A new and potentially skilful seasonal forecast model of tropical cyclone formation (genesis, TCG) was developed for the Australian region. We find that a three-predictor Bayesian model provides substantially improved skill over existing statistical TCG forecast models, with remarkably skilful hindcasts (forecasts) of Australian region and subregional seasonal TCG totals provided two months ahead of the TC season. The model is based on Poisson regression with predictor combinations chosen using stepwise regression. The three-predictor model is based on derived indices of June-July-August average convective available potential energy (CAPE), May-June-July average meridional winds at 850hPa (v₈₅₀) and June-July-August geopotential height at 500hPa (GPH). The corresponding correlation coefficient between observed annual TCG totals and cross-validated model hindcasts is \( r = 0.74 \) over the 40-year record between 1968/89-2007/08. Using four-fold cross-validation, model hindcast skill is also high with 77.5\% of the observed seasonal TCG totals hindcast within the model variance. The model is also skilful in hindcasting seasonal TCG totals in Australia’s Western (eastern Indian Ocean) and Eastern (Coral Sea) tropical cyclone subregions (\( r = 0.50 \) and \( r = 0.75 \) respectively) between observations and leave-one-out cross-validated hindcasts. Forecasting the spatial probability for Australian region TCG on a 2.5°x2.5° grid, the previously selected GPH and v₈₅₀ predictors in combination with austral winter Niño4 produce the highest forecast potential. Results demonstrate that the combination of synoptic, thermodynamic and dynamic features is most useful to identify climatic impacts on Australian region TCG.