

MANONMANIAMSUNDARANARUNIVERSITY
DIRECTORATE OF DISTANCE AND CONTINUING EDUCATION

INTERNAL ASSIGNMENT

Subject : **FUNCTIONAL ANALYSIS**

Subject Code : **SMAM41**

1.a) Let M be a closed linear subspace of a normed linear space X . If the norm of a coset $x + M$ in the quotient space X/M is defined by $\|x + M\| = \inf\{\|x + m\| : m \in M\}$, (3) then prove that X/M is a normed linear space. Further, if X is a Banach space, then prove that X/M is a Banach space.

(or)

b) State and prove the open mapping Theorem.

2.a) If P is a projection on H with range M and null space N , then prove that $M \perp N \Leftrightarrow P$ is self-adjoint; and in this case, $N = M^\perp$.

(or)

b) Prove that the mapping $x \rightarrow x^{-1}$ of G into G is continuous and is therefore a homeomorphism of G onto itself.

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INTERNAL ASSIGNMENT

Name of the Programme: M.Sc

Year II

Subject : DIFFERENTIAL GEOMETRY

Subject Code : SMAM42

1.a) Show that when a curve is analytic, we obtain a definite oscillating plane at a point of inflection unless the curve is a straight line.

(or)

b) A helicoid is generated by the skew motion of a straight line which meets the axis at an angle α . Find the orthogonal trajectories of the generators. Find the de also metric of the surface referred to the generation and their orthogonal trajectories as parametric curves.

2.a) A Geometrical Interpretation of the second fundamental Form. Let $P(u, v)$ & $Q(u+h, v+k)$ be near points on a Surface and let d be the perpendicular distance from Q onto the tangent plane to the surface at P . If r_P and r_Q are the position vectors of P & Q then prove that $d = \frac{1}{2}[Lh^2 + 2m hk + Nk^2] + O(h^3, k^3)$.

(or)

b) Prove that the only compact surfaces of class ≥ 2 for which every point is an umbilic are spheres.

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INTERNAL ASSIGNMENT

Name of the Programme: M.Sc

Year II

Subject : RING THEORY AND LATTICES

Subject Code : SMAE41

1.a) If U is an ideal of the ring R , then prove that R/U is a ring and is a homomorphic image of R .

(or)

b) State and prove unique factorization theorem.

2.a) State and prove Fermat theorem.

(or)

b) Prove that the ideal $A = (p(x))$ in $F[x]$ is a maximal ideal if and only if $p(x)$ is irreducible over F .

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INTERNAL ASSIGNMENT

M.Sc MATHEMATICS -

Subject : FINANCIAL MATHEMATICS

Subject Code : SMAS41

1.a) A coin is flipped twice. Assuming that all four points in the sample space $S = \{(h,h), (h,t), (t,h), (t,t)\}$ are equally likely, what is the conditional probability that both flips land on heads, given that

(a) the first flip lands on heads, and

(b) at least one of the flips lands on heads?

(or)

b) Explain the geometric Brownian motion as a limit of simpler models

2.a) Many credit-card companies charge interest at a yearly rate of 18% compounded monthly. If the amount is charged at the beginning of a year, how much is owed at the end of the year if no previous payments have been made?

(or)

b) Find the rate of return from an investment that, for an initial payment of 100, yields return of 60 at the end of each of the first two periods.