

ANNAMALAI UNIVERSITY

(Accredited with 'A+' Grade by NAAC)

CENTRE FOR DISTANCE AND ONLINE EDUCATION

Annamalainagar – 608 002

Semester Pattern: 2025-26

Instructions to submit Second Semester Assignments

1. Following the introduction of semester pattern, it becomes **mandatory for candidates to submit assignment for each course.**
2. Assignment topics for each course will be displayed in the A.U, CDOE website (**www.audde.in**).
3. Each assignment contains 5 questions and the candidate should answer all the 5 questions. Candidates should submit assignments for each course separately. (5 Questions x 5 Marks =25 marks).
4. Answer for each assignment question should not exceed 4 pages. Use only A4 sheets and write on one side only. **Write your Enrollment number on the top right corner** of all the pages.
5. Add a template / content page and provide details regarding your Name, Enrollment number, Programme name, Code and Assignment topic. Assignments without template / content page will not be accepted.
6. Assignments should be handwritten only. Typed or printed or photocopied assignments will not be accepted.
7. **Send all Second semester assignments in one envelope.** Send your assignments by Registered Post to The Director, Centre for Distance and Online Education, Annamalai University, Annamalai Nagar – 608002.
8. Write in bold letters, “ASSIGNMENTS – SECOND SEMESTER” along with PROGRAMME NAME on the top of the envelope.
9. Assignments received after the **last date with late fee** will not be evaluated.

Date to Remember

Last date to submit Second semester assignments : 01.11.2025

Last date with late fee of Rs.300 (three hundred only) : 15.11.2025

Director
CDOE

CENTER FOR DISTANCE AND ONLINE EDUCATION

S018– M .Sc Mathematics

FIRST YEAR – SECOND SEMESTER

ASSIGNMENT TOPIC

018E1210 ADVANCE ALGEBRA

1. Prove that the elements $a \in K$ is algebraic over F , if and only if $F(a)$ is a finite extension of F .
2. If V is a finite extension over f , then for $S, T \in A(V)$ prove that
 - (a) $r(ST) \leq r(T)$
 - (b) $r(TS) \leq r(T)$
 - (c) $r(ST) = r(TS) = r(T)$ for S regular in $A(V)$.
3. For each $i = 2, \dots, k$, $v_i \neq 0$ and $V = V_1 \oplus V_2 \oplus \dots \oplus V_R$, the minimal polynomial of T_i is $q_i(x)^i$.
4. If N is normal and $AN = NA$ then prove that $AN^* = N^*A$.
5. State and prove Wedderburn's theorem on finite Division Rings.

018E1220 – MEASURE THEORY

1. Show that the outer measure of an interval is its length.
2. State and prove monotone convergence theorem.
3. If f is absolutely continuous on $[a, b]$ and $f'(x) = 0$ almost everywhere then prove that f is a constant.
4. Prove that $(1 + a) > e^a$ if $a > 0$; or $(1 - a) > e^{-a}$ if $0 < a < 1$.
5. State and prove Tannery's theorem.

018E1230: DIFFERENTIAL GEOMETRY

- (a) Define arc length. Derive the formula for arc length of the space curve and prove that $[\bar{r}', \bar{r}'', \bar{r}'''] = k^2 \tau$ with usual notations.
(b) Obtain the curvature and torsion of the curve of intersection of the two surfaces $ax^2 + by^2 + cz^2 = 1$ and $a^1x^2 + b^1y^2 + c^1z^2 = 1$ and also find the curvature, torsion and osculating plane of the cubic curve $\bar{r} = (u, u^2, u^3)$.
- (a) State and prove the fundamental Existence theorem for space curves.
(b) State and prove Serret-Frenet formula and also prove that if the radius of curvature is constant then the curve either lies on a sphere or has constant curvature.
- (a) State and prove Liouville's formula for Geodesic curvature of a curve (k_g) and also find E, F, G, H , if $\bar{r} = (u, v, u^2 - v^2)$.
(b) Define Geodesic. Derive differential equating of a Geodesic and also show that for the anchor ring $\bar{r} = \{(b + a \cos u) \cos v, (b + a \cos u) \sin v, a \sin v\}$, the surface area is $4\pi^2 ab$.
- (a) State and prove Gauss-Bonnet theorem.
(b) State and prove Minding's theorem.
- (a) Prove that a necessary sufficient condition for a surface to be developable is that its Gaussian curvature is zero and also find the equation to the developable which has the curve $x = 6t, y = 3t^2, z = 2t^3$, for its edge of regression.
(b) State and prove Monge's Residue theorem and also show that the surface $e^z \cdot \cos x = \cos y$ is minimal.

018E1240: PARTIAL DIFFERENTIAL EQUATIONS AND TENSOR ANALYSIS

- Find the integral surfaces of the Partial Differential Equation $(x - y)y^2p + (y - x)x^2q = (x^2 + y^2)z$ passing through the curve $xz = a^3, y = 0$.
- Find the complete integral of $(p_1 + x_1)^2 + (p_2 + x_2)^2 + (p_3 + x_3)^2 = 3(x_1 + x_2 + x_3)$.
- Solve $\frac{\partial^3 u}{\partial x^3} + \frac{\partial^3 u}{\partial y^3} + \frac{\partial^3 u}{\partial z^3} - 3 \left(\frac{\partial^3}{\partial x \partial y \partial z} \right) = x^3 + y^3 + z^3 - 3xyz$.
- Let $\{A(i_1, i_2, \dots, i_r)\}$ be a set of function of the variable x^i and let the inner product $A(\alpha, i_2, \dots, i_r) \xi_i^\alpha$ with an arbitrary vector ξ_j , be a tensor of the type $A_{k_1, k_2, \dots, k_p}^{j_1, j_2, \dots, j_q}(x)$, then the set $A(i_1, i_2, \dots, i_r)$ represents the tensor of the type $A_{k_1, k_2, \dots, k_p}^{j_1, j_2, \dots, j_q}(x)$.
- State and prove Jacobi's theorem.