ANNAMALAI UNIVERSITY

DIRECTORATE OF DISTANCE EDUCATION

S 018 – M.SC. MATHEMATICS

SECOND SEMESTER

Academic Year : 2021 - 2022

ASSIGNMENT TOPICS

This booklet contains assignment topics. Students are asked to write the assignments for **FOUR** papers as per instructions.

Last date for submission -:**15.05.2022**
Last date for submission with late fee `**300/-:31.05.2022**

NOTE:

1. Assignments sent after **31.05.2022** will not be evaluated.
2. Assignments should be in the own handwriting of the student concerned and not type-written or printed or photocopied.
3. Assignments should be written on A4 paper on one side only.
4. All assignments (with Enrolment number marked on the Top right hand corner on all pages) should be put in an envelope with superscription "**M.Sc. Mathematics Assignments**" and sent to **The Director, Directorate of Distance Education**, Annamalai University, Annamalainagar – 608 002 by **Registered post**.
5. No notice will be taken on assignments which are not properly filled in with *Enrolment Number* and the *Title* of the papers.
6. Students should send full set of assignments for all papers. Partial assignments will not be considered.

ASSIGNMENT INSTRUCTIONS

Write assignments on ***FIVE***questions in each paper. For each question the answer should not exceed 4–pages. Each assignment carries 25 marks (5questions).You are expected to write **FIVE questions for every subject**.

Dr. R SINGARAVEL
DIRECTOR

5X5=25

Couse 2.1. ADVANCED ALGEBRA

Assignment

1. Prove that the mapping ρ: F[x] →F(a)defined by *h(x)*ρ= *h(a)* is a homomorphism.
2. Prove that S_n is not solvable for n>4.
3. If A is an algebra, with unit element, over F, prove that A is isomorphic to a sub-algebra of A(V) for some vector space V over F.
4. Prove that every AƐ F_n satisfies its secular equation.
5. For every prime number p and every positive integer m prove that thereis a unique field having p^m elements.

5X5=25

Couse 2.2. MEASURE THEORY

ASSIGNMENT

1. Show that the Outer measure of an Interval is its Length.
2. State and Prove Fatou's Lemma.
3. Let f be an increasing real valued function on the interval [a,b]. Then prove that, f is differentiable almost everywhere. The derivative f' is measurable and

   $\int_a^b f'(x)dx \leq f(b) - f(a)$
4. If $|u_n| = a_n$, whether u_n is real or complex, then show that,

   $$|(1 + u_{n+1})(1 + u_{n+2}) \dots (1 + u_{n+v}) - 1| \leq (1 + a_{n+1})(1 + a_{n+2})(1 + a_{n+v}) - 1$$
5. State and Prove Tannery's Theorem.

Couse 2.3. DIFFERENTIAL GEOMETRY

ASSIGNMENT

5X5=25

1. State and prove Serret-Frenet Formula.
2. Find the intrinsic equation of the curve given by $x = ae^u \cos u$; $y = ae^u \sin u$; $z = be^u$
3. Prove that A space curve is a helix if and only if the ratio of the curvature to the torsion is constant at all points
4. State and Prove Gauss-Bonnet-Theorem.
5. Show that the surface $e^z \cos x = \cos y$ is minimal.

5X5=25

Couse 2.4. PARTIAL DIFFERENTIAL EQUATIONS AND TENSOR ANALYSIS

Assignment

1. Solve $zp = -x$.
2. Find the surface which intersects the surfaces of the system $z(x + y) = c(3z + 1)$ orthogonally and which passes through the circle $x^2 + y^2 = 1, z = 1$.
3. Find complete integral of $2p_1x_1x_3 + 3p_2x_3^2 + p_2^2p_3 = 0$.
4. Show that if the transformation $T: y^i = a_j^i x^j$ is orthogonal, then the distinction between the covariant and contravariant laws disappears.
5. Show that $\frac{\partial g_{ij}}{\partial x^k} - \frac{\partial g_{jk}}{\partial x^i} = [jk, i] - [ij, k]$.