The advanced synthesis question(s) on the exam will be chosen from the following; there will also be shorter 2-step syntheses you will be required to do without the questions in advance:

a. Enovid®, a common contraceptive contains the compound norethynodrel. Convert the precursor to this component using any reagents you require. (Hint: at some point you will need to use a protecting group!)

b. The abuse of methamphetamine, an extremely potent psychostimulant is well documented in current news stories. One of the major contributors to its prevalence is its relative ease of preparation from available starting materials. Propose a synthesis from bromobenzene and propene and whatever other reagents you require.

c. Oxanamide is a mild sedative belonging to a class of molecules ironically called oxanamides. Prepare oxanamide using butanal as your only source of carbon.

d. Show how the tranquilizer valnoctamide can be synthesized from diethyl malonate:

e. Sandalwood distillate is one of the most highly prized fragrances in perfumery. The oil is environmentally rare so synthetic routes are preferred for its production. Suggest a synthesis of Polysanto® (synthetic sandalwood fragrance) from the aldehyde below and 2-butanone as well as any other reagents you require.

Mechanism List: The general mechanism questions will be 1 or 2 from this list. Remember, that I may ask other advanced mechanistic questions later on the exam.

- General mechanism for oxidation of alcohols to C=O compounds
- Fisher esterification
- Conversion of acid halide to an amide
- Claisen condensation
- Decarboxylation of β-ketoacids (end step of malonic/acetoacetic ester syntheses)
- Saponification of ester to carboxylate ion in KOH