INTERNAL ASSIGNMENT QUESTIONS
M.Sc. (Mathematics) PREVIOUS

ANNUAL EXAMINATIONS
(2016-2017)

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. SHIVARAJ
Hyderabad – 7 , Telangana State

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. If you fail to submit Internal Assignments before the stipulated date. The candidates have to pay the examination fee and submit the Internal Assignment in the same academic year. If the candidate fails to submit the Internal Assignment after payment of the examination fee they will not be given an opportunity to submit the Internal Assignment afterwards, the Internal marks will not be added to University examination marks under any circumstances.

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     (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 COURSE	:
2.	NAME OF THE STUDENT	:
3.	ENROLLMENT NUMBER	:
4.	NAME OF THE PAPER	:
5.	DD. NO. & DATE	:

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

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Prof. Shivaraj
DIRECTOR

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. Show that any group G of order $2p$ has a normal subgroup of order p, where p is a prime.

2. Prove that a group of order 105 contains a subgroup of order 35.

3. Show that every homomorphism image of a commutative ring is commutative.

4. Show that the polynomial $x^2 - 3$ is irreducible over the field of rational numbers.

5. Suppose F is a field contained in an integral domain D. If $[D:F] < \infty$, then prove that D is a field.

Section – B

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

1. Find the rank of linear mapping $\emptyset: R^5 \rightarrow R^4$,
   Where $\emptyset(a, b, c, d, e) = (2a + 3b + c + 4e, 3a + b + 2c - d + e, 4a - b + 3c - 2d - 2e,$
   $$5a + 4b + 3c - d + 6c)$$

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

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

Assignment

Msc (Mathematics)   Previous Year

Real Analysis Paper-II

Section-I

Answer the following two questions   2x5=10

1. Show that suppose $Y \subset X$, a subset E of Y is open relative to Y if and only if $E = Y \cap G$ for

    some open subset G of X

2. Show that a sequence $\{f_n\}$ of functions defined on a set E converges uniformly on E if and only

    if for every $\varepsilon > 0$, there exist $N \in J$ such that $|f_n(x) - f_m(x)| \leq \varepsilon$ for $m \geq N$, $n \geq N$, $x \in E$

Section-II

Answer the following five questions   5x2=10

1. Define countable set, uncountable set and give examples

2. Suppose $d(x, y)$ denote the distance between $x, y \in R^k$ then show that

    a) $d(x, y) \geq 0 \ \forall \ x, y \in R^k$

    b) $d(x, y) = 0 \Leftrightarrow x = y$

    c) $d(x, y) = d(y, x) \ \forall \ x, y \in R^k$

    d) $d(x, y) \leq d(x, z) + d(z, y) \ \forall \ x, y, z \in R^k$

3. Show that every closed subset of a compact set is compact

4. Suppose f and F be functions mapping $[a, b]$ into R^k if f is Reimann integrable on $[a, b]$

    and if $F' = f$ then show that $\int_a^b f(t)dt = F(a) - F(b)$

5. State and prove Weierstrass's M-test

INTERNAL ASSIGNMENT - 2016 - 2017
Course: M.Sc. Mathematics
Paper : III   Title : Topology and Functional analysis   Year : previous

SECTION -A

UNIT-1: Answer the following short answer questions (each question carries two marks)

$5*2=10$

1. State and prove Lindelof's Theorem.
2. Prove that every sequentially compact metric space is totally bounded.
3. Prove that continuous image of a connected space is connected.
4. State and prove Riesz's lemma.
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)

$2*5=10$

1. State and prove Urysohn's lemma.
2. State and prove Uniform boundedness theorem.

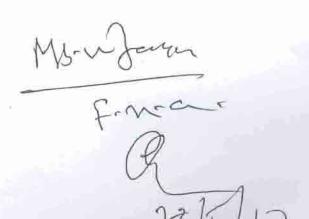Name of the faculty : Dr.B.Krishna Reddy
Dept. of Mathematics

INTERNAL ASSIGNMENT- 2016 - 2017

Course : Mathematics (Previous

Paper : IV   Title : Ele. Number theory   Year: Previous / Final

Section – A

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

1. Find $\gcd(2354, 5468)$
2. Find $\sigma(10256)$
3. Find $\phi(2345)$
4. Solve $5x \equiv 3 \pmod 7$
5. Define Dirichlet Product $f * g$.

Section – B

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

1. Show that $\phi(n)$ is Multiplicative function.
2. State and prove chinese Remainder theorem.

Name of the Faculty : Dr. G. Kamala

Dept. Mathematics.

INTERNAL ASSIGNMENT- 2016 - 2017

Course : __MSc (pre)__

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. Discuss about the roots of indicial equation in series solution

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

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

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

5. Write $x^2 + 1$ in terms of Legendre polynomials.

Section – B

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

1. State and prove orthogonal property of Legendre polynomials

2. Show that $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} (x^2-1)^n$.

Name of the Faculty : Dr K. Sreeram Reddy

Dept. ___8/04/2017___.

INTERNAL ASSIGNMENT QUESTIONS
M.Sc.(Mathematics) FINAL
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Prof.Shivaraj
DIRECTOR

INTERNAL ASSIGNMENT- 2016 - 2017

Course : <u>M. SC. (Maths) Final</u>

Paper : <u>I</u>   Title : <u>Complex Analysis</u>   Year: Previous / Final

Section – A

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

1. Find the zeros & poles of $\dfrac{(z-1)^2(z+2i)}{(z+i)^2(z-2)}$.

2. Find the value of $\sin(i)$.

3. Find the fixed points of $\dfrac{3z-4}{z-1}$

4. Compute $\displaystyle\int_{|z|=1} \dfrac{e^z}{z}\,dz$

5. Find the residue of $f(z) = \dfrac{1-z}{(1-2z)^2}$

Section – B

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

1. Find the real & imaginary parts of $\cos z$.

2. State & prove argument principle.

Name of the Faculty : Dr E. Rama

Dept. <u>Mathematics</u>

INTERNAL ASSIGNMENT- 2016 - 2017

Course : M.Sc, Mathematics, First

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. State and Prove Bounded Convergence Theorem
3. State and Prove Monotone Convergence Theorem
4. State and Prove Fatou's Lemma
5. State and Prove Jordan Decomposition Theorem
6. State and Prove Vitali Covering Lemma

Section – B

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

1. State and Prove Holder's Inequality
2. State and Prove Minkowski's Inequality
3. State and Prove Hahn Decomposition Theorem
4. State and Prove Raydon Nikodyn Theorem.

Name of the Faculty : Dr. V. SRINIVAS

Dept. Mathematics

INTERNAL ASSIGNMENT- 2016 - 2017

Course : MSc (Mathematics).

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

Section – A

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

1. What are the steps involved in graphical method of LPP.
2. State and prove Reduction theorem of Assignment problem.
3. Explain the concept of Dominance and its rules.
4. Show that Newton Raphson method is second order convergence.
5. Write the algorithm for Simplex Method.

Section – B

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

1. Solve the LPP : $Max\ Z = x_1 - 3x_2 + 2x_3$ STC $3x_1 - x_2 + 3x_3 \le 7,$
$-2x_1 + 4x_2 \le 12$
$-4x_1 + 3x_2 + 8x_3 \le 10$
& $x_1, x_2, x_3 \ge 0$

2. Use Runge-Kutta Method of order four to find y when $x=0.4$ in steps of 0.2 given that $\frac{dy}{dx} = 1 + y^2$, $y(0) = 0$

Name of the Faculty : Dr. I.G. Syamsunder.

Dept. Mathematics

INTERNAL ASSIGNMENT- 2016 - 2017

Course : M.Sc maths GLal

Paper : IV   Title : Fluid Mechanics   Year: Previous / Final

Section – A

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

1   explain about K.E of a system of particles

2   Find the center of mass of a solid hemisphere.

3   Derive the equation of meal continuity and write the eqn in cylindrical and spherical coordinates.

4   Explain about stress and strain.

5   Explain about Renolds number.

Section – B

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

1.   state and prove conservation law of Angular momentum.

2.   Derive the eqn of Navier-stokes.

Name of the Faculty :

Dept. Mathematics

INTERNAL ASSIGNMENT- 2016 - 2017

Course : __M.Sc (Final) Mathematics__

Paper : __V__   Title : __Integral Transforms, Integral Equations & Calculus & Variation__   Year: ~~Previous~~ / Final

Section – A

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

1   Find $L\{\sin\sqrt{t}\}$

2   Find $L^{-1}\left\{\frac{1}{(P+3)(P-4)}\right\}$

3   Find the Fourier Transform of $f(x) = e^{-x^2/2}$

4   On what curves the functional $v(y(x)) = \int_{x_0}^{x_1} \frac{\left(1+y'^2\right)^{1/2}}{x} dx$, can be extremized

5   S.T the function $\phi(x) = e^x\left(2x - \frac{2}{3}\right)$ is a solution of the Fredholm Integral equation.

Section – B

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

1.   Solve the Integral equation, by using the method of Successive approximation.
$$\phi(x) = 1 + x - \int_0^x \phi(t)\, dt \; ; \phi_0(x) = 1$$

2.   Find the Green's Function for the homogeneous boundary value problem
$$\frac{d^4y}{dx^4} = 0 \quad \text{with}$$
$$y(0) = y'(0) = 0, \; y(1) = y'(1) = 0$$

Name of the Faculty : Dr. K. Ramesh Babu

Dept. __Mathematics__

16/4/17