An electric-powered train is travelling at a constant speed $v_0$ around a turn of mean radius $R_0$; the track is banked at an angle $\theta$ with the horizontal.

The motor has been fixed to the floor of the engine such that its shaft is perpendicular to the track; the shaft is supported by bearings at each end. The armature and shaft of the motor are spinning at a constant speed $N$ rev/min in the same sense as the wheels of the train.

[Define any other variables that you may need. Make any assumptions that you think are reasonable. Assume that $R_0$ is much greater than all other dimensions].

(i) Calculate the reaction on the shaft at each bearing.

(ii) Would it be better to place the motor such that its shaft was parallel to the tracks?

![Schematic Diagram](image)