



# آزمون زیست شناسی مصنوعی SYNTHETIC BIOLOGY

امتحانات انتخاب تیم ایران در المپیاد جهانی  
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مدت آزمون

120 دقیقه

تاریخ برگزاری

10 خرداد 1399

تعداد سوالات

4 سوال

نکات خاص آزمون

- آزمون نمره منفی ندارد
- بارم تمام سوالات برابر می باشد

در این کادر چیزی ننویسید	تصحیح اول	تصحیح دوم	تجدید نظر

کد دانش پژوه (در این بخش چیزی ننویسید): [ ]

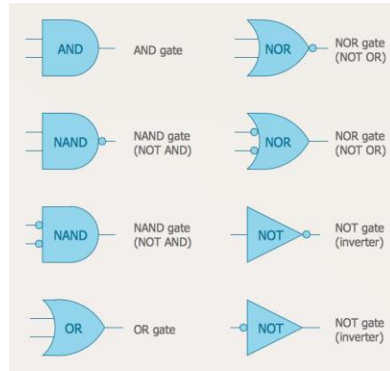
- 1) Draw the schematic logic gate representation of a gene circuit in which the output of the presence of A and absence of B needs to co-present with input C to trigger a repressor that controls the expression of a reporter gene. Also, fill the truth table of these inputs with regard to the final reporter gene.

- Truth table example:

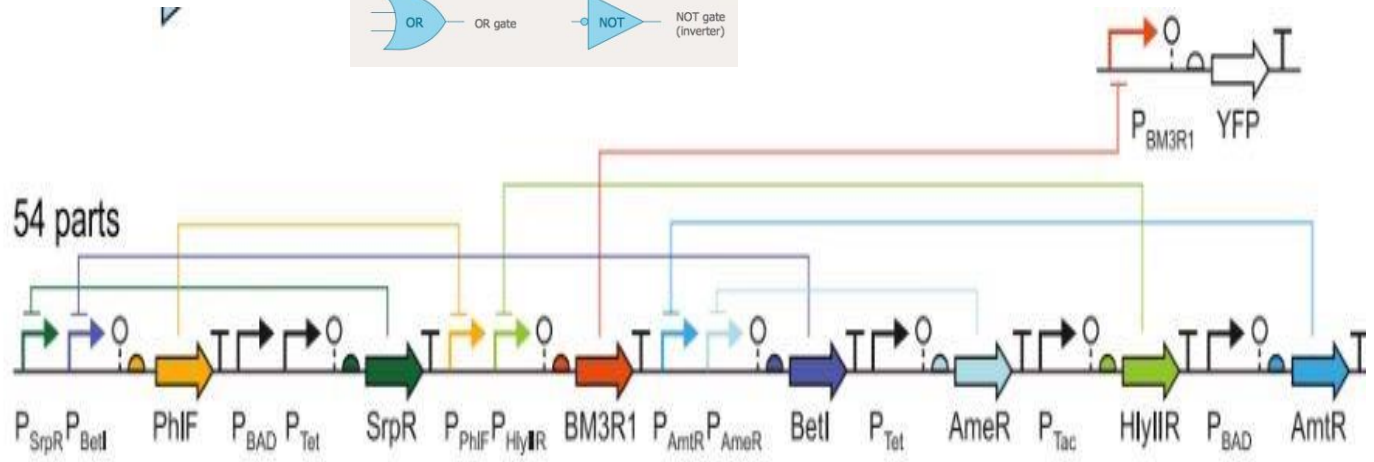
Input 1	Output
0	1
1	0

2) For the DNA sequence shown below draw the logic circuit representation and fill the truth table.

- Logic Circuits Parts:



- Output = YFP
- Inputs = BAD, Tac



فضای خالی برای ادامه جواب سوال 2

- 3) Draw a toehold (toehold mRNA) logic gate circuit that diagnoses the coronavirus COVID19 and distinguishes that it is NOT a flu virus. The mechanism should be clear.

- 4) In the synthetic CO<sub>2</sub> fixation cycle represented below, CO<sub>2</sub> molecules are marked by <sup>13</sup>C to track the pathway using LC-MS (liquid chromatography-mass spectrometry). The pathway is started using propionyl-CoA and two <sup>13</sup>CO<sub>2</sub> are fixed using the enzyme ccr. After how many turns in the cycle do two <sup>13</sup>CO<sub>2</sub> molecules that are incorporated in the first turn leave as glyoxylate (give two values for, respectively, the first and second <sup>13</sup>CO<sub>2</sub> molecules fixed in the first turn)?

First CO <sub>2</sub>	
Second CO <sub>2</sub>	

