FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY
DEPARTMENT OF AGRICULTURAL AND BIO-RESOURCES ENGINEERING
RAIN SEMESTER EXAMINATIONS 2018/2019 SESSION

COURSE: ABE 504- SOIL PLANT AND ENERGY BALANCE PRINCIPLES　　*TIME: 3Hrs Instruction:*

Answer question one (1) and any other (4) questions. Q1 is 20 marks while others are 15 marks each.

Q1. **(a)** Explain the following terms with regards to soil moisture availability in the soil:
   (i) Hydrostatic Potential
   (ii) Capillary Potential
   (iii) Hygroscopic Potential

　　(b) Give any three (3) examples to illustrate the impotance of surface tension.

Q2. **(a)** What role do salts play in soil moisture stress?
　　(b) As a result of (a) above, when is the best time to apply fertilizers?
　　(c) Plant growth is a function of soil moisture stress. Explain.

Q3. **(a)** What is wetting front?
　　(b) What are the implications of a shallow wetting front?
　　(c) Give your solutions to (b) above.

Q4. Write short notes on the following terms, giving their matnematical expressions where applicable:
   (i) Saturation Capacity　　**(ii)** Field Capacity　　**(iii)** Moisture Equivalent
   (iv) Wilting Coefficient　　**(v)** Wilting Range　　**(vi)** Available Water

Q5. Explain in details moisture movement under unsaturated conditions in the soil.

Q6. **(a)** Define the following terms:
   (i) Matric Potential, Ψ_m
   (ii) Gravitational Potential, Ψ_g or Ψ_z
   (iii) Solute Potential, Ψ_s
   (iv) Pressure Potential, Ψ_p

　　(b) State the general water potential formula in both soil and plant systems for:
   (i) Saturated Condition　(ii) Dry Condition.

Q7. **(a)** What is transpiration?
　　(b) What factors influence transpiration?
　　(c) Name the principal methods for the measurement of Evapotranspiration.