

**RAMANUJAN INSTITUTE FOR ADVANCED STUDY IN MATHEMATICS  
UNIVERSITY OF MADRAS**

**M.Sc. MATHEMATICS ENTRANCE EXAMINATION - 2019**

|              |   |
|--------------|---|
| <b>Date</b>  | 26 - 06 - 2019  |
| <b>Time</b>  | 10.00 AM - 12.00 Noon   |
| <b>Venue</b> | Ramanujan Institute for Advanced Study in Mathematics<br>University of Madras,<br>Wallajah Road (Opposite M.A. Chidambaram Stadium)<br>Chepauk,<br>Chennai - 600 005. |

- ❖ *There will be no interview after the examination.*
- ❖ *No Calculators, Cell Phones or any other electronic devices will be allowed in the examination Hall.*

**Multiple choice questions at the B.Sc. Mathematics level from the following topics :**

Classical Algebra , Modern Algebra, Real Analysis , Complex Analysis, Statics, Dynamics, Vector Calculus, Differential and Integral Calculus, Ordinary Differential Equations, Partial differential Equations, Coordinate Geometry 2D &3D, Trigonometry.  
**(Total Number of Questions 25)**

*(Each question may contain more than one correct option)*

**Model Questions**

1. Which of the following defines a group homomorphism from  $(\mathbb{Z}, +)$  into  $(\mathbb{Z}, +)$ ?  
(A)  $x \mapsto x + 7$       (B)  $x \mapsto x^2 + 8$       (C)  $x \mapsto x^3 + 9$       (D)  $x \mapsto 3x$ .
2. If  $v$  is the imaginary part of an analytic function  $f$  in a region  $D \subset \mathbb{C}$ , then  $v$  satisfies  
(A)  $v_{xx} + v_{yy} = 0$       (B)  $v_x^2 + v_y^2 = 0$       (C)  $v_{xx} - v_{yy} = 0$       (D)  $(v_x + v_y)^2 = 0$
3. If the vector  $4x.\bar{i} + (x + y).\bar{j} - az.\bar{k}$  is solenoidal, then  $a$  is equal to  
(A) 2      (B) 3      (C) 4      (D) 5

  
**DIRECTOR and HEAD**  
Ramanujan Institute for  
Advanced Study in Mathematics  
University of Madras  
Chepauk, Chennai-600 005.

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UNIVERSITY OF MADRAS**

**M.Phil. - MATHEMATICS ENTRANCE EXAMINATION - 2019**

|              |   |
|--------------|---|
| <b>Date</b>  | 26 - 06 - 2019  |
| <b>Time</b>  | 2.00 PM - 4.00 PM   |
| <b>Venue</b> | Ramanujan Institute for Advanced Study in Mathematics<br>University of Madras,<br>Wallajah Road (Opposite M.A. Chidambaram Stadium)<br>Chepauk,<br>Chennai - 600 005. |

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**Multiple choice questions at the M.Sc. Mathematics level from the following topics :**

Linear Algebra, Algebra, Real Analysis, Complex Analysis, Topology, Ordinary Differential Equations, Partial Differential Equations, Differential Geometry, Functional Analysis (Total number of questions 25).

*(Each question may contain more than one correct option)*

**Model questions**

1. A Sylow 2 - subgroup of a group of order 192 has order  
(A) 2      (B)  $2^4$       (C)  $2^6$       (D)  $2^8$
2. Which of the following statements is (are) true?  
(A) Every connected topological space is locally connected  
(B) Every connected topological space is path wise connected  
(C) Every discrete space having more than one point is path wise connected  
(D) Every path wise connected space is connected
3. Which of the following functions is (are) analytic in  $\mathbb{C}$   
(A)  $f(z) = |z|^2$       (B)  $g(z) = e^z$       (C)  $h(z) = \log|z|$       (D)  $e^{iz}$

  
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