ACCOUNTING TECHNICIANS SCHEME

EXAMINATION – SEPTEMBER, 2010

QUANTITATIVE ANALYSIS

SUGGESTED SOLUTIONS (MARKING GUIDE)

PART I MULTIPLE-CHOICE QUESTIONS (10 Marks)

1. D
2. B
3. B
4. C
5. B
6. D
7. A
8. B
9. B
10. A

2.

$$\int_c^d x\,dx = \frac{x^2}{2} + k\Big|_c^d$$

$$= \left[\frac{d^2}{2} + k\right] - \left[\frac{c^2}{2} + k\right]$$

$$= \frac{d^2}{2} - \frac{c^2}{2}$$

$$= \tfrac{1}{2}\left[d^2 - c^2\right]$$

$$= \tfrac{1}{2}(d + c)(d - c)$$

3. Ordering cost = $C_o = \frac{Q^2 C_h}{2D}$

Q = optimum quantity
Cn = holding cost
D = demand
$C_o = \frac{(120)^2 (2)}{(2)(200)} =$ ₦72.00

8. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.30 + 0.78 - 0.16$

$= 0.92$

PART II SHORT-ANSWER QUESTIONS (30 Marks)

1. 12

2. 3,600 cedis

3. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ or I_2

4. Option or choice

5. Upper triangular

6. Non-sampling

7. Negative

8. Linearity; Non – negativity.

9. L$7,302.78

10. Questionnaire

11. Exponential

12. Quantitative or numeric, Qualitative or non-numeric

13. Cumulative frequencies, upper class boundaries (in that order)

14. Additive, Multiplicative

15. n^{th} root, product (in that order)

16. 5

17. Penalties or column and row differences

18. Decision

19. Sampling

20. 141

21. Deterministic

22. t – distribution or t – test

23. Producers` surplus

24. Estimate

25. Differentiation

26. Maximum value

27. Minimum or shortest

28. Equals or is equal to

29. Loop

30. Activity-on-arrow and activity-on-node.

WORKINGS

1. 6 points on the die
   2 points on the coin
   i.e H1, H2, H3, H4, H5, H6
   T1, T2, T3, T4, T5, T6
   $\therefore$ no of sample points = 6 x 2 = 2

2. Maximum no of skippings is 5
   5 x 1200 = 6000
   $\therefore$ expected maximum earnings = 0.6 x 6000 = ₦3,600

9. $P = \frac{2000}{(1+0.1)^1} + \frac{3000}{(1+0.1)^2} + \frac{4000}{(1+0.1)^3}$
   = 1818.18 + 2479.34 + 3005.26
   = ₦7,302.78

16. $\Delta = \begin{vmatrix} 2 & -3 \\ 1 & 1 \end{vmatrix} = 2 \times 1 - (1 \times -3) = 2+3 = 5$

20. $PS = (60)(3) - \int_0^6 (q+2)^2 \, dq$

$= 180 - \left[\frac{1}{3}(q+2)^3 \right]_0^3$

$= 180 - (\frac{1}{3}(3+2)^3 - \frac{1}{3}(0+2)^3)$

$= 180 - \left[\frac{125}{3} - \frac{8}{3} \right]$

$= 180 - 39 = \underline{141}$

SOLUTION 1

(ii) Construction of component bar char of the grades recorded for two years

Grade	2004	2005	Total
A	15	10	25
B	35	30	65
C	45	22	67
D	50	15	65
E	35	25	60
F	20	18	38

(iii) Computing a percentage component bar chart of 2004 and 2005 figures:

Grade	2004	2005	Total	Percentage of total for 2004	Percentage of total for 2005
A	15	10	25	60*	40*
B	35	30	65	54	46
C	45	22	67	67	33
D	50	15	65	77	23
E	35	25	60	58	42
F	20	18	38	53	47

1 -½ e.e

½ -½ e.e

½ -½ e.e

graph + key 3

*60 $= \frac{15}{25} \times 100$

**40 $= \frac{10}{25} \times 100$

ee = each error

SOLUTION 2

(a) See graph
Mode is 75.9 kilograms

(b)

Weights	x	f	fx	x- x	$(x-x)^2$	$f(x-x)^2$	Class boundaries for histogram
62 – 65	63.5	1	63.5	-12.13	147.14	147.14	61.5 – 65.5
66 – 69	67.5	3	202.5	-8.13	66.10	198.3	65.5 – 69.5
70 – 73	71.5	6	429	-4.13	17.06 (1)	102.36	69.5 – 73.5
74 – 77	75.5 (1)	9	679.5	-0.13 (1)	0.02	0.18 (1)	73.5 – 77.5
78 – 81	79.5	7	556.5 (1)	3.87	14.98	104.86	77.5 – 81.5
82 – 85	83.5	3	250.5	7.87	61.94	185.82	81.5 – 85.5
86 – 89	87.5	1	87.5	11.87	140.9	140.90	85.5 – 89.5
		30	2,269 (1)			879.56 (1)	

(1) scored on the x-axis of the histogram

(i) mean $= \bar{x} = \frac{\sum fx}{\sum f} = \frac{2269}{30} = 75.63$ (1/2)

$\delta = \sqrt{\left[\frac{\sum f(x-\bar{x})^2}{\sum f}\right]} = \sqrt{\left[\frac{879.56}{30}\right]}$ (1)

$= \sqrt{29.32}$

$= 5.41$ (1)

(ii) Coefficient of variation $= \frac{\delta}{\bar{x}} \times 100$ (1/2)

$= \frac{5.41}{75.63} \times 100$

$= 7.15\%$ (1/2)

OR

- **ALITER**

b (i) Standard deviation

x	f	fx	x^2	fx^2
63.5	1	63.5	4032.25	4032.25
67.5	3	202.5	4556.25	13668.75
71.5	6	429.0	5112.25 (1)	30673.50 (2)
75.5	9	679.5	5700.25 (1)	51302.25 (2)
79.5	7	556.5	6320.25	44241.75
83.5	3	250.5	6972.25	20916.75
87.5	1	87.5	7656.25	7656.25
	30	2,690		172,491.50

$$S = \sqrt{\left[\frac{\sum fx^2}{\sum f} - \left[\frac{\sum fx}{\sum f}\right]^2\right]} \quad (1/2)$$

$$= \sqrt{\left[\frac{172491.50}{30} - \left[\frac{2269}{30}\right]^2\right]} \quad (1/2)$$

$$= \underline{\underline{5.41}} \quad (1)$$

OR

- **ALITER USING ASSUMED MEAN**

Class	f	x	d	d^2	fd	fd^2
62-65	1	63.5	-12	144	-12	144
66-69	3	67.5	-8	64	-24	192
70-73	6	71.5	-4	16	-24	96
74-77	9	(1) 75.5	0	(1) 0	(1) 0	(1/2) 0
78-81	7	79.5	4	16	28	112
82-85	3	83.5	8	64	24	192
86-89	1	87.5	12	144	12	144
	30				(1) 4	880 (1/2)

(i) $\text{Mean} = \bar{x} = A + \frac{\sum fd}{\sum f}$ (1/2)

$$= 75.5 + \frac{4}{30} = \underline{\underline{75.63}} \quad (1/2)$$

$$SD = \sqrt{\frac{\sum fd^2 - \frac{(\sum fd)^2}{f}}{f}} \quad (1/2)$$

$$= \sqrt{\frac{880 - \frac{4^2}{30}}{30}} \quad (1/2) = \sqrt{29.316}$$

$$= 5.14 \quad (1)$$

(ii) $C.V = \frac{\delta}{\bar{x}} \times \frac{100}{1} = \frac{5.41}{75.63} \times \frac{100}{1} = \underline{\underline{7.15\%}}$ (1/2) (1/2)

SOLUTION 3

x	f	fx	fx^2
25.5	78	1989.0	50719.5
35.5	62	2201	78135.5
45.5	95	4322.5	196673.75
55.5	145	8047.5	446636.25
65.5	101	6615.5	433315.25
75.5	80	6040.0	456020.0
85.5	59	5044.5	431304.75
	620	34260.0	2092805.00

(2) (2) -½ e.e.

(½) (1) (1)

Standard deviation $= \sqrt{\frac{\sum fx^2}{\sum f} - \left[\frac{\sum fx}{\sum f}\right]^2}$ (1)

$= \sqrt{\left[\frac{2092805.00}{620} - \left[\frac{34260}{620}\right]^2\right]}$ (1)

$= 17.94542$ (1)

i.e. ₦17,945.42 (½)

(b) Coefficient of skewness $= \frac{3(\text{mean} - \text{median})}{\text{s.d}}$ (1)

$= \frac{3(55{,}500 - 55{,}700)}{17{,}945.42}$ (1)

$= -0.033$ (1)

Which is close to 0. i.e the distribution is symmetric. (2)

SOLUTION 4

At breakeven, profit or loss equals zero i.e R = C (1)

$90 + 28q + 0.75q^2 = 100q - q^2$

$= 1.75q^2 - (100 - 28)q + 90 = 0$

$= 1.75q^2 - 72q + 90 \equiv ax^2 + bx + C$

i.e $a = 1.75,\ b = -72,\ C = 90$