INTERNAL ASSIGNMENT QUESTIONS
M.SC. MATHEMATICS PREVIOUS
ANNUAL EXAMINATIONS
(2015-2016)

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. H.VENKATESHWARLU
Hyderabad – 7 , Telangana State

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

ear Students,

Every student of M.Sc. (Mathematics) Previous 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. 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. The assignment marks will not be accepted after the stipulated date,

You are required to **pay Rs.300/- fee** towards Internal Assignment marks through DD (in favour of Director, PGRRCDE, OU) and submit the same along with assignment at the concerned counter **on or before <u>28-06-2016</u>** and obtain proper submission receipt.

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Methodology for writing the Assignments:

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   (10.30 am to 5.00 pm).
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5. The cover page of the each theory assignments must have information as given in FORMAT below.

<u>FORMAT</u>

   1. NAME OF THE STUDENT
   2. ENROLLMENT NUMBER
   3. M.Sc. (Mathematics) Previous
   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.
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Prof.H.VENKATESHWARLU
DIRECTOR

INTERNAL ASSIGNMENT- 2015 - 2016

Course : M. Sc (Mathematics)

Paper : I Title : ALGEBRA Year: Previous / ~~Final~~

Section – A

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

1 If G is a group of order 2, then show that Aut(G) is trivial.

2 Find the non isomorphic abelian groups of order 360.

3 If R is a ring with unity then show that each maximal ideal is a prime ideal.

4 If E is a finite extension of F then show that E is an algebraic extension of F.

5 Show that the polynomial $f(x) = x^7 - 10x^5 + 15x + 5$ is not solvable by radicals.

Section – B

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

1. state and prove sylow's second and third theorems.

2. Show that Every PID is a UFD. Also give an example to show that a UFD need not be a PID.

Section- A

UNIT-I

$5 \times 2 = 10$

1. Show that Every infinite Subset of a Countable Set A is Countable

2. Show that Every closed Subset of a Compact Set is Compact.

3. Show that if f and F be functions Mapping $[a, b]$ into R^k. If f is Reiman integrable on $[a, b]$ and if $F' = f$ then $\int_a^b f(t)\,dt = F(b) - F(a)$.

4. State and prove Weierstrass's M-Test

5. Show that if $\{f_n\}$ is a sequence of continuous functions on a set E and if $f_n \to f$ uniformly on E. then f is continuous on E.

Section-B

UNIT- II

$2 \times 5 = 10$

1. Show that if f be a continuous mapping on a metric Space X into a metric Space Y. If E is a connected Subset of X then f(E) is a connected Subset of Y.

(P.T.O)

② . Show that $f \in R(\alpha)$ on $[a, b]$ if and on[ly] if given $\epsilon > 0$ there exists a partition P of $[a, b]$ such that $U(P, f, \alpha) - L(P, f, \alpha) < \varepsilon$

INTERNAL ASSIGNMENT- 2015 - 2016

Course : M.SC. MATHEMATICS

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. Prove that a topological space X is a T_1-space if and only if each point set is a closed set.
2. Define Hausdorff space and a completely regular space.
3. Define ~~con~~ continuous function.
3. Prove that norm is a
4. Prove that the space l^p with $p \neq 2$ is not a Hilbert space.
5. Define sesquilinear functional ~~and~~ and norm of a bounded sesquilinear functional.

Section – B

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

1. Prove that a subspace of the real line R is connected if and only if it is an interval.
2. State and prove Uniformboundedness theorem.

Name of the Faculty : Dr. B. Krishna Reddy

Dept. Mathematics.

INTERNAL ASSIGNMENT- 2015 - 2016

Course : M.SC. MATHEMATICS

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 $\varphi^{-1}(n) = \sum_{d|n} d\,\mu(d)$.

2 If f is a multiplicative function, prove that $\sum_{d|n} \mu(d) f(d) = \prod_{p|n} (1 - f(p))$

3 Solve $25x \equiv 15 \pmod{120}$

4 Prove that $7 \mid 5^{2n} + 3 \times 2^{5n-2}$ for $n \geq 1$

5 Prove that $n^{13} \equiv n \pmod{1365}$

Section – B

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

1. State and prove Division algorithm.

2. g, $f * g$ are multiplicative functions prove that f is also a multiplicative function

Name of the Faculty : Dr. C. Goverdhan

Dept. Mathematics

INTERNAL ASSIGNMENT- 2015 - 2016

Course : M.SC. MATHEMATICS

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 Define regular, singular points.

2 Explain Frobenius method of solving 2nd order equation.

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

4 Evaluate $\frac{d}{dx}\{x^4 J_4(x)\}$.

5 Obtain a series for $J_0(x)$.

Section – B

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

1. Show that $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n}(x^2-1)^n$.
2. State and prove Generating function for $P_n(x)$.

Name of the Faculty : Dr. K. Sreeram Reddy

Dept. Mathematics.

INTERNAL ASSIGNMENT QUESTIONS

M.SC. MATHEMATICS FINAL

ANNUAL EXAMINATIONS

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INTERNAL ASSIGNMENT- 2015 - 2016

Course : MSc (Maths)

Paper : I **Title :** Complex Analysis **Year: Previous / Final**

Section – A

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

1. Find the fixed points of $\omega = \dfrac{3z-4}{z-1}$.
2. Compute $\displaystyle\int_{|z|=2} \frac{dz}{z^2+1}$.
3. Find the real & imaginary parts of $\log z$.
4. Find the residue of $f(z) = \dfrac{1}{z^2+5z+6}$ at $z=-2$.
5. Prove that $\Gamma(n+1) = n!$

Section – B

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

1. Find the linear transformation which carries 0, i, $-i$ into 1, -1, 0.

2. State & prove Residue theorem.

INTERNAL ASSIGNMENT- 2015 - 2016

Course : Msc maths (final)

Paper : II **Title :** Measure Theory **Year:** Previous / Final ✓

Section – A

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

1) Show that outer measure of an interval is its length.

2) Prove that a real valued function f defined on [a,b] is of function of bounded variation if and only if it can be written as two monotonically increasing functions.

3) State and prove montone convergence theorem

4) State and prove Lebesgue convergence theorem

5) State and prove Hahn decomposition theorem

Section – B

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

1) State and prove vitali covering Lemma.

2) State and prove Raydon Nikodyn theorem.

INTERNAL ASSIGNMENT- 2015 - 2016

Course : M.SC. MATHEMATICS

Paper : III **Title :** Operations Research & Numerical Techniques. **Year: Previous / Final**

Section – A

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

1 Define slack variable and surplus variable.

2 Write the Mathematical formulation of Assignment problem.

3 Explain the unbalanced Transportation problem. How to modify it.

4 Define the saddle point and pure strategy of a game.

5 Explain the Bisection Method.

Section – B

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

1. Solve the LPP by simplex Method : Max $Z = 6x_1 + 8x_2$
   STC $5x_1 + 4x_2 \leq 60$
   $4x_1 + 4x_2 \leq 40$
   $x_1, x_2 \geq 0$
2. Write all the steps of Hungarian Assignment Method.

Name of the Faculty : Dr. I. G. Shyam Sunder

Dept. of Mathematics
OUCW, Koti, Hyd-95

INTERNAL ASSIGNMENT- 2015 - 2016

Course : M.Sc.

IV

Paper : Fluid Mech. Title : Fluid Mech Year: Previous / Final

Section – A

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

1 state and prove conservation of angular momentum

2 state and prove Equation of continuity

3 state and prove Kelvin's circulation theorem

4 write Relation between stress and rate of strain.

5 write short note on boundary layer theory.

Section – B

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

1. Derive Navier stoke's Equation.
2. Derive two-dimensional boundary layer equation

INTERNAL ASSIGNMENT- 2015 - 2016

Course : M.Sc Mathematics (Final)

Paper : V Title : I.T, I.E & C.V Year: Previous / Final

Section – A

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

1. Solve $y'' + 9y = \cos 2t$, $y(0) = 1$, $y(\frac{\pi}{2}) = -1$ by Laplace transform
2. State and prove convolution theorem for Fourier transform
3. Define Green's function. Construct Green's function for $y'' - y = 0$, $y(0) = y(1)$
4. Use Hamilton's principle to derive Lagrange's equation of motion.
5. State and prove fundamental lemma of calculus of variations.

Section – B

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

1. Solve $\phi(x) = x + \lambda \int_0^{2\pi} \sin(x+t)\,\phi(t)\,dt$.
2. Find the extremals of the functional

$$V[y(x), z(x)] = \int_0^{\pi/2} [(y')^2 + (z')^2 + 2yz]\,dx, \quad y(0) = z(0) = 0,$$

$$y(\tfrac{\pi}{2}) = 1, \quad z(\tfrac{\pi}{2}) = -1.$$