2021
B.A./B.Sc.
Third Semester
CORE – 5
PHYSICS
Course Code: PHC 3.11
(Mathematical Physics - II)

PART–B
Total Mark: 30

Answer the following questions.

1. Obtain the Fourier series expansion of a function $f(x) = \pi - x^2, 0 < x < 2\pi$ and prove that

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$ 6

2. (a) Prove that $\int_{-\infty}^{\infty} \left[H_n(x)\right]^2 dx = 8\sqrt{\pi}$. 3

(b) Use Rodrigue's formula for $L_n(x)$. Find the the values of $L_0(x), L_1(x)$ and $L_2(x)$. 3

3. (a) Prove the relation $\beta(m,n) = \beta(m,n+1) + \beta(m+1,n)$. 3

(b) Evaluate the following integral using gamma function $\int_0^{\infty} x^2 e^{-h^2x^2} dx$. 3

4. Fit a straight line to the following data and find the error in slope and intercept of the fitted line.

x	1	2	3	4	5
y	2	4	5	4	5

6

5. A tightly stretched string with fixed end points $x = 0$ and $x = i$ is initially in position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest position, find the displacement $y(x,t)$. 6
