Semester 2 Examinations 2010/11

Module Title: Mathematics

Module Code:MATH 6047

School: School of Mechanical and Manufacturing Engineering

Programme Title:
Certificate in Craft Transferable Skills – PP 6

Programme Code: PP 6

External Examiner(s): Dr. P. Kirwan
Internal Examiner(s): Mr. D O'Shea

Instructions: Answer question 1 (worth 40 marks) and 2 other questions (worth 30 marks each)

Duration: 2   Hours

Sitting: Summer 2011

Requirements for this examination: Mathematics Tables and Graph Paper

1. Answer all eight parts: (Each worth 5 marks)

(a) Given the formula $\quad a = \sqrt{\dfrac{x(p+q)}{pq}}$

Evaluate a when $p = 9.25 \times 10^{-2}, q = 0.18 \times 10^{-3}, x = 0.0075 \times 10^{2}$

(b) Frank, John, Marie and Susan are in a Lotto Syndicate and share any winnings in the ratio 5: 7: 8: 10. The Syndicate won the lotto last week and Marie got €1.28 million. How much did the Syndicate win and how much did each of the other three members get?

(c) A rectangle has an area of 90 cm^2 and its width is 4.5 cm shorter than its length. Find the length and width of this rectangle.

(d) Make t the subject of the formula:

$$e = \sqrt{\dfrac{t-k}{k(1+kt)}}$$

(e) Given the following set of numbers: {8, 4, 7, 8, 5, 6, 8, 9, 3, 4, 2, 9, 8, 6, and 3}. Find the mean, the mode and the median.

(f) Calculate the curved surface area of a cone which has a diameter of 16 cm and a perpendicular height of 15 cm.

(g) The price of an item was €317.80 including VAT at 13.5%. What was the price before the Vat was added? By how much would the price increase if the rate of VAT changed to 21%?

(h) Find the area of a triangle which has sides of 21m, 17m and 12m.

2. (a) Find the length of the side x and the size of the angle y in the given triangle.
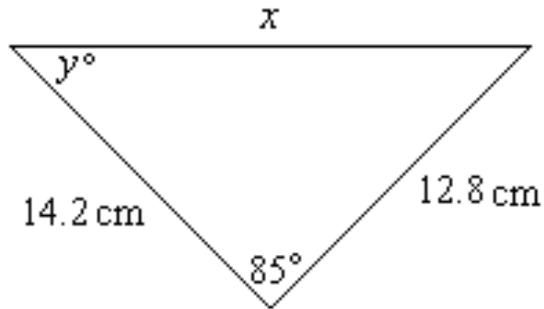
(15 marks)

(b) A solid metal cylinder of diameter 30cm and height 35cm is melted down and recast into a shape comprising of a hemisphere surmounted by a cone. Determine the perpendicular height of the cone, if its diameter is 42cm.

(15 marks)

3. (a) Draw a graph of the function, $y = 2x^2 - 5x + 2$, in the domain $-2 \leq x \leq 3$.
Hence, use this graph to solve the equations:
i $2x^2 - 5x + 2 = 0$
ii $2x^2 - 5x + 2 = 4$

(20 marks)

(b) Five tradesmen and four labourers earn a total of €5,350 per week while eight tradesman and seven labourers earn a total of €8,875 per week. Find earnings for one tradesman and one labourer.

(10 marks)

4. The table below shows the heights of 100 students.

Height (cm)	160 - 165	165 - 170	170 - 175	175 - 180	180 - 185	185 - 190
Number of Students	9	17	23	28	15	8

(i)   Calculate the mean height of the students, correct to one place of decimals. (8 marks)

(ii)   Calculate the standard deviation from the mean. (10 marks)

(iii)   Draw a Histogram to represent this data. (8 marks)

(iv)   Use the Histogram to find the mode. (4 marks)