MAY 2017 PROFESSIONAL EXAMINATIONS
QUANTITATIVE TOOLS IN BUSINESS(PAPER 1.4)
CHIEF EXAMINER'S REPORT, QUESTIONS & MARKING SCHEME

EXAMINER'S GENERAL COMMENTS

The Quantitative Tools in Business, Paper 1.4, which was written in May adequately cover the Level One Syllabus and the ICAG Manual.

STADARD OF PAPER

The standard of the Paper was a little lower than previous Papers (November 2016, May 2016, November 2015, May 2015) but it is similar in format and style to the aforementioned Papers. The questions were evenly spread over the topics in the syllabus The marking scheme was well-drawn; every sub-question had marks duly allocated and the marks were adequate for each question (i.e. it followed the weighting in the revised syllabus. The marking scheme was straightforward and candidates were rewarded for any meaningful effort.

GENERAL PERFORMANCE OF CANDIDATES

The general performance of candidates can be described as above average. Majority of the candidates who wrote the paper at centres across the country performed averagely well with many scoring above 40%. Many of the above average performers recorded are found in Accra, Kumasi, Wa and Cape Coast. Indeed, the best two candidates who were from the Wa centre scored 92% and 93% respectively. Few candidates scored below 11%. There was no traceable copying by candidates except that some candidates did not number their answers very well, which made some examiners go through some difficulties trying to separate answered questions for marking and scoring.

Few candidates also wasted their limited time trying to solve all seven questions instead of the recommended five and ended up scoring very high marks on few questions and almost nothing on some questions. Per the scripts submitted for marking this year's May Examination diet, one would conclude that candidates' preparation for the paper was very good and this has reflected in the general performance. In fact, few candidates scored 20/20 on as many as three questions in this diet.

NOTABLE STREGTHS & WEAKNESS

Candidates' notable strengths in the performance were on Calculus (QUESTION THREE), Statistics (QUESTION FIVE), Probability (QUESTION SIX) and Regression & Correlation analysis (QUESTION SEVEN). Majority of the candidates could easily form a frequency table and do simple calculation of the summary statistics (mean, median, mode, standard deviation, quartile deviation) and use the calculator very well in the QUESTIONS, FIVE & SEVEN. They could also display points very well on

graph papers. These strengths were demonstrated mostly by candidates who took their papers in Accra, Kumasi, Cape Coast and Wa. This might be due to the availability of teaching and learning materials in these centers, as well as qualified instructors for teaching the quantitative tools in business. The less patronized questions were QUESTIONS, TWO & ONE. I suggest ICAG should encourage the teaching of these topics in all the regional capitals .

Candidates' main weaknesses were; lack of basic knowledge of algebra (factorization, simplification etc.) and inadequate preparation by some candidates for the exams. This is reflected in their inability to solve simple quadratic equations for the breakeven point and the points where profits are recorded. Many candidates could not interpret figures after they had calculated them. This weakness was widespread and included candidates from even the four high performing centers. ICAG should encourage instructors to go beyond teaching students how to compute and help students learn how to interpret figures.

QUESTION ONE

a) Given the cost function $C(x) = 4x^2 - 2x + 3$,

Required:

i) Evaluate $C(+2)$, **(2.5 marks)**

ii) Evaluate $C(-2)$. **(2.5 marks)**

b) Evaluate each of the following for the given value:

i) $2x^{\frac{1}{2}}$ for $x = -8$, **(2.5 marks)**

ii) $-5x^{-\frac{1}{2}}$ for $x = 9$. **(2.5 marks)**

c) A paper producing company has determined that its profit from selling x hundred boxes of envelopes is given by the expression

$$P(x) = -5x^2 + 55x - 50, \quad 0 \le x < 10.$$

Required:

i) Determine the number of boxes the company must sell to break even. **(5 marks)**

ii) Determine the number of boxes the company must sell to make money. **(5 marks)**

(Total: 20 marks)

QUESTION TWO

a) Calculate the accumulated amount if GH¢2500.00 were invested at 18% compound interest for a period of six years. **(6 marks)**

b) A model for calculating an amount required, A_0 to achieve a specified sum at some future point in time, n years at rate of interest in percentage point r is given by

$$A_0 = \frac{A_n}{\left(1 + \frac{r}{100}\right)^n}.$$

Required:

Determine the most preferred business opportunity if

i) GH¢7000.00 is paid in 4 years' time. **(7 marks)**

ii) GH¢8000.00 is paid in 6 years' time. **(7 marks)**

You are required to discount these future sums by using the interest rate of 8%.

(Total: 20 marks)

QUESTION THREE

a) The AXM manufacturing company has determined that the cost function for producing a particular type of pavement block is given by:

$$C(x) = 80 + 600x^{\frac{2}{3}},$$

where x is measured in number of units and $C(x)$ in GH¢.

Required:

i) Calculate the derivative of $C(x)$ with respect to x. **(5 marks)**

ii) Determine how quickly the cost is changing at $x = 1000$. **(4 marks)**

b) At the Zee manufacturing company, the marginal cost for producing x gears, measured in hundreds is

$$MC = 10 + 0.1x.$$

If the fixed cost (the cost of producing zero items) is GH¢3000.

Required:

Determine the cost for manufacturing 5000 gears. **(11 marks)**

(Total: 20 marks)

QUESTION FOUR

a) A particular linear programming problem is formulated as follows:

$$Minimize \quad z = 2500x + 3500y$$

Subject to constraint

$$5x + 6y \geq 250$$
$$4x + 3y \geq 150$$
$$x + 2y \geq 70$$

Required:

i) Draw these constraints on the same graph paper. **(6 marks)**

ii) Determine the optimum solution. **(6 marks)**

b) Managers within a subsidiary company in a conglomerate want to know how to maximize the profit from two types of products X and Y. Each product X requires one hour of labour and six litres of molding material, whereas each product Y requires two hours of labour and five litres of molding material. The total labour hours available for each week is 40 and the total amount of molding material each week is 150. The profit contribution from product X is GH¢20 and from product Y is GH¢ 30.

Required:

Formulate, the linear programming model for the problem. **(8 marks)**

(Total: 20 marks)

QUESTION FIVE

The mileages recorded for a sample of company vehicles during a given week gave the following data:

138	164	150	132	144	125	149	157
146	158	140	147	136	148	152	144
168	126	138	176	163	119	154	165
146	173	142	147	135	153	140	135
161	145	135	142	150	156	145	128

Required:

a) Draw the frequency table of this data given a class size of 5. **(6 marks)**

b) Determine mean, median and mode for the data and comment on the distribution of data. **(6 marks)**

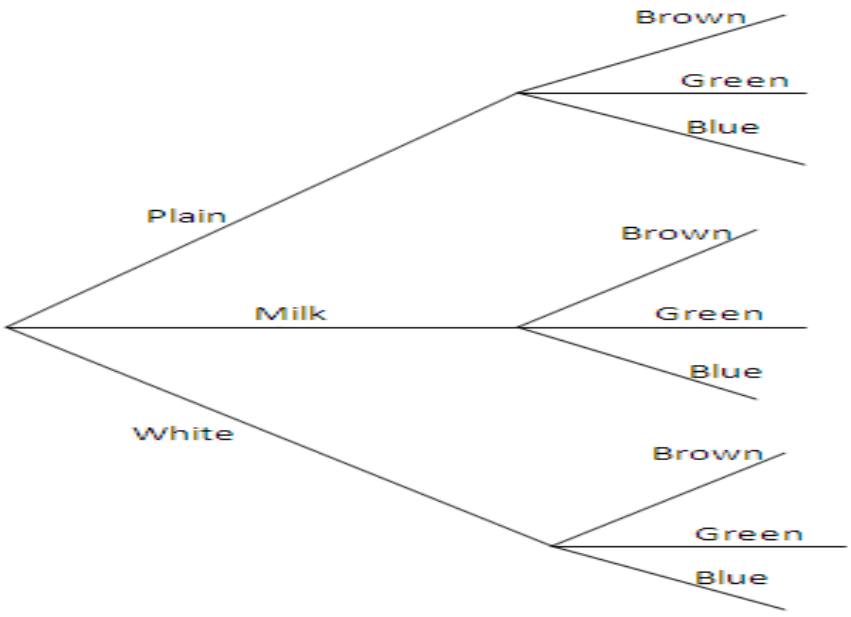
c) Compute the quartile deviation. **(4 marks)**

d) Determine the standard deviation for the data. **(4 marks)**

(Total: 20 marks)

QUESTION SIX

a) Consider people's preferences in terms of chocolate and their eye colour, presented as probability tree diagram below:



If 30% of people have brown eyes, 40% have green eyes and the remaining people have blue eyes, and it is found that 70% prefer milk chocolate , 10% prefer white chocolate and the remaining prefer plain chocolate, using the tree diagram above

Required:

Calculate the probabilty that a person

i) P (Prefer plain Chocolate and has Brown Eyes) **(1.5 marks)**
ii) P (Prefer milk Chocolate and has Brown Eyes) **(1.5 marks)**
iii) P (Prefer white Chocolate and has Brown Eyes) **(1.5 marks)**
iv) P (Prefer plain Chocolate and has Green Eyes) **(1.5 marks)**
v) P (Prefer milk Chocolate and has Green Eyes) **(1.5 marks)**
vi) P (Prefer white Chocolate and has Green Eyes) **(1.5 marks)**
vii) P (Prefer plain Chocolate and has Blue Eyes) **(1.5 marks)**
viii) P (Prefer milk Chocolate and has Blue Eyes) **(1.5 marks)**
ix) P (Prefer white Chocolate and has Blue Eyes) **(1.5 marks)**

b) If three fair coins are tossed,

Required:

Determine, the probabilities of

i) getting two heads and a tail **(3.5 marks)**
ii) getting three tails **(3.0 marks)**

(Total: 20 marks)

QUESTION SEVEN

The following data gives how much 10 students of ICAG spend on TroTro to the Institute and food weekly .

Food (x) GH¢	10	12	14	16	18	20	22	24	26	28
TroTro (y) GH¢	25	24	22	20	19	17	13	12	11	10

Required:

a) Using a graph paper, construct a scatter diagram of the data. **(4 marks)**
b) Determine, the correlation coeficient. **(4 marks)**
c) Calculate, the coefficient of determination of the data and interpret its value. **(4 marks)**
d) Determine the regression line of y on x, and interpret the coefficient. **(8 marks)**

(Total: 20 marks)

MARKING SCHEME
QUESTION ONE

(a) *Given* $c(x) = 4x^2 - 2x + 3$

(i) $c(+2) = 4(2)^2 - 2(2) + 3$ $\left(M1\frac{1}{2}\right)$

$= 16 - 4 + 3$

$= 15$ $(A1)$

(ii) $c(-2) = 4(-2)^2 - 2(-2) + 3$ $\left(M1\,{}^{1}\!/_{2}\right)$

$= 16 + 4 + 3$

$= 23$ $(A1)$

(b) (i) $2x^{1/2}$ for x = -8

$2(-8)^{1/2} = 2 \times (-2)^{1/2} \times (4)^{1/2}$ $(M2)$

$= 2 \times (-2)^{1/2} \times 2$

$= 4 \times (-2)^{1/2}$

$= \left(4\sqrt{2}\right) \times (-1)^{1/2}$ $\left(A\,{}^{1}\!/_{2}\right)$

(ii) $-5x^{-1/2}$ for x = 9

$-5x^{-1/2} = -5(9)^{-1/2}$ $\left(M\,{}^{1}\!/_{2}\right)$

$= -5 \times \left(3^2\right)^{-1/2}$

$= -5 \times 3^{2 \times -1/2}$

$= -5 \times 3^{-1}$

$= {}^{-5}\!/_{3} \quad = -1\,{}^{2}\!/_{3}$ $(A1)$

(c) $P(x) = -5x^2 + 55x - 50 \qquad 0 \le x < 10$

$\frac{dP}{dx} = -10x + 55$

(i) At break even point $P(x) = 0$ $(B1)$

$\Rightarrow -5x^2 + 55x - 50 = 0$

$x^2 - 11x + 10 = 0$

$x^2 - 10x - x + 10 = 0$

$(x^2 - 10x) - (x - 10) = 0$

$x(x - 10) - (x - 10) = 0$

$(x - 1)(x - 10) = 0 \qquad (M2)$

$\Rightarrow \quad x = 1 \quad (A\frac{1}{2}), \quad x = 10 \quad (A\frac{1}{2})$

As x satisfy $0 \le x < 10$, we have $x = 1$ as the number of boxes the company must sell to break even $(B1)$

(ii) the company will make money on the sell of x which will make $P(x) > 0$

$\Rightarrow -5x^2 + 55x - 50 < 0$

$\Rightarrow$ the company will make money on the sell of x satisfy $1 < x < 10 \qquad (B4)$

Note

$\left\{\begin{matrix} B2 \ for \ x > 1 \\ B2 \ for \ x < 10 \end{matrix}\right\}$

(Total: 20 marks)

EXAMINER'S COMMENTS

It was a less popular choice among candidates after QUESTION TWO and some candidates who answered it scored extremely low marks (i.e. 0/20,2/20, 3/20). Only a handful of candidates could do a simple substitution of numbers into the function. Sub-section (c) (i)& (ii) were challenging to many candidates. Candidates differentiated the profit function to find the number of boxes to break even in (i) and make profit in (ii). Please refer to the marking scheme for the best approach to answer it. The highest mark in this question was 19.

QUESTION TWO

(a) *Accumulated Amount* $= 2500(1+0.18)^6 \quad (M1)$

$= 2500(1.18)^6 \quad (M2)$

$= \text{GHS } 6748.89 \quad (A3)$

(b)

$(i)\ A_0 = \dfrac{7000}{(1+0.08)^4} \quad (M2)$

$= \text{GHS } 5145.21 \quad (A1)$

$(ii)\ A_0 = \dfrac{8000}{(1+0.08)^6} \quad (M2)$

$= \text{GHS } 5041.38 \quad (A1)$

profit for $(i) = 7000.00 - 5145.21 \quad (M1)$

$= \text{GHS } 1854.79 \quad (A1)$

profit for $(ii) = 8000.00 - 5041.38$

$= \text{GHS } 2958.62 \quad (A1)$

The most preferred business opportunity is '8000' paid in 6 years $(B1)$

(Total: 20 marks)

EXAMINER'S COMMENTS

This question was also a less popular choice among candidates, and those who answered it did not perform well. The average mark hovered around the figure 10/20, with few candidates scoring 20/20. Candidates who attempted this question could not use the discount formulae given, and those who could compute the discounted values could not use it to find the most preferred business opportunity. Please refer to the marking scheme for the correct solution to this question.

QUESTION THREE

$(a)\ c(x) = 80 + 600x^{2/3}$

$(i)\quad \dfrac{d\,c(x)}{dx} = 600 \times \tfrac{2}{3}\, x^{-1/3} \qquad (M2)$

$= \dfrac{400}{x^{1/3}} \qquad (A2)$

(ii) At $x = 1000$ the cost will change by $\dfrac{400}{(1000)^{2/3}} \qquad (M2)$

$= \dfrac{400}{10} = 40 \qquad (A1)$

$(b)\quad MC = 10 + 0.1x$

$Cost = \int MC\, dx \qquad (M1)$

$= \int (10 + 0.1x)\, dx$

$Cost = 10x + \dfrac{0.1}{2}x^2 + A \qquad (B3)$

$If\ x = 0,\ Cost = 3000$

$3000 = Cost = 10(0) + 0.05(0)^2 + A \qquad (M1)$

$= \qquad A = 3000 \qquad (A2)$

$Cost = 10x + 0.05x^2 + 3000 \qquad (B1)$

when $x = 5000$

$Cost = 10(5000) + 0.05(5000)^2 + 3000 \qquad (M1)$

$= 50,000 + 1,250,000 + 3000$

$= \text{GHS}\,1303,000.00 \qquad (A2)$

(Total: 20 marks)

EXAMINER'S COMMENTS

Interestingly, Question Three was the third unpopular question among candidates after Questions one & two and with a dozen or more candidates obtaining above 18/20. However, few candidates could manage 10 marks and above. The concept of integration is a bit of a challenge to many candidates and this was indicated by answers provided for subsection (b) of the question. Please refer to the marking scheme for the correct solution to this question.

QUESTION FOUR

$a(i)$

$5x + 6y \geq 250$

$5x + 6y = 250$ $(B1)$

X	0	50
Y	41.67	0

$4x + 3y \geq 150$

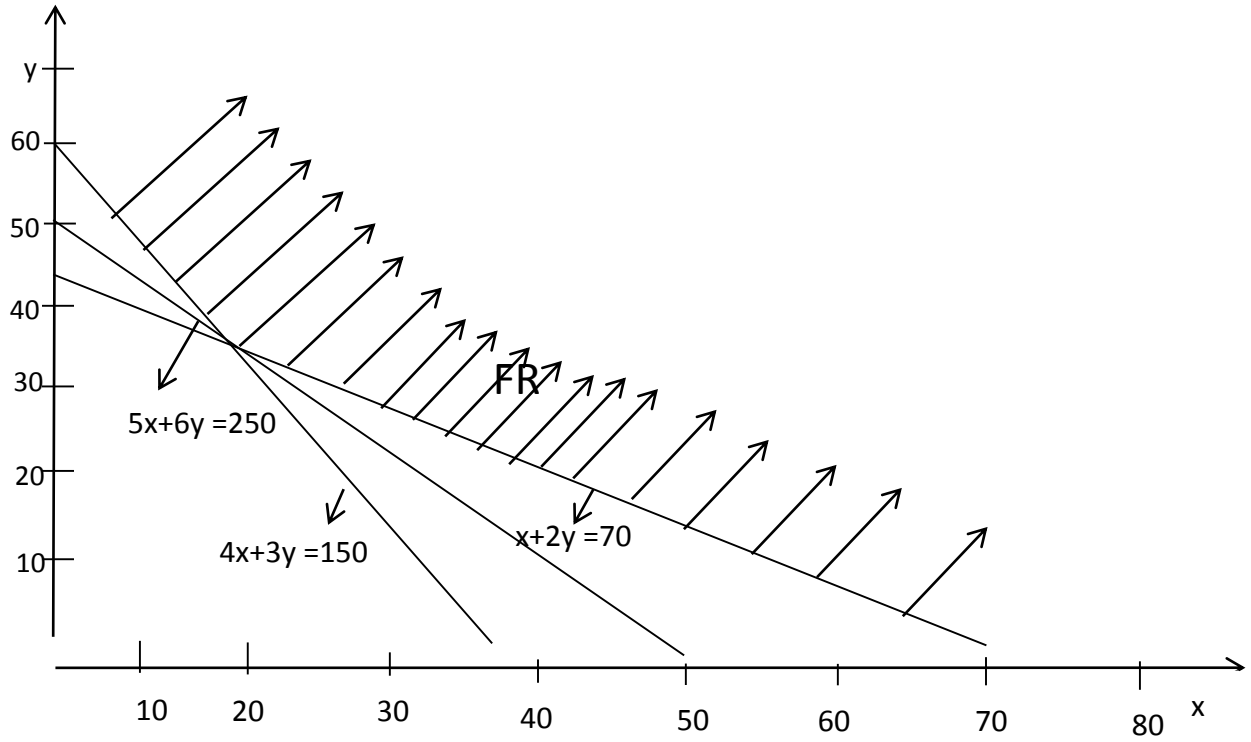
$4x + 3y = 150$ $(B1)$

X	0	37.5
Y	50	0

$x + 2y \geq 70$

$x + 2y = 70$ $(B1)$

X	0	70
Y	35	0



$(B6)$

$A(0,50)\quad B\begin{Bmatrix}4x+3y=150\\5x+6y=250\end{Bmatrix}\ x=16.67,\ y=27.78$

$C\begin{Bmatrix}5x+6y=250\\x+2y=70\end{Bmatrix}\quad x=20,\ y=25\qquad D(70,0)$

Corner Points	Objective $2500x+3500y$	Cost GHS
$A(0,50)$	$2500(0)+3500(50)\qquad \left(M\ 1/2\right)$	$175{,}000\ \left(A\ 1/2\right)$
$B(16.67,27.78)$	$2500(16.67)+3500(27.78)\ \left(M\ 1/2\right)$	$138905\left(A\ 1/2\right)$
$C(20,25)$	$2500(20)+3500(25)\ \left(M\ 1/2\right)$	$137500\left(A\ 1/2\right)$
$D(70,0)$	$2500(70)+3500(0)\ \left(M\ 1/2\right)$	$175{,}000\left(A\ 1/2\right)$

The optimum production mix is

$x = 20 \quad (B1)$

$y = 25 \quad (B1)$

The least Cost is attained at C

Summary of the question

	X	Y	Total
Labour	1	2	40
Mold Material	6	5	150
Profit	20	30	1

Problem Formulation

The Objective Function

The objective is to maximize profit contribution given by $C = 20x + 30y \quad (B2)$

Subject to the following constraints

Labour constaints (LC)

$x + 2y \leq 40 \quad (B2)$

Material Constraint (MC)

$6x + 5y \leq 150 \quad (B2)$

Non-Negative Constraint (NNC)

$x \geq 0 \ (B1)$, $y \geq 0 \ (B1)$

(Total: 20 marks)

EXAMINER'S COMMENTS

Interestingly, Question Four was the fourth unpopular question among candidates after Questions One, Two & Three. About half a dozen or more candidates scored above 15/20 with some of the candidates obtaining 20/20. Please refer to the marking scheme for the correct solution to this question.

QUESTION FIVE

Class limit	Class boundaries	Tally	Frequency	Midpoint (x)	$f_i x_i$	fx^2
119 - 123	118.5-123.5		1	121	121	14641
124 - 128	123.5-128.5		3	126	378	47628
129 - 133	128.5-133.5		1	131	131	17161
134 - 138	133.5-138.5		6	136	816	110976
139 - 143	138.5-143.5		4	141	564	79524
144 - 148	143.5-148.5		9	146	1314	191844
149 - 153	148.5-153.5		5	151	755	114005
154 - 158	153.5-158.5		4	156	624	97344
159 - 163	158.5-163.5		2	161	322	51842
164 - 168	163.5-168.5		3	166	498	82668
169 - 173	168.5-173.5		1	171	171	29241
174 - 178	173.5-178.5		1	176	176	30976

(B2)			$\sum f = 40$		$\sum fx = 5870$	$\sum fx^2 = 867850$

(B1) for any 3 correct

(B4) for any 6 correct or (B2) for otherwise

$$Mean = \frac{\sum fx}{\sum f} = \frac{5870}{40} \quad \left(M\ 1/2\right)$$

$$= 146.75 \quad \left(A\ 1/2\right)$$

$$Median = location = 1/2 \times \sum fx = 1/2 \times 40 = 20th$$

$$= L_1 + c\left(\frac{1/2 \sum f - CF}{f}\right)$$

$$= 143.5 + 5\left(\frac{20-15}{9}\right) \qquad (M1)$$

$$= 144.5 + 2.78$$

$$= 146.28 \qquad \left(A\ 1/2\right)$$

$$Mode = Median < Mean$$

The data is positively skewed. (B1)

c)

$$Quantile\ deviation = Q_3 - Q_1$$

$$Q_1 = \frac{1}{4} \times \sum f = 1/4 \times 40 = 10th$$

$$Q_1 = L_1 + c\left(\frac{1/4 \sum f - CF}{f}\right) \qquad (M1)$$

$$= 133.5 + 4.167$$

$$= 137.67 \qquad \left(A\ 1/2\right)$$

$$Q_3 = \tfrac{3}{4} \times 40 = 30th$$

$$Q_3 = L_1 + c\left(\frac{\tfrac{3}{4}\sum f - CF}{f}\right)$$

$$= 158.5 + 5\left(\frac{30-29}{2}\right) \qquad (M1)$$

$$= 158.5 + 2.5$$

$$= 161 \qquad \left(A\tfrac{1}{2}\right)$$

$$Quantile\ deviation = Q_3 - Q_1$$

$$= 161 - 137.7$$

$$= 23.3 \qquad (B1)$$

Standard deviation

$$Std.deviation(s) = \sqrt{\frac{\sum fx^2 - \left(\frac{\sum fx}{n}\right)^2}{n-1}}$$

$$= \sqrt{\frac{867850 - \left(\frac{5870}{12}\right)^2}{40-1}} \qquad (M2)$$

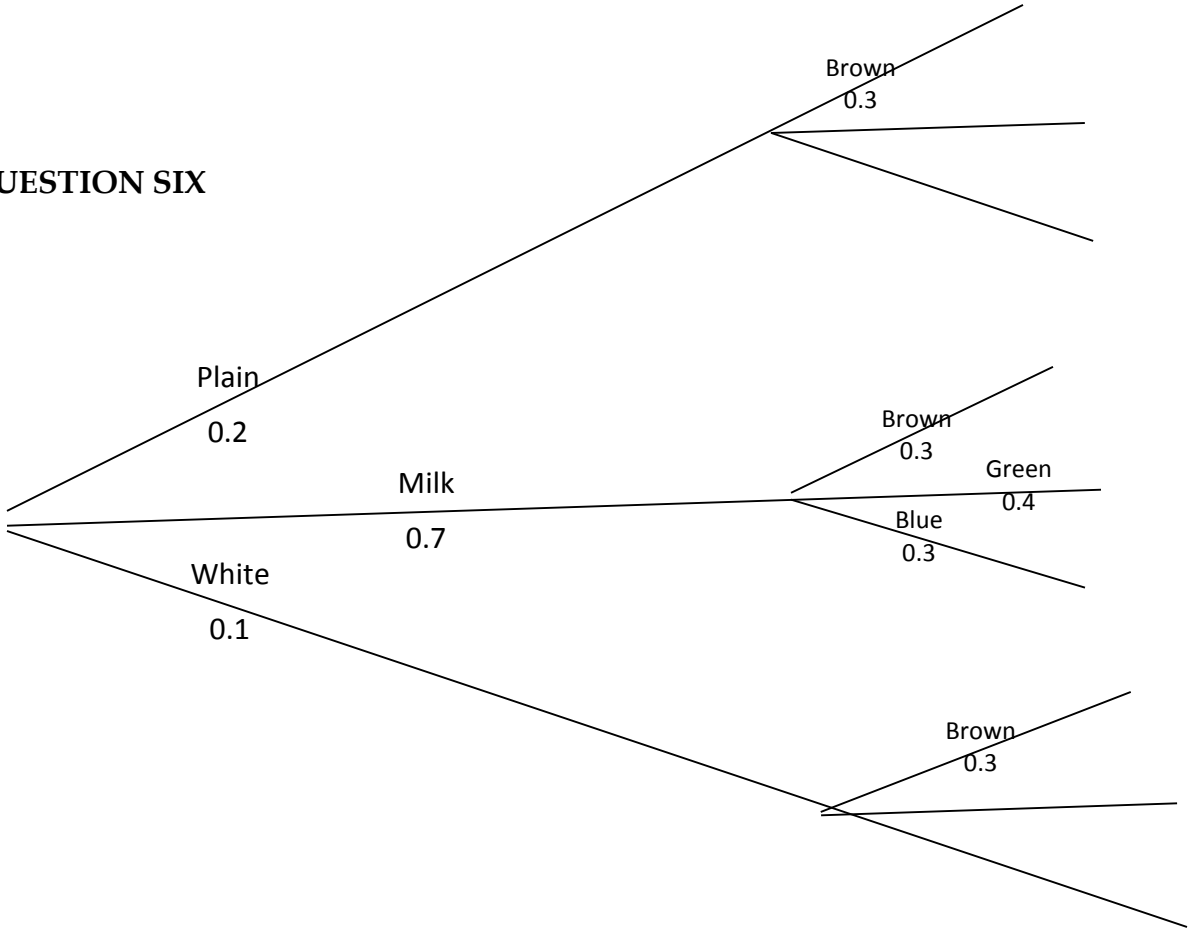
$$= 12.84 \qquad (A1)$$

(Total: 20 marks)

EXAMINER'S COMMENTS

This question was the most popular question among candidates. Candidates were well-prepared for Statistics questions. However, many candidates could not form the class interval with a class size of 5. Candidates who could form the class interval were able to calculate the summary measures easily. The only limitation identified is found in subsection (b) where candidates could not give a good interpretation of their figures. However, there were very good answers from candidates from the high performing centers with some scoring 20/20.

QUESTION SIX



$(i)\ P(Plain\ and\ Brown\ Eyes) = 0.2 \times 0.3 \quad (M1)$

$= 0.06 \quad \left(A\frac{1}{2}\right)$

$(ii)\ P(milk\ and\ Brown\ Eyes) = 0.7 \times 0.3 \quad (M1)$

$= 0.21 \quad \left(A\frac{1}{2}\right)$

$(iii)\ P(white\ and\ Brown\ Eyes) = 0.1 \times 0.3 \ (M1)$

$= 0.03 \ \left(A\frac{1}{2}\right)$

$(iv)\ P(Plain\ and\ Green\ Eyes) = 0.2 \times 0.4 \quad (M1)$

$= 0.08 \quad \left(A\frac{1}{2}\right)$

$(v)\ P(milk\ and\ Green\ Eyes) = 0.7 \times 0.4 \quad (M1)$

$= 0.28 \quad \left(A\frac{1}{2}\right)$

$(vi)\ P(\textit{white and Green Eyes}) = 0.1 \times 0.4 \quad (M1)$

$= 0.04 \qquad \left(A\frac{1}{2}\right)$

$(vii)\ P(\textit{Plain and Blue Eyes}) = 0.2 \times 0.3 \quad (M1)$

$= 0.06 \quad \left(A\frac{1}{2}\right)$

$(viii)\ P(\textit{Milk and Blue Eyes}) = 0.7 \times 0.3 \quad (M1)$

$= 0.21 \quad \left(A\frac{1}{2}\right)$

$(ix)\ P(\textit{White and Blue Eyes}) = 0.1 \times 0.3 \quad (M1)$

$= 0.03 \quad \left(A\frac{1}{2}\right)$

b)

$(i)\ P(2\ \textit{heads and a tail})$

$$= \binom{3}{2}\left(\frac{1}{2}\right)^2 \times \left(\frac{1}{2}\right) \qquad (M3)$$

$$= \frac{3 \times 2 \times 1}{1 \times 2}\left(\frac{1}{2}\right)^3$$

$$= \frac{3}{8} \quad \left(A\frac{1}{2}\right)$$

$(ii)\ P(3\ \textit{heads}\ ) = \binom{3}{3}\left(\frac{1}{2}\right)^3\left(\frac{1}{2}\right)^0 \quad (M2)$

$$= \frac{1}{8} \quad (A1)$$

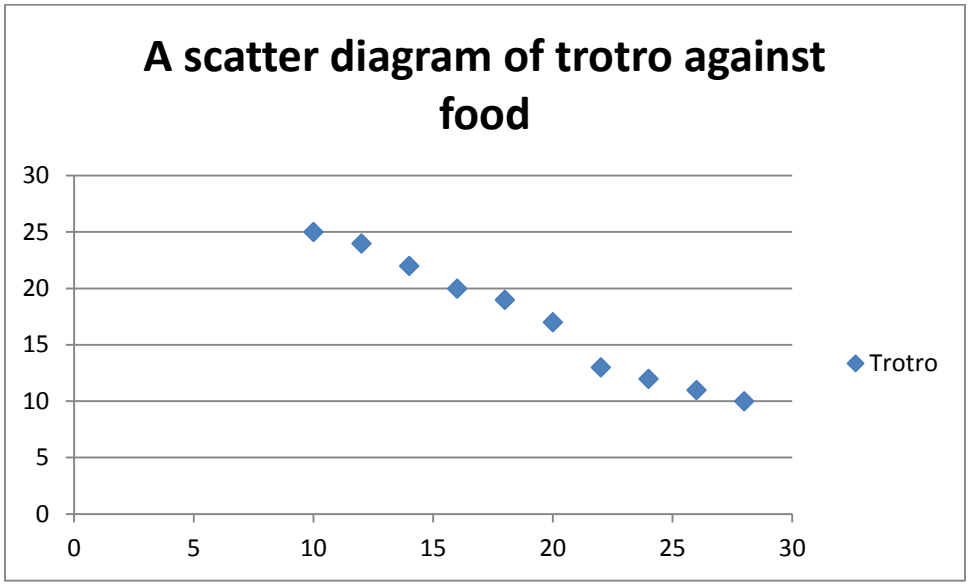
(Total: 20 marks)

EXAMINER'S COMMENTS

Question Six is the next popular question among candidates after Question Five but some candidates who attempted this question performed poorly. Some candidates could pick the required probabilities from the tree diagram but could not find the joint probabilities hence they scored very low marks. Some candidates struggled to answer sub-question (b) which involved enumeration of points in the sample space. Candidates from the high performing centers scored very high marks with as many as 10 or more scoring 20/20.

QUESTION SEVEN

a).



(B4) for 4 correct

b)

Correlation Coefficient

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left(n\sum x^2 - \left(\sum x\right)^2\right)\left(n\sum y^2 - \left(\sum y\right)^2\right)}}$$

$$= \frac{10(2988) - (190)(173)}{\sqrt{\left[10(3940) - (190)^2\right]\left[10(3269) - (173)^2\right]}} \quad (M1)$$

$$= \frac{-2990}{\sqrt{3018.49}} \quad (M1)$$

$$= -0.9905 \quad \left(A\tfrac{1}{2}\right)$$

strong negative linear correlation between expenditure on trotro and food

Food (x)	Trotro (y)	x^2	y^2	xy
10	25	100	625	250
12	24	144	576	288
14	22	196	484	308
16	20	256	400	320
18	19	324	361	342
20	17	400	289	340
22	13	484	169	286
24	12	576	144	288
26	11	676	121	286
28	10	784	100	280
$\sum x = 190$	$\sum y = 173$	$\sum x^2 = 3940$	$\sum y^2 = 3269$	$\sum xy = 2988$

Any 4 correct

$(B\,1/2)$ $(B\,1/2)$ $(B\,1/2)$

c) Coefficient of Determination

$$r^2 = (-0.9905)^2 = 0.9811 \times 100 \quad (M2)$$
$$= 98\% \,(A1)$$

Interpretation

98% of the variation in trotro expenditure is explained by the variation in food expenditure. **(B1)**

Regression line

$\hat{y} = a + bx$, *where*

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2}$$

$$b = \frac{10(2988) - (190)(173)}{10(3940) - (190)^2} \quad \left(M1\,1/2\right)$$

$$b = \frac{-2990}{3300}$$

$$b = -0.906 \quad (A1)$$

$$a = \hat{y} - bx$$

$$a = \frac{173}{10} - (-0.906)\frac{190}{10} \quad \left(M1\,1/2\right)$$

$$a = 17.3 + 0.906 \times 19$$

$a = 34.514$, hence $\quad (A1)$

$y = 34.514 - 0.906(x)$ $(B1)$

Interpretation

A student who does not spend on food will spend 34.514 on trotro.

An additional increase on food expenditure will decrease trotro expenditure by 0.906

(Total: 20 marks)

EXAMINER'S COMMENTS

Question Seven is the next popular choice among candidates after Question Six .Candidates could easily plot the scatter points and calculate the regression coefficient, the regression constant, correlation coefficient and hence the coefficient of determination. However, the interpretation of these figures were poorly done. About three candidates scored 20/20 in this question.

CONCLUSION

I suggest that the formulae sheet is beefed up a little more with formulae. The moderator/moderators are encouraged to do more to completely get rid of errors or misprints on every sheet of the Paper, and no other person should be allowed to do spell check on the questions before they are printed or packaged for the question bank.