

Sessional Examination 2021

BSc 5th Semester

Subject: Mathematics (G)

Paper 5.1

Marks: 20, Time: 1 hour

Answer any four questions

4×5=20

1. If three forces P , Q , and R acting at the angular points of triangle ABC along the tangents to the circumcircle are equivalent to a couple. Show that $P : Q : R = \sin 2A : \sin 2B : \sin 2C$.
2. Forces P , Q , R and S act along the sides AB , BC , CD and DA of the cyclic quadrilateral $ABCD$, taken in order, where A and B are extremities of diameter. If they are in equilibrium, prove that $R^2 = P^2 + Q^2 + S^2 + \frac{2PQS}{R}$.
3. A heavy uniform rod of length a rests with one end against a smooth vertical wall, the other end being tied to a point of the wall by a string l . Prove that the rod may remain in equilibrium at an angle θ to the wall, given by $\cos^2 \theta = \frac{l^2 - a^2}{3a^2}$.
4. Find the radial and transverse velocity and acceleration of a particle moving in a plane.
5. The velocity of a particle along and perpendicular to the radius vector to a fixed origin are λr and $\mu \theta$. Find the path and show that the acceleration along and perpendicular to the radius vector are $\lambda^2 r - \frac{\mu^2 \theta^2}{r}$ and $\mu \theta \left(\lambda + \frac{\mu}{r} \right)$.
