

**C. ABDUL HAKEEM COLLEGE (AUTONOMOUS),  
MELVISHARAM - 632 509.  
SEMESTER EXAMINATIONS, APRIL - 2018**

**B.Sc., PHYSICS**

**SEMESTER VI**

**U15MPH602 / U14MPH602 - RELATIVITY, QUANTUM MECHANICS  
AND MATHEMATICAL PHYSICS**

Time: Three Hours

Maximum: 75 Marks

**SECTION - A (10 X 2 = 20 Marks)**

Answer **ALL** Questions.

1. Explain Newtonian relativity.
2. Explain gravitational red shift.
3. What is meant by matter waves?
4. Write the postulates of wave mechanics.
5. What is zero point energy?
6. What is rigid rotator?
7. What are spherical polar coordinates?
8. Explain the curl of vector field.
9. What is Beta function?
10. Write Laguerre's differential equation.

**SECTION - B (5 X 5 = 25 Marks)**

Answer **ALL** Questions.

11. a) Derive an expression for time dilation.

(Or)

- b) Explain law of addition of velocities.

12. a) Discuss about Heisenberg's uncertainty principle.

(Or)

- b) Explain the properties of wave functions.

13. a) Derive time dependent Schrodinger equation.

(Or)

- b) Derive the eigen function and eigen value of linear harmonic oscillator.

14. a) Derive Green's theorem.

(Or)

- b) Explain the application of vectors to orthogonal curvilinear coordinates.

15. a) Write the properties of Dirac delta function.

(Or)

- b) Derive a relation between Beta and gamma function.

**SECTION - C (3 X 10 = 30 Marks)**

Answer **ANY THREE** Questions.

16. With a neat diagram, describe Michelson Morley experiment and significance of negative result.
17. Explain operator formalism in detail.
18. Obtain the eigen value and eigen function of a particle in a one dimensional box.
19. State and prove Stoke's theorem.
20. Obtain the series solution for Hermite's differential equation.

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