INTERNAL ASSIGNMENT QUESTIONS
M.Sc MATHEMATICS PREVIOUS

2019

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.

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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.

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2. NAME OF THE STUDENT :
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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. C. GANESH
DIRECTOR

INTERNAL ASSIGNMENT-2018-2019
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. Let G be a group X be a set if the action of G on X induces a homomorphism $\emptyset : G \to S_X$ then prove that X is a $G -$ set.

2. Let $n = \prod_{j=1}^{k} P_j^{f_j}$ (P_j distinct primes) then prove that the number of non- isomorphic abelian group of order n is $\prod_{j=1}^{k} \left|P(f_j)\right|$

3. Find the rank of linear mapping $\emptyset : R^4 \to R^3$ where $\emptyset(a,b,c,d) = (2a - b + 3c + d, a - 8b + 6c + 8d, a + 2b - 2d)$

4. Suppose $f(x) = a_0 + a_1x + a_2x^2 + -- + a_nx^n \in \mathbb{Z}[x]$, If there is a prime number p, then prove that (i) $p \mid a_0,\ p \mid a_1,\ p \mid a_2, --- \ p \mid a_{n-1}$
   (ii) $p \nmid a_n,\ p^2 \nmid a_0$ then $f(x)$ is irreducible over Q

5. Suppose F is a field then prove that prime field of F is isomorphic to Q or isomorphic to Z_p for some prime p.

Section – B

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

1. If R be a unique factorization domain then prove that the polunomial ring $R[x]$ is over R is also a unique factorization domain

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) $|G(E/F)| = [E:F]$

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

INTERNAL ASSIGNMENT- 2018 - 2019

Course : MSc (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. If p is a limit point of E, Then show that every neighbourhood of p contains infinitely many points of E.
2. Show That Every closed Subset of a compact set is compact
3. Show that The series $\sum a_n$ is converges if and only if for every $\varepsilon > 0$ there is an integer N such that $\left|\sum_{k=n+1}^{m} a_k\right| < \varepsilon$, if $m \geq n \geq N$
4. Show that $\underline{\int_a^b} f\,d\alpha \leq \overline{\int_a^b} f\,d\alpha$
5. Show that The series $\sum \frac{1}{n^p + n^q x^2}$ is uniformly convergent for all values of x, if $p > 1$.

Section – B

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

1. Show that The metric space $\mathcal{C}(X)$ is complete
2. Let f be a continuous mapping defined on a compact metric space (X, d) into a metric space (Y, ρ), Then show that f is uniformly continuous on X.

Name of the Faculty : Dr. A. Srisailam
Dept. of Mathematics
O.U.C.S

INTERNAL ASSIGNMENT- 2018 - 2019

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 every sequentially compact metric space is compact

2 Prove that continuous image ~~of~~ of a connected space is connected.

3 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 $\bar{f}$ on X such that $\bar{f}(x_0) = \|x_0\|$ and $\|\bar{f}\| = 1$

4. State and prove Riesz ~~lemma~~ lemma.

5. Prove that the product of two bounded self-adjoint linear operators A and B on a Hilbert space H is ~~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 Lebesgue covering lemma.

2. State and prove Generalised Hahn-Banach theorem.

Name of the Faculty : Dr. B. Krishna Reddy

Dept. Mathematics.

INTERNAL ASSIGNMENT- 2018 - 2019

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 State and prove fundamental theorem of arithmetic.

2 Show that the series $\sum_{n=1}^{\infty} \frac{1}{p_n}$, where p_n denote nth prime, diverges.

3 Find $(250, 575)$ and express the gcd as linear combination of 250, 575

4 Solve the linear congruence $9x \equiv 21 \pmod{30}$.

5 State and prove Lagrange theorem.

Section – B

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

1. State and prove division algorithm.
2. State and prove Chinese remainder theorem.

Name of the Faculty : Dr. V. Naga Raju

Dept. Mathematics

INTERNAL ASSIGNMENT- 2018 - 2019

Course : Msc (previous)

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 * Explain the method of solving $\alpha(x)y'' + \beta(x)y' + \gamma(x)y = 0$ by Frobenious method

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

3 * Define the Wronskian of $\phi_1, \phi_2, \ldots \phi_n$. Examine

4 whether e^x, e^{-x} linearly dependent or independent.

5 * Show that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \sin x$

* Show that $J_n(-x) = (-1)^n J_n(x)$

Section – B

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

1. State and prove generating function for $P_n(x)$
2. Show that (i) $\frac{d}{dx} x^n J_n(x) = x^n J_{n-1}(x)$. (ii) $\frac{d}{dx} x^{-n} J_n(x) = -x^{-n} J_{n+1}(x)$.

Name of the Faculty : Dr. K. Sreeram Reddy

Dept. Mathematics.

INTERNAL ASSIGNMENT QUESTIONS
M.Sc MATHEMATICS FINAL

2019

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Prof. C. GANESH
DIRECTOR

INTERNAL ASSIGNMENT-2018-2019, CDE, OSMANIA UNIVERSITY,
M.Sc. (Final), MATHEMATICS, PAPER-I,
COMPLEX ANALYSIS

SECTION-A

Answer the following short answer questions (5x2=10)

1). Define conformal mapping, Bilinear transformation . Is the mapping $w = \bar{z}$ is conformal.

2). Define holomorphic function. If $f(z)$ is holomorphic show that $u_x = v_y, \quad u_y = -v_x$.

3). Define cross ratio and show that cross ratio of (z_1, z_2, z_3, z_4) is real iff z_1, z_2, z_3, z_4 lie on a circle or on a straight line.

4). find the poles and residues of the following fuctions.

a) $\frac{1}{sin z}$ b) $\frac{1}{sin^2 z}$

5). Evaluate the Integral $\displaystyle\int_0^\infty \frac{x^2}{(x^2+a^2)^3}dx$

SECTION-B

Answer the following questions (2x5=10)

1). a)Evaluate the Integral $\displaystyle\int_0^{2\pi} \frac{1}{(a+bcos\theta)}d\theta$

b).State and prove Residue theorem and evaluate $\displaystyle\int_C \frac{e^{2z}}{(2z-1)^2}dz$ where $C : |z| = 1$.

2). a) Define singularity of a function and explain about types of singularities.

b) Expand $f(z) = \dfrac{1}{z^2-5z+6}$ for $2 < |z| < 3$.

A.V.Lakshmi
(Dr. A. Venkata Lakshmi)

INTERNAL ASSIGNMENT- 2018 - 2019

Course : M.Sc, Mathematics

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 State and Prove Bounded Convergence Theorem.
2 state and Prove Lebesgue Convergenc theorem.
3 State and Prove Vitali Covering Lemma.
4 State and Prove Jordan Decomposition theorem.
5 State and Prove Raydon Nikodym Theorem.
6. 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 Holders and Minkowskis Inequalities.
2. State and Prove Riesz Fisher Theorem.

Name of the Faculty : Dr. V. SRINIVAS

Dept. Mathematics.

INTERNAL ASSIGNMENT- 2018 - 2019

Course : M.Sc. (Final) MATHEMATCS

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 What are the steps involved in Big-M-Method.

2 State and prove Reduction theorem in A-P.

3 Explain the concept of Dominance in GAME THEORY

4 Write the algorithm for Newton's Raphson Method.

5 Evaluate $\int_0^1 e^{-x^2}dx$ by dividing the range of integration into 4 equal parts using (i) Trapezoidal Rule (ii) Simpson's Rule

Section – B

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

1. Solve the following LPP by two phase Method ; Max $Z = 3x_1 - x_2$

   STC $2x_1 + x_2 \geq 2$

   $x_1 + 3x_2 \leq 2$

   $x_2 \leq 4$

   $x_1, x_2 \geq 0$

2. Solve $\frac{dy}{dx} = x^2 + y$, $y(1) = 1.5$ in the interval (1, 1.3) with $h = 0.1$ using Runge-Kutta Method.

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

Dept. of Mathematics.

INTERNAL ASSIGNMENT - 2018 - 2019

Course : M.Sc. Mathematics

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 Write the Newton's laws of motion

2 Find moment of inertia of solid sphere about diameter

3 ~~Obtain~~ write the relation between stress and rate of strain

4 Discuss steady viscous flow in tube of uniform cross section.

5 Discuss prandtl's Boundary layer theory

Section – B

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

1. Derive equation of continuity in spherical coordinates
2. Derive Navier stoke's Equations.

Name of the Faculty : J. Anand Rao

Dept. Mathematics

INTERNAL ASSIGNMENT- 2018 - 2019

Course : M.Sc (Mathematics)

Paper : V **Title :** IT & IE & C of V **Year:** ~~**Previous**~~ **/ Final**

Section – A

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

1. Find $L^{-1}\left\{\frac{1}{(P+3)^3}\right\}$
2. Find Fourier Sine Transform of $f(x) = e^{-ax}$
3. write the Formula of Fredholm integral equation of First Kind
4. Solve the integral equation $\int_0^x (x-t)\phi(t)\,dt = x^2$
5. Define Fundamental lemma of calculus of variation

Section – B

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

1. Solve the System of integral equation

$$\left.\begin{aligned} \phi_1(x) &= \sin x + \int_0^x \phi_2(t)\,dt \\ \phi_2(x) &= 1-\cos x - \int_0^x \phi_1(t)\,dt \end{aligned}\right\}$$

2. using Green's function, solve the boundary-value problem

$$y'' + y = x \text{ with } y(0) = y\left(\frac{\pi}{2}\right) = 0$$

Name of the Faculty : Dr. K. Ramesh Babu

Dept. Mathematics

4/5/19