INTERNAL ASSIGNMENT QUESTIONS
M.Sc. (Mathematics) PREVIOUS

ANNUAL EXAMINATIONS
June / July 2018

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. C. GANESH
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 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 <u>hand written Assignments</u> 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.

<u>FORMAT</u>

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 **<u>25TH MAY, 2018</u>** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

Prof. C. GANESH
DIRECTOR

INTERNAL ASSIGNMENT- 2017 - 2018

Course: MATHEMATICS

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

Section – A

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

1. Prove that every group of order p^2 is an abelian, where p is a prime.

2. Let $f: R \to S$ be a homomorphism of a ring R in to a ring S then prove that $ker. f = \{0\}$ if and only if f is one- one.

3. Let M be an $R -$ module, then prove that $Hom_R(M, M)$ is a sub ring of $Hom(M, M)$.

4. Find a suitable number a such that $Q(\sqrt{3}, \sqrt{5}) = Q(a)$.

5. Suppose $F^* = F - \{0\}$, F is a field. If F^* is a cyclic group under multiplication, then prove that F is a finite field.

Section – B

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

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. If $f(x)$ is a non constant polynomial in $\mathbb{C}[x]$, then prove that $f(x)$ splits completely into linear factors in $\mathbb{C}[x]$.

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

INTERNAL ASSIGNMENT- 2017 - 2018

Course : MSc(I st year) Mathematics

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. (1) Under addition and scalar multiplication R^k is a vector space over the real field
2. (2) Show that $M(x,y) = \dfrac{d(x,y)}{1+d(x,y)}$, $\forall\, x, y \in X$ is a metric space
3. (3) Show that A set E is open if and only if its complement is closed
4. (4) Let f be a continuous mapping of a metric space X into a metric space Y. prove that $f(\bar{E}) \subseteq f(E)$ for every subset E of X
5. (5) If $\lim_{n\to\infty} f_n(x) = f(x)$, $x \in E$ and $M_n = \sup_{x \in E} |f_n(x) - f(x)|$ Then prove that a necessary and sufficient condition for Uniform convergence of $\{f_n\}$ on E is that $M_n \to 0$ as $n \to \infty$

Section – B

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

Section- B

1. (1) State and prove Reiman's Theorem
2. (2) Show that The metric space $\mathscr{C}(X)$ is complete

Name of the Faculty : Dr. A. Srisailam

Dept. O.U.C.S

INTERNAL ASSIGNMENT- 2017 - 2018

Course : M.Sc.

Paper : III **Title :** Topology and functional Analysis **Year:** Previous / Final

Section – A

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

1. If $X=\{a,b,c,d,e\}$, $T=\{\phi, X, \{a\}\{c\}\{a,c\}\}$ and $A=\{a,b,c\}$. Find $\bar{A}$, A^{0} and $D(A)$.
2. Prove that a topological space X is disconnected $\Leftrightarrow$ there exists a continuous mapping of X onto the discrete two point space $\{0,1\}$.
3. State and Prove Riesz's lemma
4. Let X be a normed linear space and $x_0 \neq 0$ be an element of X. Prove that there exists a bounded linear functional $\tilde{f}$ on X such that $\tilde{f}(x_0) = \|x_0\|$ and $\|\tilde{f}\| = 1$.
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 Questions (each question carries Five marks) 2x5=10

1. State and Prove Urysohn's lemma.
2. State and prove Uniformboundedness Principle.

Name of the Faculty : Dr. B. Krishna Reddy

Dept. Mathematics, UCS, OU.

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INTERNAL ASSIGNMENT- 2017 - 2018

Course : M.Sc. Mathematics Previous

Paper : IV **Title :** Elementary Number Theory **Year:** Previous / ~~Final~~

Section – A

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

1 Prove that $\sum_{d|n} \varphi(d) = n$ for $n \geq 1$.

2 State and prove Mobius inversion formula.

3 Derive a formula for $\varphi(n)$.

4 State and prove Lagrange's theorem.

5 Find the remainder when $15!$ is divided by 17.

Section – B

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

1. Prove that $\Lambda(n) = \sum_{d|n} \mu(d) \log\left(\frac{n}{d}\right) = -\sum_{d|n} \mu(d) \log d$.
2. State and prove Chinese remainder theorem.

Name of the Faculty : C. GOVERDHAN

Dept. Mathematics

INTERNAL ASSIGNMENT- 2017 - 2018

Course : MSc

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 Express $f(x) = x^3 - 3x^2 + 2$ in terms of Legendre polynomials

2 Show that $P_n(-x) = (-1)^n P_n(x)$

3 Show that $J_{-n}(x) = (-1)^n J_n(x)$ For any integer n.

4 Show that $J_{-1/2}(x) = \sqrt{\frac{2}{\pi x}} \cos x$.

5 Solve : $(y-z)p + (z-x)q = x-y$

Section – B

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

1. Show that $(1-2xz+z^2)^{-1/2} = \sum_{n=0}^{\infty} z^n P_n(x)$, $|x| \le 1$, $|z| \le 1$.

2. Solve : $(p^2+q^2)y = qz$.

Name of the Faculty : Dr. K. Sreeram Reddy.

Dept. Mathematics.