 Marks)

1. Find the first 3 terms in the Maclaurin’s series for (i)  (2 Marks)

 (ii)  (2 Marks)

 (iii)  (2 Marks)

1. (a) (i) Find the nature of the stationary points for the function  (4 Marks)

 (ii) Find the maximum and minimum values of , and values of x 

 where they occur . (4 Marks)

(b)Find the maximum and minimum values of 

 (4 Marks)