List of Tables

1.1 Grouping of quantum systems by symmetries and values of angular momentum of particles ................................. 4

3.1 The values of Brody parameter and Berry-Ronik parameter are given for different values of $\lambda$ in $H = H_1 + \lambda H_2$ with $N = 4$ and $m = 10$. In the last four columns, root mean square deviations of the histogram with respect to BR, Brody, Wigner and Poisson distributions are given. 51

3.2 Same as Table 3.1 with Hamiltonian $H = H_1 + \lambda H_2$ for $N = 5$ and $m = 10$. ................................................... 52

3.3 Same as Table 3.1 with Hamiltonian $H = H_1 + \lambda H_2(\nu = 2)$ for $N = 4$ and $m = 10$. ................................. 53

3.4 Same as Table 3.1 with Hamiltonian $H = H_1 + \lambda H_2(\nu = 2)$ for $N = 5$ and $m = 10$. ................................................... 54

3.5 Critical values of two-body strength parameter for bosonic ensembles ............................................................... 55

4.1 Values of parameter $\mu$ for different values of $\lambda$ and $E_k$. .......................................................... 83

4.2 Values of $\sigma$ for different values of $\lambda$ and $E_k$. .......................................................... 84

4.3 Values of $\sigma$ for different values of $\lambda$ and $E_k$. .......................................................... 85

4.4 Values $\sigma_{off-diagonal}$, $\sigma_{diagonal}$ and $\zeta$, for 20 different cases for $N = 4$, $m = 10$, considering only 2-body part of the interaction with taking all single particle energies to be degenerate. ........................................ 86

4.5 Same as Table 4.4 for $N = 5$, $m = 10$. .......................................................... 87

5.1 Values of the ground state occupancies (ensemble averaged) of orbitals obtained by diagonalizing density matrix $\langle \rho(gs) \rangle$ with different values of $\lambda$ in Hamiltonian $H = H_1 + \lambda H_2$. ........................................ 110
5.2 Values of occupancies (ensemble averaged) of orbitals of 25'th eigenstate obtained by diagonalizing density matrix ($\rho(gs)$) with different values of $\lambda$ in Hamiltonian $H = H_1 + \lambda H_2$.

6.1 Ensemble averaged scalar moments and related quantities for different values of Bosons ($m$) and Single particle states ($N$) considering the two body interaction $H_2$.

6.2 Same as Table 6.1 for $\lambda = 0.005$ in interaction $H = H_1 + \lambda H_2$.

6.3 Same as Table 6.1 for $\lambda = 0.025$ in interaction $H = H_1 + \lambda H_2$.

6.4 $\nu = 2$ part of $\gamma_1$.

6.5 $\nu = 2$ part of $\gamma_2$.