

## National Electrical Engineering Quiz 2010

University College Cork, Waterford Institute of Technology

### Round 1 General Knowledge

- 1) Name the actor who plays the part Edward Cullen in the film "Twilight".
- 2) Name the only country with whom Haiti shares a border .
- 3) Who is the Irish Minister of State for Science, Technology, Innovation and Natural Resources?
- 4) Which Italian rugby team was beaten recently by Munster in the Heineken Cup ?
- 5) Which of the following countries is a member state of the EU ?  
Macedonia , Malta , Moldova , Montenegro
- 6) What is dactylography the study of ?
- 7) Where is the 2010 Winter Olympics about to be held ?
- 8) What do the letters E.N.D. stand for in the title of the Black Eyed Peas Album "The E.N.D." ?

### Round 2 Maths

- 1) The velocity of a body travelling at  $v$  cm/sec along a straight line is proportional to the square of its distance  $s$  from a fixed point  $O$  on the line. If  $v = 2$  when  $s = 10$  find the acceleration when  $s = 20$ .
- 2) What 2 digit number is twice the sum of its digits?
- 3) A cube is painted on all of its sides. It is then divided into  $10 \times 10 \times 10$  equal sized cubes. Determine how many of the smaller cubes are painted on exactly 2 sides.
- 4) Solve for  $x$ , given that the logarithms are real numbers

$$\log_5(x+3) + \log_5(x-1) = 1$$

- 5) In a class test the average score for girls is 91 and the average score for boys is 85. If the class average is 89 what fraction of the class are boys ?
- 6) Evaluate

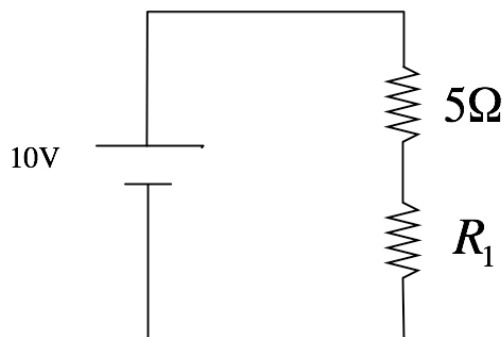
$$\left( \tan\left(\frac{\pi}{2}\right) \right)^{-1}$$

where  $\pi/2$  is in radians.

- 7) The line B contains the points and (6,-2) and (-4,10).  
The line A with equation  $ax + 6y + 21 = 0$  is perpendicular to B.  
Find the value of the real number a.
- 8) There is a pole in a lake. One-half of the pole is in the ground, another one-third of it is covered by water, and 12 ft is out of the water. What is the total length of the pole in ft?

### Round 3 Science and Engineering

- 1) The electrostatic charge of an electron, accurate to 4 significant figures, is  $1.602 \times 10^p$ . What is the value of p?
- 2) When a short circuit replaces  $R_1$  the current drawn from the 10V battery increases by 1.5A. Determine  $R_1$ .



- 3) What company recently released the iPad?
- 4) When Anders Celsius (1701–1744) created the celsius scale, what temperature did he assign to the boiling point of water?
- 5) A particle, a, of mass  $m$  kg is projected vertically upwards with an initial speed of  $v$  m/s. Simultaneously, a particle, b, of mass  $2m$  kg is released from rest at a point 100 m directly above particle a. Deduce  $v$  if the particles collide at a height of 50m. Assume acceleration due to gravity is approximately  $9.8m/s^2$  and neglect air resistance.
- 6) The resistance  $R(t)$  of a light bulb decreases linearly (as it heats up) in the first 2 seconds after it is switched on as follows:  $R(t) = 500\left(1 - \frac{t}{4}\right)\Omega, 0 \leq t \leq 2$ .  
  
How much energy does the light bulb dissipate in the first 2 seconds if it is connected to a 250V (RMS), 50 Hz AC supply?
- 7) What is the name of the mobile phone recently announced by Google?
- 8) Is the moon gradually moving towards, or away from, the Earth?

#### Round 4 Picture Round

1) Who is this?



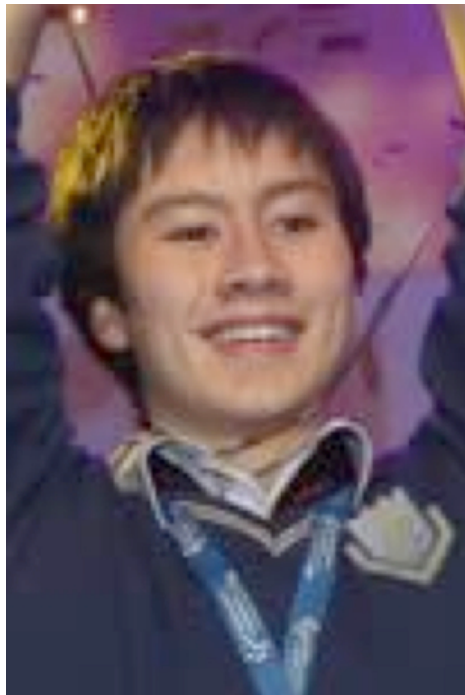
2) Who is this?



3) Who is this?



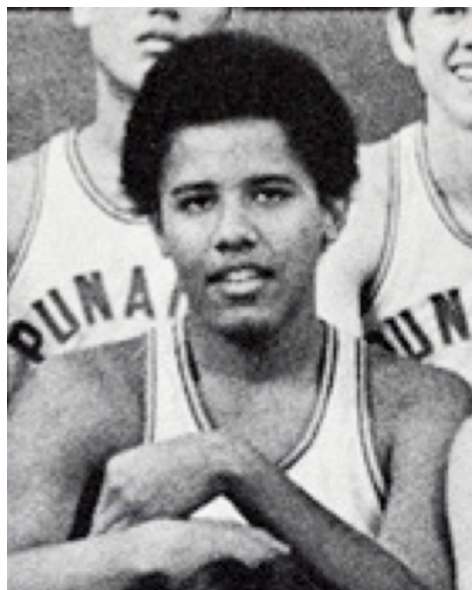
4) Who is this?



5) Who is this?



6) Who is this?



7) Who is this?



8) Who is this?





### Round 5 Maths II

- 1) What is the remainder when  $2^{10}$  is divided by 5?
- 2) A certain street contains 200 houses. If the houses are to be numbered 1 to 200, how many times will the digit 1 appear?
- 3) Cork and Waterford are 70 miles apart. A cyclist travels at 9 miles per hour from Cork to Waterford, while a walker travels at 1 miles per hour from Waterford to Cork. If both set out at the same time, how many miles will the cyclist have to travel before meeting the walker en route?
- 4) The colour of each face of a cube is chosen randomly and independently from the colours Red, Green and Blue. What is the probability that the cube has at least one pair of opposite faces which have the same colour?
- 5) If a person runs up 8 steps of the escalator, it takes them 60.0 seconds to reach the top of the escalator. If they run up 13 steps of the escalator, then it takes them only 47.5 seconds to reach the top. How many seconds would it take to reach the top if they did not run up any steps of the escalator at all?
- 6) On the first day of a chess tournament with 5 players every player plays 2 games. How many games are played that day ?
- 7) A man makes a temporary kennel space for his dog by leaning a rectangular door of dimensions 1.5 metres x 1 metre against a vertical wall at an angle of 60 degrees. Find the area of the floor of the kennel if the side of length 1.5 metres is on the ground..
- 8) Evaluate  $\log_{10}(\sqrt{0.0001})^3$ .

### Round 6 Science and Engineering II

- 1) According to news.softpedia.com on 22/1/2010, what game for mobile phones had been paid for more than 100 million times? Was it  
(a) Tetris (b) Crash Bandicoot (c) Guitar Hero ?
- 2) A light year is approximately



$$9.5 \times 10^9 \text{ km.}$$

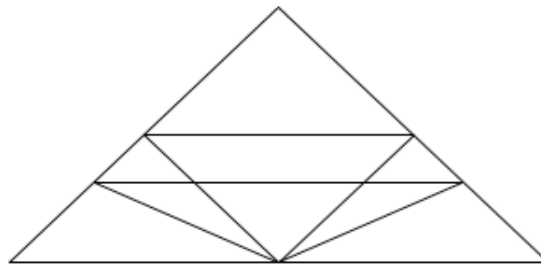
What is the value of q?

- 3) True or False? According to Stephen Hawking, Cosmic Black Holes aren't black, they actually glow?
- 4) In audio visual applications, what is HDMI an abbreviation for?
- 5) What is the decimal equivalent of the binary number  

$$0111\ 1101\ 1010_2$$
- 6) Mechanical energy is the sum of the potential and what other energy?
- 7) All electromagnetic waves originate from what type of accelerating particles?
- 8) Willard Boyle and George Smith were awarded 50% of the 2010 Nobel Prize for Physics . What achievement earned them this prize?

#### Round 7 Maths Pictures

- 1) How many triangles are present in the figure below? Hint : significantly more than 12...



- 2) Evaluate

$$\lim_{x \rightarrow \infty} \left( \frac{\sin\left(\frac{1}{x}\right)}{\sin\left(\frac{1}{x}\right)} \right)$$

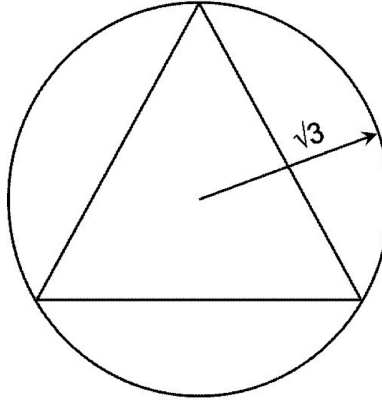
- 3) Evaluate

$$(\sqrt{3} + \sqrt{2})^8 - 98(\sqrt{3} + \sqrt{2})^4 + (\sqrt{3} + \sqrt{2}) + 1$$

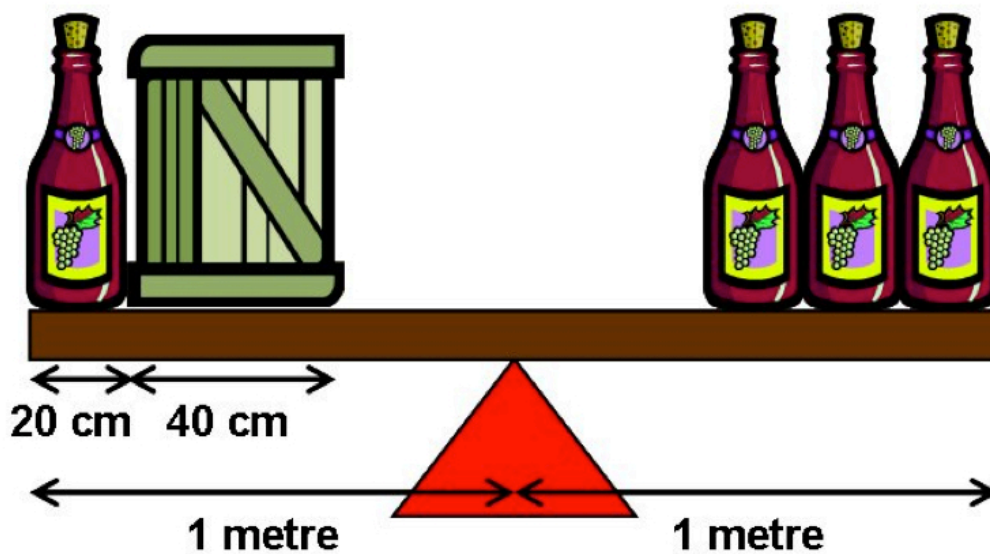
- 4) Evaluate

$$\left( \sqrt[3]{25} \right)^{4.5}$$

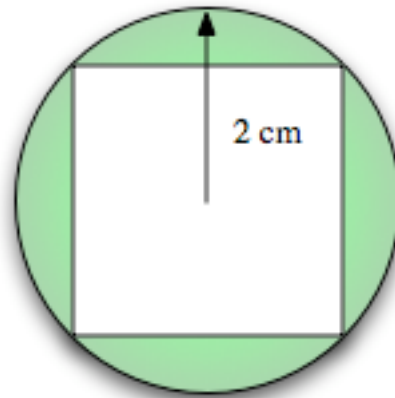
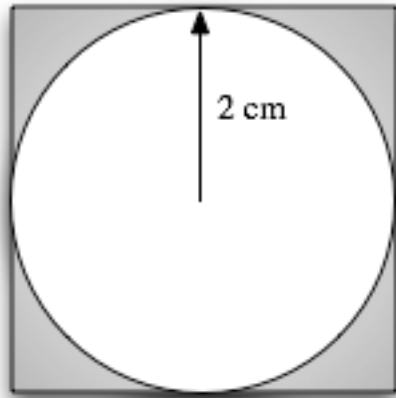
- 5) Find the area of the equilateral triangle inscribed in the circle of radius  $\sqrt{3}$  cm.



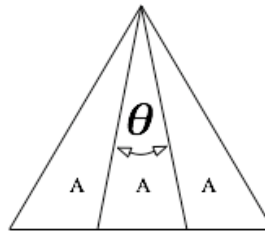
- 6) If the crate weighs 4 kg, how heavy is each identical bottle?



- 7) Calculate the magnitude of the difference in area between the two shaded regions below



- 8) If the equilateral triangle is partitioned into three triangles of area  $A$ , is  $\theta$   
 (a)  $< 20^\circ$  (b)  $= 20^\circ$  (c)  $> 20^\circ$  ?



### Round 8 General Knowledge

- 1) Which Irish actress stars in the film adaptation of "The Lovely Bones" ,due to be released in Ireland on Feb 17<sup>th</sup>.2010
- 2) Who is the European Commissioner for Research, Innovation and Science?
- 3) Where is the seat of the European court of Justice ?
- 4) What is a person suffering from Clinophobia afraid of ?
- 5) Which of the following is not an event in the Olympic sport the decathlon :  
 Shot put      Long Jump      400 m Hurdles
- 6) What is the capital city of Malaysia ?
- 7) Name the actor who is the voice of Buzz Lightyear in the animated film Toy Story
- 8) What club team in Kilkenny does the hurler Henry Shefflin play for?

## Answers

### Round 1 General Knowledge

- 1) Robert Pattinson
- 2) The Dominican Republic
- 3) Conor Lenihan
- 4) Benetton Treviso
- 5) Malta
- 6) Fingerprints
- 7) Vancouver
- 8) Energy Never Dies

### Round 2 Maths

- 1)  $160/25$  or  $6.4$
- 2) 18
- 3) 96
- 4)  $x=2$
- 5)  $1/3$
- 6) 0
- 7) -5
- 8) 72 ft

### Round 3 Science and Engineering

- 1)  $P = -19$
- 2)  $R_1 = 15\Omega$
- 3) Apple
- 4)  $0^\circ\text{C}$
- 5)  $v = 10\sqrt{9.8}\text{m/s}$
- 6)  $500\ln[2]$
- 7) Nexus One
- 8) Away from the Earth (approx. 3.8 cm/year)

### Round 4 Picture Round

- 1) Angelina Jolie
- 2) David Beckham
- 3) Drew Barrymore
- 4) Richard O'Shea
- 5) Cheryl Cole
- 6) Barack Obama
- 7) Kylie Minogue
- 8) Vinnie Jones

### Round 5 Maths II

- 1) 4
- 2) 140
- 3) 63
- 4)  $19/27$
- 5) 80 seconds
- 6) 5
- 7) 0.75 square meters
- 8) -6

### Round 6 Science and Engineering II

- 1) Tetris
- 2)  $q=12$
- 3) True
- 4) High-Definition Multimedia Interface
- 5) 2010
- 6) Kinetic Energy
- 7) Charged particles
- 8) In 1969, they created the first successful CCD (charge-coupled device), popular now in digital cameras...

### Round 7 Maths Pictures

- 1) 18
- 2) 1
- 3)  $\sqrt{3} + \sqrt{2}$
- 4) 125
- 5)  $\frac{9\sqrt{3}}{4}cm^2$
- 6) 2 kg
- 7)  $(8\pi - 24)cm^2$
- 8) (c)  $2\tan^{-1}\left(\frac{1}{3\sqrt{3}}\right) \approx 21.7868^\circ$

### Round 8 General Knowledge

- 1) Saoirse Ronan
- 2) Maire Geoghegan-Quinn
- 3) Luxemburg
- 4) Going to bed

- 5) 400 m Hurdles
- 6) Kuala Lumpur
- 7) Tim Allen
- 8) Ballyhale Shamrocks