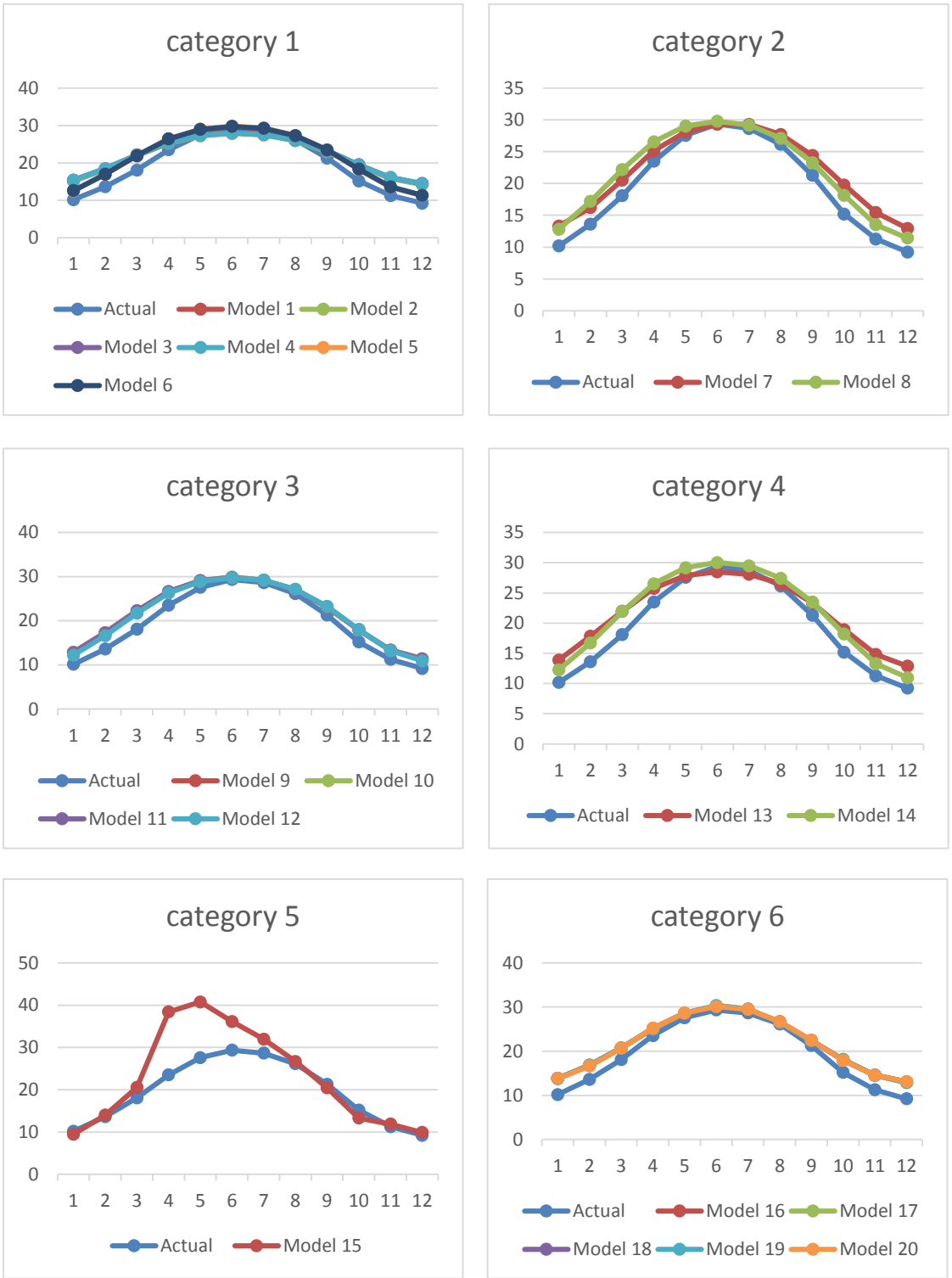

Figure 4. The performance of the six categories in Asyut city

6. CONCLUSION

The aim of this paper is to select best models that show the best estimating MAD-GSR in specific locations in Egypt. Twenty models in six categories with several variables are applied and these models are established and validated to the period from 2003 to 2012 of MAD-GSR in four different locations in Egypt (Borg ElArab, Cairo, Sidi Barrani and Asyut). Using the statistical indicators as RMSE, MABE, MAPE, R^2 and r to evaluate performance of prediction models. In this study, the best results that depended on the minimum RMSE and its values in all cities as follows: 0.3335 MJ/m^2 in Borg ElArab, 0.4342 MJ/m^2 in Cairo, 0.4277 MJ/m^2 in Sidi Barrani and 0.7479 MJ/m^2 in Asyut. The results are show that the sinh and tanh wave models give a good estimations in Borg ElArab sites with (RMSE < 0.333 MJ m^2) and (RRMSE < 1.7092%). Therefore, the solar declination angle based models (16, 17, 18, 19 and 20) are the best models for estimating MAD-GSR on a horizontal surface.

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