# INTERNAL ASSIGNMENT QUESTIONS
# M.Sc (MATHEMATICS) PREVIOUS

## 2022

**PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION**
(RECOGNISED BY THE DISTANCE EDUCATION BUREAU, UGC, NEW DELHI)
**OSMANIA UNIVERSITY**
(A University with Potential for Excellence and Re-Accredited by NAAC with “A” + Grade)

**DIRECTOR**
**Prof. G.B. Reddy**
**Hyderabad – 7 Telangana State**

**PROF.G.RAM REDDY CENTRE FOR DISTANCE EDUCATION**
**OSMANIA UNIVERSITY, HYDERABAD – 500 007**

Dear Students,

Every student of M.Sc. Mathematics Previous Year has to write and submit **Assignment** for each paper compulsorily. Each assignment carries **20 marks.** The marks awarded to you will be forwarded to the Controller of Examination, OU for inclusion in the University Examination marks. The candidates have to pay the examination fee and submit the Internal Assignment in the same academic year. If a candidate fails to submit the Internal Assignment after payment of the examination fee he will not be given an opportunity to submit the Internal Assignment afterwards, if you fail to submit Internal Assignments before the stipulated date the Internal marks will not be added to University examination marks under any circumstances.

You are required to **pay Rs.300/-** towards the Internal Assignment Fee through Online along with Examination fee and submit the Internal Assignments along with the Fee payment receipt at the concerned counter.

**ASSIGNMENT WITHOUT THE FEE RECEIPT WILL NOT BE ACCEPTED**

**Assignments on Printed / Photocopy / Typed papers will not be accepted and will not be valued at any cost.**

**Only hand written Assignments will be accepted and valued.**

**Methodology for writing the Assignments:**

1. First read the subject matter in the course material that is supplied to you.
2. If possible read the subject matter in the books suggested for further reading.
3. You are welcome to use the PGRRCDE Library on all working days including Sunday for collecting information on the topic of your assignments.
   (10.30 am to 5.00 pm).
4. Give a final reading to the answer you have written and see whether you can delete unimportant or repetitive words.
5. The cover page of the each theory assignments must have information as given in FORMAT below.

**FORMAT**

1 NAME OF THE COURSE :
2. NAME OF THE STUDENT :
3. ENROLLMENT NUMBER :
4. NAME OF THE PAPER :
5. DATE OF SUBMISSION :

6. Write the above said details clearly on every assignments paper, otherwise your paper will not be valued.
7. Tag all the assignments paper-wise and submit
8. Submit the assignments on or before **20th July, 2022** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

**DIRECTOR**

**INTERNAL ASSIGNMENT- 2021 - 2022**
**Course: MATHEMATICS**

**Paper: I** **Title: Algebra** **Year: Previous**

**Section – A**

**Answer the following short questions (each question carries two marks)** $(5\,X\,2 = 10M)$

1. Prove that every nilpotent group is solvable.
2. Prove that in a nonzero commutative ring with unity, an ideal $M$ is maximal if and only if $R/M$ is field.
3. Let $R$ be a ring with unity. Let $Hom_R(R,R)$ denote the ring of endomorphisms of R as a right $R-$module, then prove that $R \simeq Hom_R(R,R)$ as rings.
4. Find the splitting field of $p(x) = x^2 + x + 1 \in \frac{Z}{(2)}[x]$ and list all its elements.
5. Express the symmetric function $x_1^3 + x_2^3 + x_3^3$ as rational function of elementary symmetric functions.

**Section – B**

**Answer the following questions (each question carries five marks)** $(2X5 = 10M)$

1. Let $G$ be a finite group, and let $p$ be a prime, the prove that all Sylow $p-$ subgroups of $G$ are conjugate and their number $n_p|o(G)$ and satisfies$n_p \equiv 1(mod\ p)$.
2. Prove that $f(x) \in F[x]$ is solvable by radicals over $f$ if and only if its splitting fields $E$ over $F$ has solvable Galois group $G(E/F)$.

Name of the Faculty: **Dr. G. Upender Reddy**
Dept. **Mathematics**

# PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION
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## INTERNAL ASSIGNMENT QUESTION PAPER - 2021 - 2022

**Course : M.A., M.Com., M.Sc.**

**Paper :** II **Title :** Real Analysis **Year: Previous / ~~Final~~**

### Section – A

**UNIT – I : Answer the following short questions (each question carries two marks) 5x2=10**

1. Prove that every neighbourhood is an open set.
2. Prove that every compact subset of a metric space is closed.
3. Prove that continuous image of a compact metric space is compact.
4. Prove that if f is a continuous real valued function defined on [a,b], then f ∈ R(α) on [a,b].
5. State and prove Cauchy's criterion for uniform convergence of sequence of functions.

### Section – B

**UNIT – II : Answer the following Questions (each question carries Five marks) 2x5=10**

1. Suppose $E \subset Y \subset X$. Then prove that E is compact relative to X if and only if E compact relative to Y.
2. Prove that every continuous function defined on a compact metric space is uniformly continuous.

Name of the Faculty : prof S. Harisingh Naik

Dept. of Mathematics

# PROF.G. RAM REDDY CENTRE FOR DISTANCE EDUCATION
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## INTERNAL ASSIGNMENT QUESTION PAPER-2021-2022

Course: M.Sc. Mathematics

Paper: III Title: Topology and Functional Analysis Year : Previous

### Section-A

Unit-I: Answer the following short questions (each question carries Two marks) 5x2=10

1. Let (X,T) be a topological space where X= {a,b,c,d} and T= {ϕ,X,{a}, {b},{a,b}}. Let A={a,b,d}. Then find interior of A and derived set of A.
2. Prove that every sequentially compact metric space is totally bounded.
3. Prove that a topological space X is disconnected ⇔ there exists a continuous mapping of X onto the discrete two point space {0,1}.
4. Prove that the space C[a,b] is not an inner product space.
5. Prove that the product of two bounded self-adjoint linear operators A and B on a Hilbert space H is self-adjoint if and only if AB=BA.

### Section-B

Unit-II: Answer the following short questions (each question carries Five marks) 2x5=10

6. State and prove the Tietze extension theorem.
7. State and prove generalized Hahn-Banach theorem

Name of the faculty: Dr. B. Krishna Reddy

Dept. of Mathematics

## Prof G RAM REDDY CENTRE FOR DISTANCE EDUCATION

## OSMANIA UNIVERSITY,HYDERABAD 500007

## INTERNAL ASSIGNMENT QUESTION PAPER

## M.Sc Mathematics (Previous) 2021-22

Paper-IV Title : Elementary Number Theory

### Section -A

Note: Answer the following questions (5 x 2=10 Marks)

(1) Find the integers $x$ and $y$ such that $48x+110y=(48,110)$

(2) $\sum_{d/n}\mu(d)=\left[\frac{1}{n}\right]$ for any $n\geq 1$.

(3) State and prove Wilson's theorem.

(4) State and prove Euler's criterion.

(5) State and prove Jacobi triple product identity.

### Section – B

Note: Answer the following questions (2 x 5=10 Marks)

(6) If $f$ and $g$ are multiplicative functions, then show that $f*g$ is also a multiplicative Function.

**(7)** State and prove Quadratic reciprocity law .

**(Dr V.Kiran)**

**20-06-2022**

**Department of Mathematics**

# PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION
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## INTERNAL ASSIGNMENT QUESTION PAPER - 2021 - 2022

**Course : M.A., M.Com., M.Sc.**

**Paper :** V **Title :** Mathematical Methods **Year: Previous / Final**

### Section – A

**UNIT – I : Answer the following short questions (each question carries two marks) 5x2=10**

1 Solve $\frac{d^2y}{dx^2}+y=0$ by power series Method

2 Show that $J_{(-n)}=(-1)^n J_n(x)$ if n is a positive integer

3 Define Fundamental matrix and show that $(\det\phi)' = (\operatorname{tr} A)\det\phi$ where A is $n\times n$ continuous matrix

4 Define Lipchitz condition ~~and~~ give an example

5 Solve the one-dimensional wave equation

$$\frac{\partial^2 y}{\partial t^2}=c^2\frac{\partial^2 y}{\partial x^2}$$

### Section – B

**UNIT – II : Answer the following Questions (each question carries Five marks) 2x5=10**

1. Define and prove Abel's formula

2. Solve $\frac{\partial u}{\partial t}=c^2\frac{\partial^2 u}{\partial x^2}$ under $u(0,t)=0$, $u(l,t)=0$ and $u(x,0)=x$, $(0<x<l)$, $l$ being the length of the rod

**Name of the Faculty :** Dr. A. Srisailam

**Dept.** of Mathematics O.U.C.S