UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, MAY 2018

COURSE NO : MN 380
COURSE NAME: **MINE DRAINAGE**
CLASS : MN III TIME: **3 HOURS**

Name**:** _____ Index Number: _____

SECTION A

ANSWER ALL QUESTIONS IN THE ANSWER BOOKLET. 2 marks each.

1. Groundwater in drainage refers to water that …..
   a. is below the ground
   b. flows through the soil
   c. is held by capillarity
   d. evaporates from the ground

2. When artesian conditions exist then
   a. The water comes from an unconfined aquifer forming a fountain
   b. The potentiometric water level is above the ground surface
   c. The groundwater level is found within the aquifer
   d. None of the above

3. In mine drainage, the catchment area of an open pit refers to
   a. The surface area of the pit outline
   b. The area of the pit bottom
   c. The area that directs rain water into the pit
   d. None of the above

4. Water in the unsaturated part of the soil is
   a. Hygroscopic water
   b. Gravitational water
   c. Artesian water
   d. Vadose water

5. When ditches are used for drainage, confined aquifers are best drained by
   a. Ditches at the surface
   b. Ditches filled with bentonite
   c. Ditches across the face
   d. Ditches at the bottom of pit

6. In draining adits water moves by
   a. Pumping with centrifugal pumps
   b. pumping with reciprocating pumps
   c. Pumping with vane pumps
   d. gravity

7. Two similarly sized pumps connected in series will approximately
   a. Double the power
   b. Double the discharge
   c. Double the pressure
   d. Double the efficiency

8.Vertical wells at the surface can drain

a. shallow unconfined aquifers only
c. deep aquifers only
b. confined aquifers only
d. multiple aquifers

9. Bentonite is sometimes used for stopping groundwater flow because of its

a. High porosity
c. High permeability
b. Low porosity
d. Low permeability

10. The operating point of a centrifugal pump is

a. Where the system characteristic intersects the efficiency curve
b. Where the system characteristic is parallel to the pump characteristic
c. Where the pump characteristic intersects the power curve
d. Where the system characteristic intersects the pump characteristic

11. Surface runoff is best prevented from entering the pit by

a. Peripheral wells
b. Ditches at the surface
c. In-pit wells
d. Horizontal drainage holes

12. Cavitation occurs when the vapour pressure is less than the pressure at the centre of the pump

a. True
b. False

13. In a field pumping test, when the steady state has not yet been reached the condition is known as the,

a. Transcient condition
b. Variable flow condition
c. Steady state condition
d. Variable pressure condit

14. The zone of influence is the horizontal distance from a pumping well where

a. The drawdown is at maximum
c. the drawdown is undefined
b. The drawdown equal the diameter of well
d. the drawdown is zero

15. A typical velocity of water flowing in open ditches in adits is……m/s

16. Which of the following pumps is not a positive displacement pump?

a. Reciprocating pump
c. Vane pump
b. Axial flow pump
d. Gear pump

17. Pore water pressure does not depend on the diameter of wells

a. True
b. False

18. The main characteristics of a pump are

a. Volume and density
c. Power and efficiency
b. Velocity and pressure
d. Head and discharge

19. When selecting pumps, the pump should be able to pump out the daily inflow quantity

a. Within 24 hours
b. Within 20 hours
c. Within 18 hours
d. Within a shift

20. In a multistage centrifugal pump,
    a. The there is one impeller operating at variable speeds
    b. Many impellers of different diameters are mounted on the same shaft
    c. Many impellers are mounted separately and connected in series
    d. Many impellers are mounted on the same shaft in the same pump

21. Water flow from reciprocating pumps
    a. Pulsates
    b. Is laminar
    c. Is uniform
    d. None of the above

22. The pressure loss in pipe fittings like valves is
    a. Friction loss
    b. Shock loss
    c. Impact loss
    d. Heat loss

23. Axial flow pumps are generally…….pumps
    a. Low pressure, low discharge
    b. High pressure low discharge
    c. Low pressure, high discharge
    d. High pressure, high discharge

24. A triplex single acting pump has ……. valves

25. A duplex double acting pump has …….. valves

26. A single double acting pump has ……..... valves

27. A duplex single acting pump has ……..….. valves

28. Submersible pumps are the pumps you will find in

a. Peripheral wells
b. Sumps
c. Adits
d. Pit bottoms

29. The calculation of drawdown due to multiple pumping is based on
a. The principle of superposition
b. The principle of superstition
c. T

SECTION B

ANSWER QUESTION 1 AND ANY OTHER ONE.

1. In a pumping test in an unconfined sandy soil, water level in two observation wells sited at 20m and 40m from a pumping well were measured until a steady state was reached. Under that condition, the ground water level originally at 4m from the ground surface, dropped by 3m in the nearer observation well, and 1.5 in the farther one. If the thickness of the sandy soil is 28m, and the pumping rate was 0.20 m^3/sec,
   a. What is the permeability of the sandy soil? **(10 marks)**
   b. How far will the water level be from the ground surface at 30m from the pumping well? **(10 marks)**

2. A triplex double acting reciprocating pump with a stroke of 300mm, diameter of 100mm runs at 120 revolutions per minute. Determine the capacity in m^3/hr. **(10 marks)**

3. Describe how horizontal drains are used in stabilising slopes in open pit mines **(10 marks)**

Examiner: E. M. Buaba