

18. (a) Derive the equation of motion for states and operators in the Heisenberg and interaction pictures.

Or

- (b) Describe the motion of a particle in an electromagnetic field and hence derive the velocity and acceleration of a charged particle.
19. (a) Obtain the matrix of Clebsh-Gordan coefficients for $j_1 = 1$, $j_2 = \frac{1}{2}$.

Or

- (b) Derive the generator of infinitesimal translation in time and explain the time evolution of the system.
20. (a) Prove that the time reversal operator is anti-unitary and derive the time reversal operator for a non-zero spin particle.

Or

- (b) Derive the casimir operators of a quantum isotropic oscillator and hence the generators of $U(3)$ and $SU(3)$.

Reg. No. :

Code No. : 7117

Sub. Code : C 31 P

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2010.

Third Semester

Physics

QUANTUM MECHANICS – I

(For those who joined in July 2008 and afterwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

1. What are stationary states?
2. What is box normalization?
3. What are eigenfunctions and eigenvalues of an operator?
4. When do you say two functions are orthonormal?
5. Define inner products in terms of Dirac's bra and ket.

