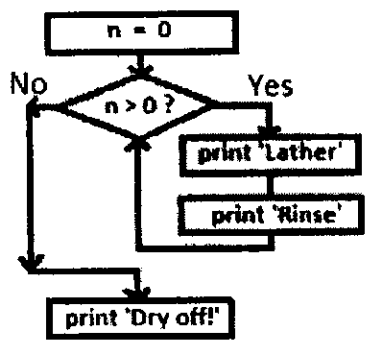
FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
DEPARTMENT OF PETROLEUM ENGINEERING
2019/2020 RAIN SEMESTER EXAMINATIONS
PET 516:- COMPUTER APPLICATION TO PETROLEUM ENGINEERING
INSTRUCTION: - ANSWER FIVE QUESTIONS IN ALL
TIME ALLOWED: 3 HOURS **DATE: 09/07/2021**

Question-1:

a. In FORTRAN, what can the in-built function FLOAT do?
b. The following are possible function statement in FORTRAN. Please comment on each statement:

S/N	FUNCTION STATEMENT	COMMENTS
1	FUNCTION PATT(S, T, F)	
2	FUNCTION JOG(T, X, I, K)	
3	INTERGER FUNCTION TONE(C, B, D)	
4	FUNCTION PATT(S, T, F) INTEGER S, T, F	

c. Mathematically, NCR = $\frac{N!}{(N-R)! \times R!}$. Write the main program with the function subprogram that can compute the above expression.
d. What is wrong with this loop below? Explain and draw the right flow chart



e. What is a common statement and what is it used for in FORTRAN?

Question-2:

a) Provide the Python operator (code) as per the table below:

S/N	Meaning/Desscription	Python Operator
1	Less than	
2	Less than or Equal to	
3	Equal to	

4	Greater than or Equal to	
5	Greater than	
6	Not equal to	

b) Provide the three (3) Python Variable Name Rule with examples of good and bad variable name.
c) Provide the five Python (5) reserve words
d) List the highest precedent rule to the lowest precedent rule in Python. With this rule, what will be the answer to this equation; X = 1 + 2**3/4*5
e) Re-write the simple python code below and convert to a FORTRAN IV code:

```
H = raw_input ('Hours = ')
Rate = raw_input ('Rate = ')
P = H * R
print 'Gross Pay = ', P
```

Question-3:

a) Give three advantages of modular programming
b) Which of the python codes below will never print some something else and why?

```
A:
if x < 2 :
 print 'Below 2'
elif x >= 2 :
 print 'Two or more'
else :
 print 'Something else'
B:
if x < 2 :
 print 'Below 2'
elif x < 20 :
 print 'Below 20'
elif x < 10 :
 print 'Below 10'
else :
 print 'Something else'
```

c) Review the python code below and comment if the code will run or not. If you feel the code will not run, provide your reasons why.

```
$ cat notry.py
astr = 'Hello Bob'
istr = int(astr)
print 'First', istr
astr = '123'
istr = int(astr)
print 'Second', istr
```

d) Periods other than a year could be used, but the discount rate needs to be adjusted. Assuming we start from an annual discount rate then to adjust to another period we need to calculate a rate i. Given annual rate r, for a period x, where x is a fraction (e.g., six months = 0.5) then the formula below holds:

$$i + 1 = (r + 1)^x$$

Write a subroutine subprogram that will calculate the discount rate "i" for a period less than one year.

e) Outline the six steps required for program development.

Question 4

a) Discuss extensively software application in the five broad areas of petroleum Engineering
b) List any three of these applications in each of those five broad areas
c) What are the limitations with the use of software
d) Briefly explain the various phases involved in software development

Question 5

(a) The table below shows an After Tax Cash Flow of OK-OIL and Gas Company

Monthly Prod. (MMSTB)	Gross Revenue ($M)	Expensed Cost ($M)	Royalties ($M)	Net Revenue ($M)
0.07	7.28	1.45	0.91	5.36
0.25	25.49	2.72	3.19	20.30
0.89	89.20	3.87	11.15	75.05

Assuming linear relationship, estimate the expensed cost and accrued revenues of the company as well as Government royalty at a monthly production of 650,000bbl

(b) What is the limitation of linear interpolation?

(c) Obtain the second degree interpolating polynomial of this Well

Q (bbl/D)	450	500	640
P (psi)	900	1000	1500

(d) Hence find: Q(1200psi)

Question 6

(a) Write out the general form for Lagrange interpolation passing through $n+1$ data points
The Carman-Kozeny model of laminar flow in packed beds is used to calculate permeability as a function of porosity, Ø as shown in the following table:

Porosity, Ø	0.15	0.22	0.26
Permeability, k, md	7.29	23.00	37.96

(b) Obtain an approximate equation to the Carman-Kozeny model using Lagrangian interpolatioin passing through all the three points

(c) Calculate the approximate value (correct to 2dp) and actual value of permeability when porosity is 0.24 given that the Carman-Kozeny model is: $k = 2160\emptyset^3$

(d) Explain your result