MANONMANIAMSUNDARANARUNIVERSITY

DIRECTORATEOFDISTANCEANDCONTINUNINGEDUCATION

INTERNAL ASSIGNMENT FOR MAY 2025 EXAMINATIONS

Subject :**FUNCTIONAL ANALYSIS**

Subject Code :**SMAM41**

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

(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 FOR MAY 2025 EXAMINATIONS

NameoftheProgramme:M.Sc

Year II

Subject :DIFFERENTIAL GEOMETRY

SubjectCode :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 . 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 $P(u,v)$ & $Q(u+h, v$ $+$) be near points on a Surface and let ' ' be the perpendicular distance from a onto the tangent plane to the surface at . If and r_Q are the position vectors of & then prove that $d=\frac{1}{2}[Lh^2+2mhk+Nk^2]+O(h^3,k^3)$.

(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 FOR MAY 2025 EXAMINATIONS

NameoftheProgramme:M.Sc

Year II

Subject :RING THEORY AND LATTICES

SubjectCode :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 FOR MAY 2025 EXAMINATIONS

M.Sc MATHEMATICS -

Subject :FINANCIAL MATHEMATICS

SubjectCode : 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 attheendof 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.