STRICTLY CONFIDENTIAL

THE PUBLIC ACCOUNTANTS EXAMINATION COUNCIL OF MALAWI

2012 EXAMINATIONS

ACCOUNTING TECHNICIAN PROGRAMME

PAPER TC 3: BUSINESS MATHEMATICS & STATISTICS

(DECEMBER 2012 MAIN)

TIME ALLOWED: 3 HOURS

SUGGESTED SOLUTIONS

SECTION A

ANSWERING ALL QUESTIONS FROM THIS SECTION

1. (a) $401-\left(101^2-99^2\right)=401-\left[(101-99)(101+99)\right]$, **M1**

$=401-2\times200=401-400=1$, **M1, A1**

3 Marks

(b) Given $\log_3 2=0.63093$, then $\log_3 6^{1/3}=\frac{1}{3}\log_3(2\times3)$, **M1**

$=\frac{1}{3}\left[\log_3 2+\log_3 3\right]$, **M1**

$=\frac{1}{3}\left[0.63093+1\right]=0.5436$, **M1, A1**

4 Marks

(TOTAL : 7 MARKS)

2. (a) $\frac{x+3}{5}-\frac{3x}{10}\geq7$

$\left(\frac{x+3}{5}-\frac{3x}{10}\right)\times10\geq7\times10$, **M1**

$2(x+3)-3x\geq70$ i.e. $2x+6-3x\geq70$, **M1**

$-x\geq64,\Rightarrow x\leq-64$, **M1, A1**

4 Marks

(b) (i) Masankho's wages $=12\times K300+9\times K350$, **M1**

$=K6750$, **A1**

2 Marks

(ii) Let x be the number of hours she worked as a waiter. **M1**

Then $350\times15+300x=11250$, **M1**

$300x=11250-5250$, **M1**

$x=6000\div300=20\text{hrs}$, **A1**

4 Marks

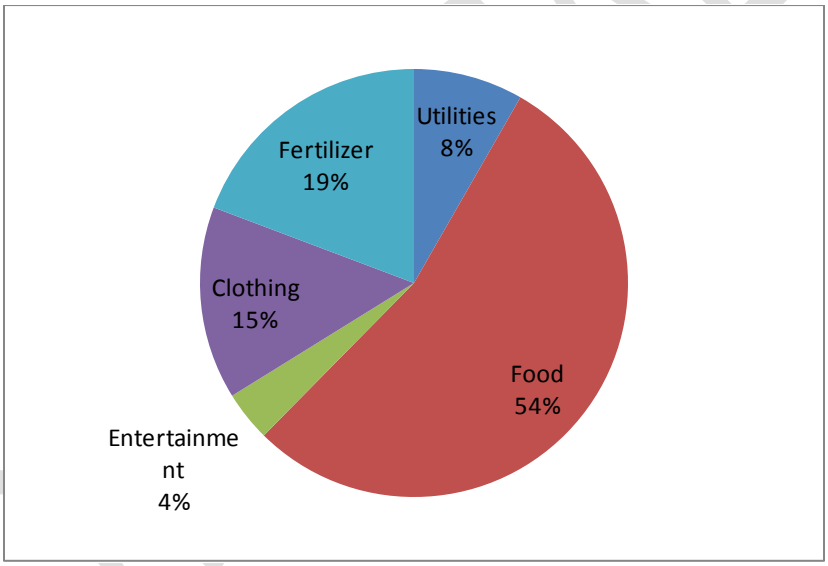
(TOTAL : 10 MARKS)

3. (a) Calculating angles:

	Amount (K)	Degrees
Utilities	4980	30
Food	32500	195
Entertainment	2280	14
Clothing	8760	52
Fertilizer	11580	69
Total	60120	360

M1 **M2**

Pie chart:



Correct labeling and sectors: **A2**

5 Marks

(b) $MN = \begin{pmatrix} 2 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix} \begin{pmatrix} 150 & 120 \\ 120 & 100 \\ 40 & 30 \end{pmatrix} = \begin{pmatrix} 700 & 570 \\ 470 & 380 \end{pmatrix}$, **M1, A2**

Interpretation: Matrix MN represents the cost of producing a bicycle of each model at each of the locations. **A1**

4 Marks

(TOTAL : 9 MARKS)

4. (a) Now $FV = PV(1+r)^n$

$FV = K13{,}000{,}000 \times 2 = K26{,}000{,}000$, PV = K13,000,000 and $r = \frac{15}{100} = 0.15$,

So $26{,}000{,}000 = 13{,}000{,}000(1+0.15)^n$, **M1**

$2 = (1.15)^n$

Taking logs: $\log 2 = \log(1.15)^n$, **M1**

$n \log 1.15 = \log 2$

$n = \frac{\log 2}{\log 1.15} = 4.9595 \approx 5\ yrs$, **M1, A1**

4 Marks

(b) (i) Let x and y be the number of flights on the DC1 and DC2 respectively.

Then $20x + 30y = 1900$, **A1**

$30x + 40y = 2700$, **A1**

2 Marks

(ii) Solving the equations:

$20x + 30y = 1900$ .....(i)

$30x + 40y = 2700$ .....(ii)

$60x + 90y = 5700 \ldots . 3 \times (i)$,

$60x + 80y = 5400 \ldots . 2 \times (ii)$, **M1**

Subtracting: $10y = 300 \Rightarrow y = 30$, **M1**

Substitute into (ii): $20x + 30 \times 30 = 1900$, **M1**

$20x = 1000 \Rightarrow x = 50$, **M1**

i.e. 50 DC1 flights and 30 DC2 flights. **A1**

5 Marks

(iii) Total operational costs =

$50 \times K90{,}000 + 30 \times K110{,}000 = K7{,}800{,}000$, **M1, A1**

2 Marks

(TOTAL : 13 MARKS)

5. (a) 10.5 km uses 1 litre.

Then 525 km would use $\frac{525}{10.5}\times 1 litres = 50\ litres$, (full tank) **M1**

If it had used 1 litre to 12 km, it would cover:

$$\frac{50}{1}\times 12 = 600\,km,$$ **M1, A1**

3 Marks

(b) (i) P(less than K60,000 and owns three televisions sets) =

$$\frac{11+15+80}{1000} = 0.106,$$ **M1, A1**

2 Marks

(ii) P(earns more than K80,000 per month or owning more than three television sets)

= P(> K80000) + P(> 3 TVs) – P(>K80000 and >3 TVs), **M1**

$$= \frac{30+32+28+25+20}{1000} + \frac{0+1+12+21+20}{1000} - \frac{20}{1000},$$ **M1**

$$= = \frac{169}{1000} = 0.169,$$ **A1**

3 Marks

(TOTAL : 8 MARKS)

6. (a) $C = 0.25q + \frac{400}{q} + 4$

Now $\frac{dC}{dq} = \frac{d}{dq}\left[0.25q + 400q^{-1} + 4\right] = 0.25 - 400q^{-2},$ **M1**

$\frac{dC}{dq} = 0 \Rightarrow 0.25 - 400q^{-2} = 0\ ,$ **M1**

i.e. $\frac{400}{q^2} = \frac{1}{4}$ or $q^2 = 1600,$ **M1**

$q = \sqrt{1600} = 40$, disregarding the –ve value **A1**

Interpretation: Gives the production level where production cost is either a maximum or minimum. **A1**

5 Marks

(b) (i) The terms form a Geometric sequence common ratio,
r = (100 – 20)% = 0.8, **M1**

Now nth term is ar^{n-1}, where a = 500. Production is terminated when rate of production < 100.

So need n such that $500\times0.8^{n-1}<100$, **M1**

$$\text{i.e } 0.8^{n-1}<\frac{100}{500}=0.2$$

Applying logs: $(n-1)\log 0.8<\log 0.2$, **M1**

$$n-1>\frac{\log 0.2}{\log 0.8}, \quad \textbf{M1}$$

$$\text{So } n>\frac{\log 0.2}{\log 0.8}+1=8.2126, \quad \textbf{M1, A1}$$

i.e. reduction occurs for eight weeks. **6 Marks**

(ii) Total number of articles made = $\frac{a(r^n-1)}{r-1}=\frac{500(0.8^8-1)}{0.8-1}\approx 2081$,

M1, A1
2 Marks

(TOTAL : 13 MARKS)

SECTION B

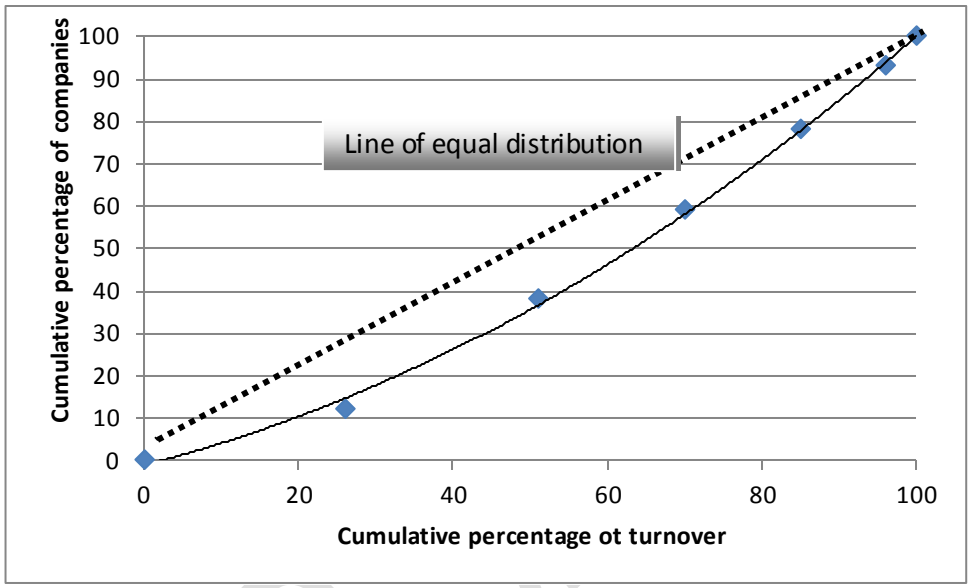
7. (a) Computations:

Turnover (K'000)	**f**	Mid-value (x)	**Total Turnover: fx**	% no. of companies	**No. of cos cum FC**	Total Turnovr %	**Total Turnover Cum %**
0 - 320	52	160	**8320**	26	**26**	12	**12**
320 - 360	50	340	**17000**	25	**51**	25	**38**
360 - 400	38	380	**14440**	19	**70**	21	**59**
400 - 440	30	420	**12600**	15	**85**	19	**78**
440 - 480	22	460	**10120**	11	**96**	15	**93**
480 - 750	8	615	**4920**	4	**100**	7	**100**
	200		**67400**	100		100	
	M1	**M1**	**M1**	**M1**	**M1**	**M1**	

6 Marks

(i) Total annual turnover = $\sum fx = K67{,}400{,}000$, **A1**

(ii) Lorenz curve:



M1 (labeled axes), **M1**(plotting points), **A2** (joining points to obtain curve and line of equality)

4 Marks

(iii) Conclusion: It would be concluded that the distribution of turnover between the 200 companies is not equal. Some companies contribute more to total turnover than others. If the distribution had been equal it would have been the same as the line of equal distribution. **A2**

2 Marks

(b) (i) Payback refers to the time required to recover the initial investment or the initial cash outlay. **A1**

1 Mark

(ii) Advantages – simplest and most straightforward method compared to others. **A1**

Disadvantages – does not take into account time value of money. **A1**

2 Marks

(iv) Payback period

Year	Cash flows	Net Cash Flow (NCF)
0	-1,100,000	-1,100,000
1	300,000	-800,000
2	200,000	-600,000
3	400,000	-200,000
4	350,000	150,000
5	400,000	550,000

M1, **M1**

$$\text{Payback Period} = \left(\begin{array}{c}\text{Last year with a} \\ \text{negative NCF}\end{array}\right) + \left(\frac{\begin{array}{c}\text{Absolute Value of} \\ \text{NCF in that year}\end{array}}{\begin{array}{c}\text{Total Cash Flow} \\ \text{in the following year}\end{array}}\right)$$

= 3+200000/350000 = 3.5711 years (or approx 4 yrs), **M1**,**A1**
4 Marks

Note: Candidates may not use the formula but just use Net cash flows. So payback period would be the year when the NCF become positive, in this case, 4 years.

(TOTAL : 20 MARKS)

8. (a) (i) Internal data sources are sources that provide data from within an organization eg sales vouchers, salary schedules while external data sources are ones that provide data from outside the organization eg internet, public libraries **A4**
4 Marks

(ii) Advantages:

Internal: easily accessible (also less costly)

External: provide a wide range of available data. **A2**
2 Marks

(b) Table for calculations

Actual Sales	rank	Forecast 1	rank	d^2	Forecast 2	rank	d^2
140	3	120	2	1	150	2	1
180	5	240	5	0	180	3.5	2.25
290	7	220	4	9	250	6	1
110	2	250	6	16	130	1	1
570	8	470	8	0	640	8	0
90	1	140	3	4	180	3.5	6.25
220	6	270	7	1	260	7	1
160	4	90	1	9	210	5	1
				40			13.5
	M1		**M1**	**M1, A1**		**M1**	**M1,A1**

(i) Rank correlation between actual sales and forecast 1:

$$r_s = 1 - \frac{6d^2}{n(n^2-1)} = 1 - \frac{6\times 40}{8\times 63} = 0.52,$$ **M1, A1**

6 Marks

(ii) Rank correlation between actual sales and forecast 2:

$$r_s = 1 - \frac{6d^2}{n(n^2-1)} = 1 - \frac{6\times 13.5}{8\times 63} = 0.84,$$ **M2, A1**

6 Marks

(iii) Would recommend Method 2 since there is a greater degree of association between forecast values and actual sales. **A2**

2 Marks

(TOTAL : 20 MARKS)

9. (a) Preference for telephone interviews:

(i) It allows quicker contact with geographically dispersed respondents

(ii) Interviewer probing is possible, **A2**

Non-preference for telephone interviews:

(i) Respondent anonymity is lost

(ii) Non-verbal responses cannot be observed, **A2**

4 Marks

(b) (i) Administrative section – this is where the respondent is identified, if not anonymous, by name, contact details and where the interview was conducted. The section is used for checkbacks to confirm the validity of recorded data. **A2**

2 Marks

(ii) Demographic section – provides information about the respondent such as age, gender, marital status, qualifications; for companies: company size, sector etc. This helps classify the research data into segments for ease of interpretation. **A2**

2 Marks

(iii) Information section – This consist of all the questions that will solicit responses that will address the research objective. The section may be subdivided into categories dealing with different aspects of the study. **A2**

2 Marks

(c) (i) Two charts:

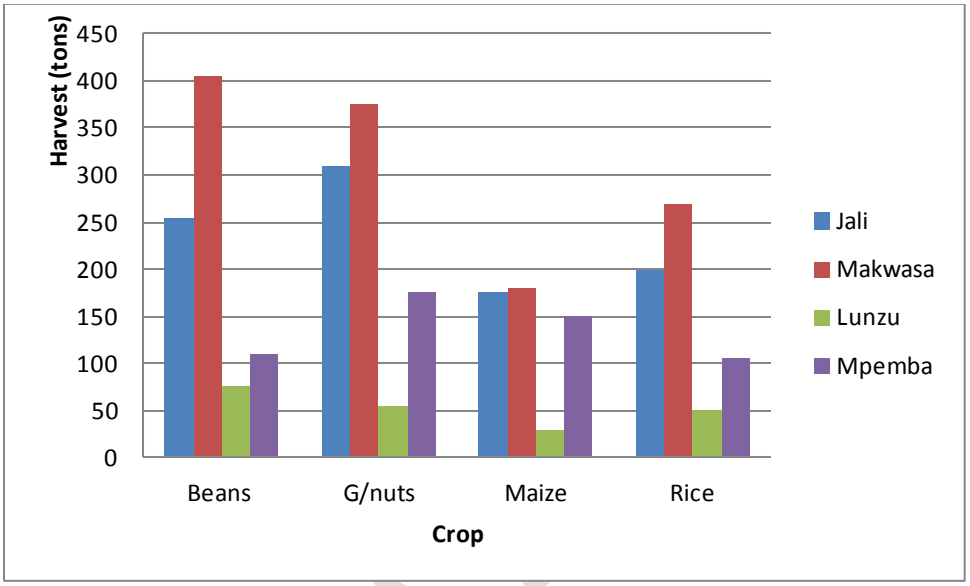
(I) Component bar chart – For this is discrete data, it may be important to compare total crop harvest at each of the farms or total harvest for each crop. **A2**

2 Marks

(II) Multiple bar chart – For this discrete data, multiple bar charts would be useful in making comparisons between harvests at the different farms and between crops. **A2**

2 Marks

(ii) Multiple bar chart



M1 (Labeled axes), **M1** (Key), **A4** (Correct bars for each crop type)
6 Marks
(TOTAL : 20 MARKS)

E N D