**Section A**

1. The electrical resistivity index ***I*** of an oil reservoir rock sample is known to be related to the water saturation ***Sw*** thus: . Which of the following values of parameter **n** may render the relationship unfit to be defined as a mathematical function?
   1. B. C. D.
2. If the length L (in ft) of iron rods required to fabricate a machine component that must weigh M (in kg) is given thus: . What would be the Domain of the function ?
3. The voltage V (in volts) that results if an alternating current I (in amps) flows through an inductor of inductance L is given thus: . What is the maxima of the function?
   1. B. C. D. volts
4. If the mass Y (in kg) of cement required to make X number of concrete slabs is given by function

; derive the function

* 1. B. C. D.

1. In a crank-connecting rod system, the crank rotates with an angular velocity of . How many revolutions can the system complete in a second?
   1. revs B. revs C. revs D. revs

**Section B**

1. (a) The oscillatory motion of a rotating arm A1 in a machine part has been expressed as .

1. Sketch a neat and well-labelled diagram of the motion. **(1 mark)**
2. What is the maximum vertical distance of the graph from the horizontal axis? **(½ mark)**
3. How long would it take the arm to rotate through one complete revolution? **(½ mark)**

(b) There exists another rotating arm A2 whose oscillatory motion has same amplitude and angular velocity as in the oscillatory motion of A1; but lags behind by time units. Write out the expression of the motion of A2. Sketch a neat and well-labelled graph of this motion. **(3 marks)**