Course Code: 4MSCM1
Course: Functional Analysis-II
Credit: 4
Last Submission Date: October 31, (for January session)
April 30 (for July Session)

Max. Marks:-70
Min. Marks:-25

Note:-attempt all questions.

Que.1 State & prove Closed graph theorem.

Que.2 State & prove Hahn – Banach theorem for linear space.

Que.3 If X is an inner product space and x, y ∈ X. Then

$$|x, y| \leq \| x \| . \|y\|$$

Que.4 Use Cauchy's inequality to prove Schwarz's inequality in the Hilbert space l_2^n.

Que.5 Let $\{e_1, e_2, -----, e_n\}$ be a finite orthonormal set in a Hilbert space H and x be any element to H. Then $\sum_{i=1}^{n} |(x, e_i)|^2 \leq ||x||^2$

Que.6 State & prove Projection theorem.

Que.7 State & prove Riesz Representation theorem for continuous linear function on a Hilbert space.

Que.8 Every Hilbert space H is reflexive.

Que.9 Let T be an operator on H define the adjoint T* of T . the mapping T→ T* of B(H) info itself has the following properties , for $T, T_1, T_2 \in B(H)$ and $\propto \in C$ we have

(1) $(T_1 + T_2)^* = T_1^* + T_2^*$
(2) $(\propto T)^* = \bar{\propto} T^*$
(3) $(T_1 T_2)^* = T_2^* \; T_1^*$
(4) $T^{**} = (T^*)^* = T$
(5) $\| T^* \| = \| T \|$
(6) $\| T^* T \| = \| T \|^2$

Que.10 If T_1 and T_2 are normal operators on a Hilbert space H with the property that either commutes with the adjoint of the other, then $T_1 + T_2$ and $T_1 T_2$ are normal.