

Autumn Examinations 2017/18

Module Title: Business Statistics and Maths

Module Code:	MATH6007
School:	Mechanical, Electrical and Process Engineering
Programme Titles:	Bachelor of Science in Automotive Technology and Management
Programmes Codes:	TTMGT_7_Y2
External Examiner(s):	Dr James Cruickshank
Internal Examiner(s):	Mr. Adrian O'Connor
Instructions:	Answer all four questions (each question carries 25 marks) Do not write, draw or underline in RED. Show all calculations and workings in full.
Duration:	2 hours
Sitting:	Autumn 2018

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination. If in doubt please contact an Invigilator.

Question 1

In a division of a large company the annual cost (€000s) of leasing high end company cars for each executive is shown in the table below.

24	32	35	36	41	46	48	51
25	32	36	37	42	47	49	52
28	34	36	37	43	47	49	55
29	35	36	40	45	47	51	64

- (a) Form a frequency distribution table for the data with 5 class intervals of equal width. Then calculate the cumulative frequency distribution. 10 marks
- (b) Calculate the median of the frequency distribution, using an appropriate formula. 5 marks
- (c) Draw an ogive to represent the data. Use the graph paper provided in the centre of the answer book. 5 marks
- (d) Using the ogive, estimate the median and third quartile of the data. 5 marks

Question 2

The table below summarises the car sales per sales person from a nation-wide dealership for a particular month.

Number of Sales			Number of Sales People
0	but less than	20	10
20	but less than	30	16
30	but less than	40	18
40	but less than	50	22
50	but less than	70	12

- (a) Represent the data on a histogram. Use the graph paper provided in the centre of your answer booklet. 5 marks
- (b) Calculate estimates of the mean and standard deviation of this distribution. 10 marks
- (c) Using an appropriate formula estimate the mode of the distribution. 5 marks
- (d) Use the histogram from part (a) to verify your estimate of the mode for part (c). 5 marks

Question 3

- a) Find the APR on the following loan.

€10,000 borrowed for 3 years with one repayment of €11,576.25 at the end of the 3 year period.

5 marks

- b) A long term savings product offers an AER of 4%. An investor wishes to accumulate €20,000 in 15 years, by making equal annual deposits at the beginning of each of the 15 years.

(i) How much must the investor deposit at the beginning of each of the 15 years? 10 marks

(ii) How much will be in the account at the end of the fifth year? 10 marks

Question 4

- a) An unopened packet of adhesive contains 3.5kg of powder. The instructions say that the entire packet should be mixed with 4 litres of water. If a packet has already been opened and some of the adhesive has been used, now 750g of the powder remains.

(i) How much water should be mixed with the remaining adhesive? 4 marks

(ii) If the full packet covers 40 square metres, what is the coverage of the remaining adhesive? 2 marks

- b) A car dealer sells a particular car for €32,000, and his mark-up is 35%.

(i) What was the cost price? 4 marks

(ii) What was the profit? 2 marks

- c) A delivery of home heating oil costs €450 including VAT at 13.5%. Find how much of the price is VAT? 5 marks

- d) The following table shows the annual production for an assembly line for a number of years.

Year	2010	2011	2012	2013	2014	2015
Production Units	76	86	102	95	120	146

(iii) Calculate simple index numbers for the production of the assembly line with 2010 as the base year? 4 marks

(iv) What year saw the largest increase in production? 4 marks

Formulae

Statistics

Mean:

$$\bar{x} = \frac{\sum fx}{\sum f}$$

Standard Deviation:

$$SD = \sqrt{\frac{\sum f(x)^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

Median:

$$Median = L_M + C_M \left(\frac{\frac{1}{2}N - F_{M-1}}{f_M} \right)$$

Mode:

$$Mode = L_M + C_M \left(\frac{d_M - d_{M-1}}{2d_M - (d_{M-1} + d_{M+1})} \right)$$

Annuities

Present value annuity due:

$$\ddot{a}_{\bar{t}|} = \frac{[1 - (1 + i)^{-t}]}{[1 - (1 + i)^{-1}]}$$

Present value annuity:

$$a_{\bar{t}|} = \frac{[1 - (1 + i)^{-t}]}{i}$$

Accumulated value annuity due:

$$\ddot{s}_{\bar{t}|} = \frac{[(1 + i)^t - 1]}{[1 - (1 + i)^{-1}]}$$

Accumulated value annuity

$$s_{\bar{t}|} = \frac{[(1 + i)^t - 1]}{i}$$

Profit Ratios

$$\text{Mark-up} = \frac{\text{Sale Price} - \text{Cost Price}}{\text{Cost Price}}$$

$$\text{Profit Margin} = \frac{\text{Sale Price} - \text{Cost Price}}{\text{Sale Price}}$$