ZIMBABWE

MINISTRY OF HIGHER AND TERTIARY EDUCATION, INNOVATION, SCIENCE AND TECHNOLOGY DEVELOPMENT

HIGHER EDUCATION EXAMINATIONS COUNCIL (HEXCO)

NATIONAL DIPLOMA

IN

BUSINESS MANAGEMENT STUDIES

SUBJECT: Quantitative Techniques PAPER NO: 500/15/S06

DURATION: 3 Hours

MARCH/APRIL 2020 EXAMINATION

REQUIREMENTS

1. Calculator.
2. Formulae list.
3. Graph paper

INSTRUCTIONS TO CANDIDATE

1. Answer ANY FIVE (5) questions.
2. All questions carry equal marks.
3. Use non-programmable calculator

This paper consists of 5 printed pages.

PAPER NO: 500/15/S06 – QUANTITATIVE TECHNIQUES

QUESTION 1

The data below shows the marks obtained by 40 students in a test.

Mark	Frequency	Cf
<20	4	4
20 - < 40	8	12
40 - < 60	22	34
60 - < 80	4	38
80 - < 100	2	40

midpoints mean Cf median

a) Calculate

i) Mean mark (4 marks)

ii) Median mark (4 marks)

iii) Coefficient of variation (5 marks)

iv) Coefficient of skewness and comment (3 marks)

b) Draw a histogram and use it to estimate the modal mark. (4 marks)

QUESTION 2

a) A typist makes on average 2 errors on a page. Find the probability that the typist makes

i) Exactly 3 errors on a page. (2 marks)

ii) At least 1 error on half a page. (3 marks)

b) State any four (4) characteristics of a normal distribution. (4 marks)

c) Given that 2 of every 10 Accountancy students are repeating Quantitative Techniques, find the probability that among 5 randomly selected students.

i) At least 1 student will be repeating Quantitative Techniques. (3 marks)

ii) Between 1 and 4 will not be repeating Quantitative Techniques. (4 marks)

iii) Exactly 3 will be repeating Quantitative Techniques. (4 marks)

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QUESTION 3

The following data give the quantities and costs of materials of a company over two years:

	Quantity (tonnes)		**Cost ($bn)**	
Division	Year 1	Year 2	Year 1	Year 2
A	176	200	154	180
B	38	40	120	150
C	46	50	272	248

a) Calculate Paasche Price Index and interpret it. (5 marks)

b) The manager of division A claims that the price of materials for his division has increased by 20,35%. Is this claim true? Justify. (3 marks)

c) $A = \begin{pmatrix} 2 & 1 & 4 \\ 3 & 5 & 1 \\ 2 & 0 & 6 \end{pmatrix}$

Find:

i) The determinant of matrix A. (4 marks)

(ii) the inverse of A. (8 marks)

QUESTION 4

a) What are the 5 advantages of sampling in data collection? (5 marks)

b) The heights of 10 randomly selected students are given below:

1.63 1.65 1.71 1.92 1.47 1.71 1.75 1.64 1.71 1.64

Calculate a 95% confidence interval for the heights of the students. (8 marks)

c) A sample of medical records was examined and the following results were observed:

	Cause of death	
Smoking status	Tuberculosis	Other
Smokers	20	50
Non-smokers	32	98

Test at 5% level of significance whether there is a relationship between smoking and cause of death. (7 marks)

QUESTION 5

a) State four (4) components of time series. (4 marks)

b) The following data shows the sales of a company over a four year period:

Quarter	2013	2014	2015	2016
1	200	300	350	400
2	350	380	400	500
3	400	450	500	600
4	500	550	650	700

Calculate the 4 point moving average. (12 marks)

c) Differentiate the following:

i) $x^{\frac{1}{2}}$ (2 marks)

ii) $3x^2 + 2x^3$ (2 marks)

QUESTION 6

a) Define the following terms as used in statistics:

i) Population parameter (2 marks)

ii) Statistic (2 marks)

iii) Type II error (2 marks)

iv) Confidence interval (2 marks)

v) Simple random sampling (2 marks)

b) A debt of $60 000 is to be repaid through amortisation over 2 years. The rate of interest is 12% per annum compounded quarterly:

i) Calculate the quarterly payments (3 marks)

ii) Draw up the amortisation schedule (7 marks)

QUESTION 7

a) How long does it take for a sum of money to double itself at a simple interest rate of 25% per annum? (5 marks)

b) What is the annual rate of interest being charged by a bank on a loan of $5 000,00 if $7 093,00 is to be repaid in 3 years time if interest is compounded half yearly? (5 marks)

c) The following table shows the number of chairs made by a certain carpenter. Using the method of least squares estimate the number of chairs he will make on a Sunday.

Day	x	Number of chairs	x^2	y	xy
Monday	1	11	1	121	11
Tuesday	2	13	4	169	26
Wednesday	3	15	9	225	45
Thursday	4	16	16	256	64
Friday	5	20	25	400	100
Saturday	6	24	36	576	144
	21	99	91	1749	390
	7	7			

(10 marks)

15

$y = a + bx$

$b = \frac{n\Sigma xy - \Sigma x \cdot \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$

$= \frac{6(390) - 21(99)}{6(91) - 21^2}$

$= \frac{261}{105}$

$= 2{,}485714286$

$a = \frac{\Sigma y - b\Sigma x}{n}$

$= \frac{99 - 2{,}485714286(21)}{6}$

$7{,}18$

$y = 7{,}18 + 2{,}49x$

$y = 7{,}18 + 2{,}49(7)$

$y = 25{,}2$

$5000 = 7093\left(1 + \frac{i}{2}\right)^{3\times2}$

$5000 = 7093\left(1 + \frac{i}{2}\right)^{6}$

$5000 = 7093(2 + i)^6$

$\frac{5000}{7093} = \frac{7093(2+i)^6}{7093}$

$0{,}147 = 2 + i$

0,147