COMBINED COMPETITIVE EXAMINATION FOR RECRUITMENT TO THE POSTS OF
PROVINCIAL MANAGEMENT SERVICE, ETC - 2016

SUBJECT: PHYSICS (PAPER-I)

TIME ALLOWED: THREE HOURS **MAXIMUM MARKS: 100**

NOTE: Attempt FIVE Questions in All. Calculator is Not Allowed.

Q No. 1: a) State and prove Stoke's Theorem. **(1+9 Marks)**

b) Explain the vectors triple product and show that: **(2+8 Marks)**
$\vec{A}X\ (\vec{B}\ X\ \vec{C}) = (\vec{A}\ .\vec{C})\vec{B} - (\vec{A}\ .\vec{B})\vec{C}$

Q No. 2: a) What is conical pendulum? Calculate its period of revolution. **(1+1+8 Marks)**

(b) Define conservation of angular momentum and explain it with two examples. **(2+4+4 Marks)**

Q No. 3: a) What are Lorentz transformation equations? Discuss consequences of the Lorentz transformation for:

(i) Relativity of time (ii) Relativity of length **(2+4+4 Marks)**

b) Derive the Einstein mass-energy relation $E=mc^2$ and illustrate its importance in Physics. **(8+2 Marks)**

Q No. 4: a) Define Bernoulli's Theorem. Derive its mathematical expression for steady, incompressible, non-viscous and irrotational flow. **(2+8 Marks)**

b) Discuss in detail two applications of Bernoulli's equation. **(5+5 Marks)**

Q No. 5: a) What is Michelson's interferometer? Describe its principle, construction and working. **(1+1+1+3+4 Marks)**

b) What is meant by polarization of light? How can you get a plain polarized light by a polarizing sheet? Show that in circular polarization, the average intensity of light is proportional to the square of maximum amplitude of the light waves. **(1+3+6 Marks)**

Q No. 6: a) What is entropy? Derive the relation for the change in entropy during reversible process. **(1+9 Marks)**

(b) Explain the Maxwell Law of distribution of molecular velocities for the molecules of a gas. **(10 Marks)**

Q No. 7: Differentiate between the classical Maxwell-Boltzmann and quantum Bose-Einstein statistics with their physical significance. **(20 Marks)**

Q No. 8: **Write note on the following:-** **(5x4=20 Marks)**

(i) Gauss's Theorem.
(ii) Surface Tension.
(iii) Diffraction Gratings.
(iv) Brownian Motion.