1.

What are the major technological advances
inspiring the recent boom in Synthetic Biology?

- ( ) Multiplexed
  and high-throughput Polymerase Chain Reaction (m-PCR/ht-PCR)
- ( ) Autonomous
  Laboratory Workflows (ALW) and robotics
- ( ) Matrix-Assisted
  Laser Desorption and Ionization and Electrospray Ionisation (MALDI/ESI)
- (•) High-performance
  DNA sequencing and DNA synthesis
- ( ) Homologous
  recombination and bacterial transformation

2. What
   kind of activity or group does the abbreviation *iGEM* refer to in Synthetic Biology?

- ( ) An
  international non-governmental watchdog organization supervising the ethical conduct of genetic modifications
- ( ) A
  government task-force, established in the UK, to develop industrial guidelines for engineering microbiology
- (•) An
  international competition in which student teams produce genetically engineered machines
- ( ) A
  lobbying group supporting the introduction of genetically modified organisms to the European market
- ( ) The
  Institute for Genetic Engineering and Manipulation at Stanford University

3. What
does the abbreviation *DBT* stand for
in Synthetic Biology?

- ○ Develop-Balance-Tinker
  (the three core concepts underlying the genetic engineering of complex biological systems by Synthetic Biology)
- ◉ Design-Build-Test
  (an engineering approach for the iterative improvement of engineered biological systems)
- ○ Data-driven
  Biological Technologies (the combination of computational analysis and post-genomic molecular profiling techniques, such as metabolomics)
- ○ Directed Botanical Therapeutics
  (the production of plant-based drugs in microbial systems)
- ○

  Dicyclobenzotoluene (a key
  chemical required for high-throughput genome engineering)

4. Why
are untargeted metabolomics based experiments usually considered to take a longer time than similar targeted analyses?

- ○ Highly complex data produced
- ○ Longer Chromatography Runs
- ○ Time taken to Identify Unknown Metabolites
- ◉ All of the above

5. Within
the TEST platform, spectroscopic based analyses (aside from NMR) are considered useful as:

- ○ Data can be directly overlaid on to species specific biochemical maps
- ○ They generate rich multi-dimensional data
- ◉ They are quick and non-destructive
- ○ Can identify and quantify a large proportion of all chemical species within a sample

6. What
are the two main approaches to producing designer genomes?

- ○ Genome transplantation and mutagenesis
- ◉ Genome editing /reduction and genome synthesis
- ○ DNA synthesis (writing) and sequencing (reading)
- ○ Gene knock-outs and knock-ins
- ○ Genome modelling and synthesis

7. Responsible research and innovation should seek to continuously pursue which of the following steps?

- ○ Anticipate
  economic, social and environmental impacts, intended or otherwise
- ○ Reflect
  on purposes, motivations, potential implications, uncertainties, ignorance, assumptions, questions, and dilemmas
- ○ Engage
  on opening up visions, impacts, and questioning to broader deliberation, dialogue, engagement and debate in an inclusive way
- ○ Act
  – using these processes to influence the direction and trajectory of the research and innovation process itself
- ◉ All
  of the above

8. What factor(s) must be considered when designing a microbial cell factory?

- ☐ Genetic differences between the consumers of cell factory products
- ☑ The design of engineered synthetic pathways
- ☑ The natural metabolism of the host organism
- ☑ The feedstock on which the cell factory will grow

9. Constraint-based metabolic modelling can be used to predict...?

- (●) Metabolic flux through a network
- ( ) The most valuable chemical
- ( ) An average temperature at which to run an experiment

10. Optimisation of the ribosome binding site (RBS) sequence has an affect on:

- (●) translation
- ( ) neither transcription or translation
- ( ) transcription

11. Why might we wish to control the timing of gene expression in a pathway?

- [ ] To change the product being produced
- [x] To reduce the metabolic burden on the cell
- [x] To reduce accumulation of toxic intermediates