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

2025

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. N.Ch. Bhatracharyulu

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 II Semester 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 fee only remaining Examination fee pay to Examination Branch, OU, after notification separately to be issued.**

Candidates are required to submit the Assignment fee receipt of Rs.500/- along with the assignment answers scripts at the concerned counter on or before **31.12.2025** and obtain proper submission receipt.

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

HAND WRITTEN ASSIGNMENTS will be accepted and valued.

Students are advised to use Blue Pen only.

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. NAME OF THE PAPER :
5. 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 **31.12.2025** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

DIRECTOR

PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION

OSMANIA UNIVERSITY, HYDERABAD – 500 007

INTERNAL ASSIGNMENT QUESTION PAPER
COURSE: M. Sc., (MATHEMATICS) – II - Semester

Paper: I **Subject: Galois Theory**

Section – A

UNIT – I: Answer the following short questions (each question carries two marks) $(5\ X\ 2 = 10M)$

1. Let $f(x) = a_0 + a_1x + \cdots a_nx^n \in Z[x], n \geq 1$. If there is a prime $'p'$ such that $p^2 \nmid a_0, p|a_0, p|a_1 \ldots p|a_{n-1}, p \nmid a_n$ then prove that $f(x)$ is irreducible over Q.
2. If the multiplicative group F^* of nonzero elements of a field F is cyclic then prove that F is finite.
3. Prove that the Galois group of $x^4 + 1 \in Q[x]$ is the Klein four group.
4. Let $f(x)$ be a polynomial over a field F with no multiple roots. Then prove that $f(x)$ is irreducible over F if and only if the Galois group G of $f(x)$ is isomorphic to a transitive permutation group.
5. Express the symmetric functions $x_1^2 + x_2^2 + x_3^2$ as rational functions of the elementary symmetric functions.

Section – B

UNIT – II: Answer the following questions (each question carries five marks) $(2X10 = 20M)$

1. Let E be a finite extension of a field F. Then prove that the following are equivalent (a) $E = F(\alpha)$ for some $\alpha \in E$. (b) There are only a finite number of intermediate fields between F and E.
2. Let F contains a primitive nth root ω of unity. Then the prove that the following are equivalent
   (i) E is a finite cyclic extension of degree n over F.
   (ii) E is the splitting field of an irreducible polynomial $x^n - b \in F[x]$. Furthermore $E = F(\alpha)$, where α is a root of $x^n - b$.

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

PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION

OSMANIA UNIVERSITY, HYDERABAD–500 007

INTERNAL ASSIGNMENT QUESTION PAPER

COURSE : M.Sc. (Mathematics) II Semester

Paper : II Subject : Lebesgue Measure and Integration

Total Marks: 30

Section – A

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

1 Give an example of algebra but not a σ-algebra.

2 If $A \subseteq B \subseteq R$, then show that $m^*(A) \leq m^*(B)$

3 Show that every monotonic increasing function is of bounded variation.

4. State and prove Fatou's lemma.

5 Show that every absolutely continuous function is uniformly continuous.

Section – B

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

1 Show that there exists a bounded non measurable subset of R.

2. State and prove Lebesgue convergence theorem

VKishan 25/10/25

Name of the Faculty :

Dept. of Mathematics

PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION

OSMANIA UNIVERSITY, HYDERABAD–500 007

INTERNAL ASSIGNMENT QUESTION PAPER

COURSE : M.Sc. (Mathematics) II Semester

Paper : III Subject : Complex Analysis

Total Marks: 30

Section – A

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

1 $u(x,y)$ is harmonic in some domain find conjugate when $u(x,y)=\frac{y}{x^2+y^2}$

2 Evaluate $\int_{|z|=1} \frac{\sinh z}{z^2(z-2)}\,dz$

3 ↘ 'C' +ve oriented boundary of square lies $x=y=\pm 2$, Evaluate

4 integral $\int \frac{\cos z}{z(z^2+8)}\,dz$.

5 ↘ obtain the Taylor series Expansion of $f(z)=\frac{1}{(z-1)(z-2)}$ about $z=0$

↘ Evaluate $\int_0^\infty \frac{1}{x^6+1}\,dx$.

Section – B

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

1 State and prove milne-Thomson method & Find analytic function of $f(z)$ when $u(x,y)=x^4-6x^2y^2+y^4$.

2.

i) if $f(z)=\frac{z^3}{z^2-1}$ at $z=\infty$ Find residue.

ii) Evalute $\int_{-\infty}^{\infty} \frac{\cos x}{(x^2+a^2)(x^2+b^2)}\,dx$ $(a>0, b>0)$

Name of the Faculty : Dr E. SRINIVAS

Dept. mathematics,

PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION

OSMANIA UNIVERSITY, HYDERABAD–500 007

INTERNAL ASSIGNMENT QUESTION PAPER

COURSE : M.Sc. (Mathematics) II Semester

Paper : IV Integral Eqns & COV. Subject : Integral Eqns & Calculus of variations.

Total Marks: 30

Section – A

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

1 Define i) Symmetric kernel ii) Degenerate kernel iii) Iterated kernel

2 Solve the integral Eqn : $\phi(x) = e^x - \int_0^x e^{x-t}\phi(t)dt$

3 Find $\int_0^\infty t^{-3/2}(1-e^{-t})dt$

4. Find resolvent kernel for the kernel $K(x,t) = \sin(x-2t)$, $0 \le x \le 2\pi$, $0 \le t \le 2\pi$

5 State and prove Fundamental Lemma of Calculus of Variation.

Section – B

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

1 Find the Green's functions for $\frac{d^4y}{dx^4} = 0$ with $y(0) = y'(0) = y(1) = y'(1) = 0$

2. Derive i) Hamilton's Principle
ii) Hamilton's Equation of Motion.

Name of the Faculty : Dr. D.Q. Shyam Sunder

Dept. Mathematics