SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
M.Sc. Appl. Maths - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - II
20PAMCT2005 - Topology

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Prove that a subspace Y of complete metric space X is complete iff it is closed.
2. If X and Y are metric spaces and f a mapping of X into Y, then show that f is continuous iff $f^{-1}(G)$ is open in X whenever G is open in Y.
3. State and prove Cauchy's inequality.
4. Define topological space and give an example and explain homeomorphism.
5. Show that every separable metric space is second countable.
6. Prove that any continuous image of a compact space is compact.
7. Prove that every sequentially compact metric space is totally bounded.
8. Show that every compact subspace of a Hausdorff space is closed.

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. State and Prove Cantor's Intersection Theorem.
10. Prove that the set R^n of all n-tuples $x = (x_1, x_2, ...x_n)$ of real numbers is a real Banach space with respect to coordinatewise addition and scalar multiplication and the norm defined by$\|x\| = \left(\sum_{i=1}^{n} |x_i|^2\right)^{\frac{1}{2}}$
11. A topological space is compact if and only if every class of closed sets with empty intersections has a finite subclass with empty intersection.
12. Prove that every compact Hausdorff space is normal.

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. State and prove Tychonoff's Theorem.

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