DOON UNIVERSITY, DEHRADUN
End Semester Examination, 3rd Semester, 2023
Academic Year 2023-24 (Odd Semester)
School of Physical Sciences, Department of Physics
Programme Name: M. Sc. Integrated
PHC-201, Mathematical Physics II

Time Allowed 120 Minutes   *Maximum Marks: 30*

SECTION: A (Each 2 marks)

1. What is the total mass of a car made of 755 kg heavy engine, 52 kg heavy body, 7.1 kg heavy tyres. Write the answer considering significance of the digits.
2. Write down all the Dirichlet's condition.
3. Express the function $f(x) = x + e^{(x)} + \tan(x + \frac{\pi}{6})$

SECTION: B (Each 4 marks)

4. A mass of 1.5 kg measured with the weighing machine with least count 10 gm has the horizontal speed of 10 m/s with the observed with the instrument having least count 0.001 m/s. The mass takes a height gain of 3.00 meters observed with the instrument having least count of 0.01 least count. What will be the final error in the total energy after the height gain. The formula for total energy is $mv^2/2 + mgh$.
5. Derive the expression for the complex Fourier series coefficients.
6. State and derive the statement of Parseval's theorem.

SECTION: C (Each 6 marks)

7. Find out the Fourier series of the $f(x) = x^3$ using the differential and the integral formula of g(x) with the given conditions: $g(x) = x^2$ $0 < x < 2$ and $f(0) = 0$.
8. Find out the half Sine and Cosine series for the half function defined as $f(x) = e^x$ $0<x<\pi$ period $= 2\pi$.