



NWFP PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATION FOR THE POSTS OF
PROVINCIAL MANAGEMENT SERVICE (BPS-17) 2010

2010

APPLIED MATHEMATICS PAPER-I

MARKS:100

TIME:03 Hours

Note: Attempt any TWO questions from section A and any THREE questions from section B.

SECTION - A

Q NO 1.

Explain the gradient of scalar field and also find the Mathematical expression for it.

Q NO 2.

State and prove the stoke's theorem.

Q NO 3.

What is the Centre of Gravity? Prove that potential energy of body is equal to that of a single particle with mass of body situated at its centre of gravity.

SECTION - B

Q NO 4.

Derive the Radial and Transverse component of velocity and acceleration in terms of polar coordinate.

Q NO 5.

a) Prove that in conservative field of force the total energy for system of Particles remain constant through out the motion.

b) A particle is moved by a force $\mathbf{F} = 20\hat{i} - 30\hat{j} + 15\hat{k}$ along a straight line from point A to the point B with positions vectors $2\hat{i} + 7\hat{j} - 3\hat{k}$ and $5\hat{i} - 3\hat{j} - 6\hat{k}$ respectively. Find the work done?

Q NO 6.

State and prove the Kepler's first law of planetary motion.

Q NO 7.

a) Define Rectilinear motion and derive the expression for motion of particle with variable acceleration for time dependent case only.

b) Find the distance traveled and velocity attained by a particle moving in a straight line, any time t if it starts from rest at $t=0$ and subject to an acceleration $t^2 + \sin t + e^t$?