**2ⁿᵈ Semester (B.Sc.-H) Final Internal Examination-2020**
**Department of Physics**
**Prabhat Kumar College, Contai**
**Paper-C4 (Waves and Optics)**

**Group-A (Theory)**
(Answer any one of the following)

1) Give an analytical description of the phenomenon of beats. Write down the applications of beats.
2) Trace analytically and graphically the motion of a particle that is subjected to two perpendicular simple harmonic motions having equal frequencies, different amplitudes and phases differing by $\frac{\pi}{2}$.
3) A particle is simultaneously subjected to $N$ simple harmonic motions of same frequency. Amplitude of each oscillation is $A_0$ and phase difference between successive oscillations is $\phi$. Show that amplitude of the resultant motion is given by

$$A = A_0 \frac{\sin\left(\frac{N\phi}{2}\right)}{\sin\left(\frac{\phi}{2}\right)}$$

4) Obtain the differential equation of motion for transverse vibrations of a stretched uniform flexible string.
5) Obtain an expression for intensity of Fraunhofer diffraction pattern of a double slit. Hence deduce the conditions for maxima and minima.
6) Outline the theory of zone plate. What are the differences between a zone plate and a convex lens?

**Group-B (Practical)**
(Answer any one of the following)

Write down working formula and experimental procedure of any one of the following experiments:

1) Determine the refractive index of the material of a prism using sodium source.
2) Determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
3) Determine the wavelength of sodium light using Fresnel Biprism.
4) Determine the wavelength of sodium light using Newton's Rings.
5) Determine the wavelength of sodium light using plane diffraction grating.
6) Determine the dispersive power and resolving power of a plane diffraction grating.

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