Bankim Sardar College

Internal Examination 2020

Semester 4

Subject : Physics(H)   Paper: CCH8   Full Marks: 90

Group A

Answer all questions

10x1=10

1.(a) Show a graphical representation of a complex number.

(b) Write Euler's formula for complex number.

(c) What is a pole of a complex function?

(d) What is a singular function?

(e) Write an expression for Fourier transform of a function.

(f) What is inverse Fourier transform?

(g) State Cauchy Riemann equations

(h) Name the medium that was searched in Michelson Morley experiment.

(i) What do mean by relativistic variation of mass?

(j) What is proper velocity?

Group B

Answer all questions

3x10=30

2(a) State the conditions for Fourier expansion of a function.

(b) Expand the square wave function in a Fourier series.

(c) Write a python program to evaluate the Fourier coefficients of a square wave function.

Group C

Answer all questions

10x2=20

3(a) What is an analytic function?

(b) What is a branch point?

(c) What are residues of a complex function?

(d) What is the Fourier transform of a delta function?

(e) State the scale change property of the Fourier transform.

(f) What is derivative of a Fourier transform?

(g) State the Lorentz transformation equations.

(h) What do you mean by mass energy equivalence?

(i) What is relativistic invariant interval?

(j) Write down Euler equation of mechanics.

Answer any six questions

6x5=30

4. State Cauchy theorem of residues and hence show that the integral $\int_0^{2\pi} \frac{d\theta}{2+cos\theta} = \frac{2\pi}{\sqrt{3}}$

5. Write the Taylor expansion of a complex function.

6. Show that Z=ln(x+iy) satisfy the Cauchy Riemann equations.

7. Briefly describe the Michelson Morley experiment.

8. What is length contraction?

9. What is time dilation?

10. What do you mean by relativistic addition of velocities?

11. Show that the Fourier Transform of a Gaussian is another Gaussian.