**COVENANT UNIVERSITY**
**CANAANLAND, KM 10, IDIROKO ROAD**
**P.M.B 1023, OTA, OGUN STATE, NIGERIA.**

**TITLE OF EXAMINATION:** MOCK EXAMINATION
**COLLEGE:** ENGINEERING
**DEPARTMENT:** PETROLEUM ENGINEERING
**SESSION:** 2020/2021 **SEMESTER:** OMEGA
**COURSE CODE:** PET328 **CREDIT UNIT:** 2
**COURSE TITLE:** COMPUTER APPLICATIONS IN PETROLEUM ENGINEERING I
**INSTRUCTIONS**: Attempt to answer ALL questions



**TIME**: 2 hours

---

The entire question set is situated within a context of you being recently added to an oilfield asset team as a Reservoir Engineering Intern. The Senior Reservoir Advisor (SRA) and the Lead Software Developer (LSD) are your training mentors, and have tasked you with the following request. A custom Python module, *peteng.py* being built and used by the team is herewith attached.

**Question 1: [17½ marks]**

a. Give a sequence of GitHub operations you would need to implement in order to have offline access to project files in a repository that the Lead Software Developer just shared with you. **[2 marks]**
b. How does function *fvf* in Module peteng source a value for Argument *pb*, if a user did not specify a value? **[2 marks]**
c. Given that values have been assigned to variables *P, Pb, Bob, co*, and *pressure_step*; construct a loop perform the following task:
   i. execute $B_o = B_{ob}e^{[c_o(P_b-P)]}$ **[1½ marks]**
   ii. report the value of Bo at the current value of P **[1 mark]**
   iii. decrements the value of P with pressure_step **[1 mark]**
d. Demonstrate your understanding of Module penteng by answering the following questions:
   i. What happens if Line 8 is not included? **[2 marks]**
   ii. If a user specifies value for Argument pb in a call to Function fvf defined in Line 37, which Line(s) of the function body would not be executed? **[2 marks]**
   iii. What is the essence of Line 49? **[2 marks]**
   iv. Fix the bug in Line 50. $B_o = B_{ob}e^{[c_o(P_b-P)]}$ is intended. **[2 marks]**
   v. Give a sample call to Function stoiip_2 defined in Line 63 **[2 marks]**

**Question 2: [17½ marks]**

a. Following principle of sequential execution, write a line of code that you think should precede the following:

```
if current_pressure > 2800:
    print('Bubble-point pressure attained!')
```

**[2 marks].**
b. What is the purpose of Line 75 of Module *peteng*? **[2 marks]**

c. Create Function *archie_sw* according to the equation $s_w = \sqrt[n]{\frac{aR_w}{\phi^m R_t}}$. You may pass all parameters as function arguments. Let the return value be in 4 decimal places. **[3½ marks]**

d. Giving that *pay_list* and *poro_list* contains values of thickness and porosity for various layers of a stratified reservoir, respectively. The Reservoir Advisor wants you to write Function *average_poro* that accepts these two lists and returns the thickness-weighted average porosity, rounded up to 4 decimal places, according to the following algorithm: $Average\ Porosity = \frac{\sum_i^N \phi_i h_i}{\sum_i^N h_i}$; where N is the number layers, $\phi_i$ and $h_i$ are porosity thickness of Layer i, respectively. **[10 marks]**

**Question 3: [17½ marks]**

a. Write a line of code by which you would make reservoir gridblocks natural orderings an object that can be concatenated with string 'Block' **[2 marks]**

b. Construct a logical statement that would evaluate to True only if all of the following condition is fulfilled:
- Condition 1: *counter* is less than or equal to *num_of_blocks*
- Condition 2: *block_status* stores the string 'active' **[2 marks]**

c. Write simple statements to import necessary functions from Module *peteng* into a script you are working on, giving the following scenarios:
   i. You need only Functions *sol_gor* and *bubble_pressure*. **[1 mark]**
   ii. You need almost all the functions therein, and you do not want to add prefixes to their names when calling them. **[1½ marks]**
   iii. You need almost all the functions therein, and you would like to add prefixes to their names when calling them. **[1 mark]**

1. Write a script to implement the following workflow, in response to a request from the Reservoir Advisor:
- Make Function *stoiip_discretized* from Module peteng available for call. **[2 marks]**
- Create a Function *trimmed_sum* that receives *inp_list* and *threshold_val* (a float) and returns the sum of all elements of *inp_list* whose values are greater than *threshold_val* **[4 marks]**
- Call Function *stoiip_discretized* and pass the *stoiip_list* component of its output as argument to a call of Function *trimmed_sum.* **[4 marks]**

**Question 4: (14 marks)**

The questions featured in Test 2 go here!

**Notes about the mock examination**

1. This mock examination questions are prepared only to serve as sample exam questions; since this is the first edition of this course, hence no past questions yet.
2. These mock exam questions only reveals to you the structure (coverage, score allocations and the level of rigour) of the real exam. There is no intention to repeat these questions in the real exam; not even to re-package them. Questions in the real exam are almost altogether independent of the questions here.
3. The marking guide to these questions is being worked on. Hopefully, it would go live on Moodle and GitHub tonight; this is not a promise, though; it may not be ready!
4. Use these questions wisely.

```
print('Best wishes, now and always!!!')
```