CITY COLLEGE

Internal Examination 2020−2021

Physics (Hons.) CBCS Semester 3

Paper: CC5 (Mathematical Physics II)

Time: 1 Hour; Full Marks: 20

Answer any <u>ten</u> questions from the following: **10×2=20**

1. Write down Fuch's theorem in concerned with the singularities of a differential equation.
2. Show that Bessel's equation has a regular singularity at x = 0 and an irregular singularity at x = ∞.
3. For Bessel Functions plot the graphical variations of J_0, J_1, J_2.
4. Show that $J_{-n}(x) = (-1)^n J_n(x)$.
5. In case of Legendre polynomial, prove that $P_2(x) = \frac{1}{2}(3x^2 - 1)$.
6. What do you mean by orthogonality of Legendre polynomial?
7. Write down the Dirichlet condition in concerned with the Fourier series.
8. What is Parseval identity?
9. Prove that $\Gamma\left(1/2\right) = \sqrt{\pi}$.
10. A wave packet has the form, $\psi(x) = \frac{1}{\sqrt{2a}}$ for $|x| \leq a$. Find the Fourier transform of this wave packet.
11. A biased six-sided die has probabilities 1/2 p, p, p, p, p, 2p of showing 1, 2, 3, 4, 5, 6 respectively. Calculate p.
12. Can a discontinuous function have a Fourier series? Explain.

Answer script must be emailed to **<u>sem3hcityphysics@gmail.com</u>** within 15 minutes of the end of the examination.