Types of questions
1. True or false questions.
2. Given a partial of SAS output, fill in the missing values, and then answer questions. F table will be given.
3. Identify design(s) if you’re given a problem; answer questions.

Concepts:
1) Issues in experimental design
2) Nuisance factor and factor of interest
3) Type I & II errors
4) Randomization distribution vs. two sample t-test
5) Descriptive & inferential statistics
6) Population vs sample
7) Sampling distribution & Central limit theorem
8) Several often used distributions
9) tests on means & variances
10) sample size determination
11) hypothesis test & confidence interval
12) one-, two-, three-, four- way anova(main effect model) & model adequacy checking
13) contrast & simultaneous confidence intervals
14) designs in chapter 4 & corresponding ANOVA models
15) factorial design (ch 5)
   - interaction
   - statistical models, assumptions, hypothesis testing, F statistic
   - estimate the parameters in the statistical models
   - from a part of computer output: # levels of a factor, # replicates
   - Tukey’s test for interaction when n=1
- Multiple comparisons
- Blocking factorial design with stat models, e.g., day as a blocking factor;

16) 2-level factorial design (ch 6, 7)
- Models and assumptions
- Relation between coefficients in regression model and factor effects in ANOVA
- $R^2$ and $R^2_{adj}$
- single replicate case for 3 or more factors – no test available. How to detect significant factors or interactions?
- unreplicated $2^k$ factorial design / confounding in two or four blocks
- how are the term(s) confounded?

17) 2-level fractional factorial design (ch 8)
- Why need fractional factorial design? Principles
- One-half fraction case
- Defining relation, confounding and alias
- Design resolution (if you’re given I=….)
- One quarter fraction case
- How to choose the best design (max resolution & min aberration criteria)
  e.g. The word length patterns for IV designs $2^{7-2}$ are {4,4,4}, and {4,4,5}
  which design is better?

18) Experiments with random factors (ch 13)
- random factor
- random vs fixed
- models (random or mixed), assumptions, hypothesis tests and interpretation
- estimate the parameters - variances
- write F tests if given a EMS table

19) Nested and split-plot design (ch 14)
- Why nested? Nested vs. crossed
- Model for nested design (2-stage) & assumptions
- Why split-plot? Models & assumptions for split-plot design
- Whole plot vs. sub-plot
- Split-plot vs. nested (in terms of similarity/dissimilarity?)
- Split-plot vs. factorial (in terms of similarity/dissimilarity?)