INTERNAL ASSIGNMENT QUESTIONS
M.Sc. (Mathematics) SEMESTER I

2024

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

Dear Students,

Every student of M.Sc. (Mathematics) Semester I has to write and submit **Assignment** for each paper compulsorily. Each assignment carries **30 marks.** The marks awarded to the students will be forwarded to the Examination Branch, OU for inclusion in the marks memo. If the student fail to submit Internal Assignments before the stipulated date, the internal marks will not be added in the final marks memo under any circumstances. The assignments will not be accepted after the stipulated date. **Candidates should submit assignments only in the academic year in which the examination fee is paid for the examination for the first time.**

Candidates are required to submit the Exam fee receipt along with the assignment answers scripts at the concerned counter on or before **25.06.2024** and obtain proper submission receipt.

ASSIGNMENT WITHOUT EXAMINATION FEE PAYMENT RECEIPT (ONLINE) WILL NOT BE ACCEPTED

Assignments on Printed / Photocopy / Typed 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 (Instructions) :

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 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 STUDENT :

2. ENROLLMENT NUMBER :

3. NAME OF THE COURSE :

4. SEMESTER (I, II, III & IV) :

5. TITLE OF THE PAPER :

6. DATE OF SUBMISSION :

6. Write the above said details clearly on every subject assignments paper, otherwise your paper will not be valued.
7. Tag all the assignments paper wise and submit them in the concerned counter.
8. Submit the assignments on or before **25.06.2024** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

DIRECTOR

INTERNAL ASSIGNMENT Question Paper - 2023 - 2024
Course: M. Sc., (MATHEMATICS) – I - Semester

Paper: I   **Subject: Algebra**

Section – A

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

1. Prove that every group is isomorphic to some permutation group S_G.

2. Prove that G is nilpotent if and only if G has a normal series $\{e\} = G_0 \subset G_1 \subset G_2 \subset \cdots \subset G_m = G \ni G_i/G_{i-1} \subset Z(G_i/G_{i-1})$.

3. Let A be a finite abelian group and let P be a prime if $P \mid |A|$ then prove that A has an element of order P.

4. State and prove the Fundamental theorem of homomorphism of rings.

5. If R is a ring with unity then prove that each maximal ideal is prime ideal.

Section – B

$2 \times 10 \leq 20$

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

1. Let G be a finite group, P be a prime and n_P be the number of Sylow P – subgroups of G then, prove that all Sylow P – subgroups of G are conjugate and n_P divides $|G|$; $n_P \equiv 1 \pmod P$.

2. Prove that every Principal ideal domain (PID) is a Unique factorization domain (UFD), but a UFD is not necessarily PID.

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

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INTERNAL ASSIGNMENT QUESTION PAPER -2023-2024
COURSE : M.Sc. (Mathematics) I Semester

Paper : II Subject : Mathematical Analysis

Section - A

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

1) *Define an open set , closed set and Prove that*
   A set E is open $\Leftrightarrow$ its complement is closed.

2) *Let f be a continuous mapping defined on compact metric space X into a metric space Y.*
   Then f(X) is a compact subset of Y.

3) *To prove that* $\int_{\underline{a}}^{b} f d\alpha \leq \int_{a}^{\overline{b}} f d\alpha$

4) *Prove that evry Uniformly convergent sequence*
   of bounded functions is Uniformly bounded.

5) *Define* $f : \mathbb{R} \to \mathbb{R}$ *as* $f(x) = \begin{cases} x + 2 & -3 < x < -2 \\ -x - 2 & -2 \leq x < 0 \\ x + 2 & 0 \leq x < 1 \end{cases}$

   Then Prove that f is continuous on $(-3, -2)$

Section -B

II Answer the following Long questions (each question carries **ten marks**) 2x10 = 20

1) *i) Every k − cell is compact in* $\mathbb{R}^k$

   ii) A sub set E of $\mathbb{R}$ *is connected* $\Leftrightarrow$ *it has the following*
   propperty : $x \in E$, $y \in E$ and $x < z < y$, then $z \in E$.

2) *State and prove that Weierstrass approximation theorem.*

Name of the Faculty : V. Venkateshwarlu

Department : Mathematics

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INTERNAL ASSIGNMENT QUESTION PAPER - 2023 - 2024

COURSE : M.Sc. (Mathematics) I Semester

Paper : __III__   Subject : Ordinary differential Equation

Total Marks: 30

Section – A

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

① State and prove Gronwall Inequality

② State and prove Abel's Formula Theorem

③ Solve the IVP $x'' + x' + 2x = 0$, $x(0) = 0$, $x'(0) = 2$

④ Solve Bessel differential eqn $x^2 y'' + xy' + (x^2 - n^2)y = 0$

⑤ Explain Generating Function For Bessel Function

Section – B

UNIT – II : Answer the following Questions (each question carries ten marks)   2x10=20

① State and prove Picard's Theorem

② State and prove Hille–Wintner theorem

Name of the Faculty : Dr. A. Srisailam

Dept. of Mathematics
OUCS.

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QUESTION PAPER   INTERNAL ASSIGNMENT

M.Sc Mathematics (Semester -I) 2023-24

Paper-IV   Title: Elementary Number Theory   Max Marks 30

Section -A

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

(1) State and prove Euclid"s Lemma..

(2) Show that $\sum_{d/n} \mu(d) \dfrac{n}{d} = \varphi(n)$ for all $n \geq 1$.

(3) State and prove Mobius inversion formula.

(4) Find the remainder when $1! + 2! + 3! + ... + 50!$ is divided by 30.

(5) State and prove Gauss lemma.

Section – B

Note: Answer the following questions   (2 x 10 = 20 Marks)

(6) (i) State and prove Euclidean algorithm.

(ii) If g and $f * g$ are multiplicative functions, then show that f is also multiplicative function.

(7) (i) State and prove Wolstenholme"s theorem.

(ii) State and prove quadratic reciprocity law.

(Dr V.Kiran)

Department of Mathematics