# tribhuvan university

# Institute of science and Technology

# Shree siddhanath Science Campus Mahendranagar ,Kanchanpur

# Level: M.Sc.(physics) semester: second

# exam: internal assessment(open book)

# Sub: Quantum Mechanics II (PHY. 551)

# F.M : 15 Time: (60+60+30) minutes

Candidates are required to give their answers in their own words . You will be given 150 Minutes to submit it electronically from your official e-mail address to [bhawani.joshi@snsc.tu.edu.np](mailto:bhawani.joshi@snsc.tu.edu.np) and to the concerned faculties ([bhim.thagunna@snsc.tu.edu.np](mailto:bhim.thagunna@snsc.tu.edu.np) and nirmala.kalauni@snsc.tu.edu.np).

Attempt all the questions

Q.N.1 Show that any coupling between two states of equal energy causes the system to oscillate completely from one state to another.(Quantum resonance) [7.5]

OR

The general form of the spin orbit coupling is

HLS =(1/2µ2c2) ( L .S) (1/r)(dV/dr)

Calculate the corrections to the levels of a three dimensional harmonic oscillator . [7.5]

Q.N.2 Obtain magnetic hyperfine splitting of the hydrogen ground state.Show that how the enclosed flux is quantised .[7.5]

OR

Explain the concept of rotational spectra of a diatomic molecule. Considering a diatomic molecule as an an-harmonic oscillator ,obtain an expression for frequency of electronic transition between two rotational energy levels. [7.5]

Best of Luck