INTERNAL ASSIGNMENT QUESTIONS
M.Sc. (MATHEMATICS) PREVIOUS
YEAR WISE (OLD PATTERN) BACKLOG

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

Dear Students,

Every student of M.Sc. Mathematics Previous Year (Year wise) has to write and submit **Assignment** for each paper compulsorily. Each assignment carries **20 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 **15-04-2025** 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.

Students are advised not use Black Pen.

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 **15-04-2025** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

DIRECTOR

INTERNAL ASSIGNMENT-

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 group is isomorphic to some permutation groupS_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. Show that the degree of extension of splitting fields $x^3 - 2 \in Q[x]$ is 6.

Section – B

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

1. For any ring R and any ideal $A \neq R$, then prove that the following are equivalent
   (i) A is Maximal
   (ii) The quotient ring$\frac{R}{A}$ has no non trivial ideals
   (iii) For any element x∈R, x$\notin A$, $A + \langle x \rangle = R$

2. Suppose E is a finite separable extension of F then prove that the following are equivalent.
   (i) E is a normal extension of F
   (ii) F is the fixed field of $G(E/F)$
   (iii) $|G(E/F)| = [E: F]$

QUESTION PAPER

INTERNAL ASSIGNMENT-

Course : ~~PGD~~ - M.Sc Mathematics I st year

Paper : ______________ Title : Real Analysis (Mathematical Analysis).

Section – A

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

1 Prove that every neighborhood is an open set.
2 Prove that compact subsets of metric spaces are closed.
3 Let f be a monotonic function defined on (a,b). Then prove that the set of ~~all discontinuous~~ points of (a,b) at which f is discontinuous is atmost countable.
4 → If P^* is the refinement of P, then ① $L(P,f,\alpha) \le L(P^*,f,\alpha)$
5 → If f is continuous on [a,b] then prove that $f \in R(\alpha)$ on [a,b]

Section – B

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

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

Name of the Faculty :

Dept. ______________

INTERNAL ASSIGNMENT

Course: M.Sc. Mathematics

Paper: III Title:Topology and Functional Analysis

Section-A

Unit-1: 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,e} and T= {ϕ,X,{a}, {b}, {c}. {a,b}, {b,c}, {c,a},{a,b,c}}. Let A={b,c,d}. Then find interior of A and derived set of Aand isolated points of A.
2. Prove that every sequentially compact metric space is compact.
3. Prove that every compact subspace of a Hausdorff space is closed.
4. If Y is a closed subspace of a Hilbert space H., then prove that Y = $Y^{\perp\perp}$.
5. Let and Y be normed spaces and S,Tε B(X,Y). Then prove that $(S+T)^X = S^X + T^X$.

Section-B

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

1. State and prove the Tietze extension theorem.
2. State and prove Riesz's theorem for linear theorem.

[illegible]

[illegible]

QUESTION PAPER INTERNAL ASSIGNMENT

M.Sc Mathematics (Previous)

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 $60x + 92y = (60, 92)$

(2) Evaluate $\phi(2100), d(2100), \sigma(2100), \sigma(d(2100))$

(3) State and prove Wolstenholme's theorem.

(4) Evaluate (41/43) , (53/59).

(5) State and prove Euler's pentagonal number theorem.

Section – B

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

(6) Suppose f is a multiplicative function . Then show that f is a completely multiplicative function if and only if $f^{-1}(n) = \mu(n) f(n)$ for all $n \geq 1$

(7) State and prove Chinese remainder theorem . Using this solve the system of congruences $x \equiv 1 (\bmod 2), x \equiv 2 (\bmod 3), x \equiv 2 (\bmod 17)$

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INTERNAL ASSIGNMENT QUESTION PAPER

Course: M.Sc.(Mathematics)

Paper : V

Title: **MATHEMATICAL METHODS**

Year: **Previous(First Year)**

Section-A 5×2=10

Answer the following questions(each question carries Two marks).

1. Express x^3 in terms of Legendre polynomials.

2. Solve $x' = e^x, x(0) = 1$ by the method of successive approximations.

3. Solve $y'' + y = sec\, x$ using the method of variation of parameters.

4. Define Green's function.

5. Solve $p^2 + q^2 = 1$.

Section-B 2×5=10

Answer the following questions(each question carries Five marks)

1. State and prove Picard's theorem.

2. Solve $\frac{\partial^3 z}{\partial x^3} - 2\frac{\partial^3 z}{\partial x^2 y} = 2e^{2x} + 3x^2 y$.