16. It can be observed that $A_{m \to n}$ is proportional to

(a) $\left(\frac{\nu}{c}\right)$ (b) $\left(\frac{c}{\nu}\right)$

(c) $\left(\frac{\nu}{c}\right)^3$ (d) $\left(\frac{c}{\nu}\right)^3$.

17. Hamiltonian and Lagrangian are related by

(a) $H = \Sigma\, p_i q_i - L$ (b) $H = \Sigma\, p_i \dot{q}_i - L$

(c) $H = \Sigma\, \dot{p}_i q_i - L$ (d) $H = \Sigma\, \dot{p}_i \dot{q}_i - L$.

18. Creation operator $\hat{\hat{a}}$ is

(a) $\frac{i}{\sqrt{4\hbar w}}(\hat{P}_i - iw\,\hat{Q}_i)$

(b) $\frac{i}{\sqrt{4\hbar w}}(\hat{Q}_i - iw\,\hat{P}_i)$

(c) $\frac{i}{\sqrt{2\hbar w}}(\hat{Q}_i - iw\,\hat{P}_i)$

(d) $\frac{i}{\sqrt{2\hbar w}}(\hat{P}_i - iw\,\hat{Q}_i)$.

19. The concept of field quantisation in the case radiation fields was introduced by

(a) Heisenberg (b) Einstein

(c) Dirac (d) Pauli.

20. The field is represented by a field function which in a mechanical system corresponds to

(a) two degrees of freedom

(b) three degrees of freedom

(c) five degrees of freedom

(d) an infinite degrees of freedom.

SECTION B — (5 × 5 = 25 marks)

21. (a) Explain the terms scattering amplitude and scattering cross–section.

Or

(b) Write a note on neutron–proton scattering.