CMR INSTITUTE OF TECHNOLOGY

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Internal Assesment Test - I

Sub:	STATISTICS FOR MANAGERS							Code:	22MBA14
Date:	24-03-2023	Duration:	90 mins	Max Marks:	50	Sem:	I	Branch:	MBA

		Marks	OBE CO	OBE RBT
	Part A - Answer Any Two Full Questions (2* 20 = 40 marks)			
1 (a)	Explain the Law of Statistics.	[03]	CO1	L2
(b)	Outline the different types of averages in detail.	[07]	CO1	L4
(c)	Examine the characteristics of an Ideal Average.	[10]	CO1	L3
2 (a)	The arithmetic mean of 50 item was 80. It was discovered later that two items were wrongly taken as 23 and 24 in place of 32 and 42 respectively. Calculate the correct value of the Mean.	[03]	CO1	L3
(b)	Solve the missing frequencies of the following series, if the arithmetic average is 47.2:	[07]	CO1	L3
(c)	Outline the Value of Median, Q1 and Q3:	[10]	CO1	L4
3 (a)	Calculate the combined average of all these students. There are 16 Commerce students whose average mark is 75 and 32 Arts students whose average mark is 45.	[03]	CO1	L3
(b)	Summarize the Value of the Mode by the appropriate method (both) inspection and Grouping Table Method.	[07]	CO1	L5
(c)	Judge the below case and solve the same.	[10]	CO1	L5

Marks :	41.5	44.5	47.5	50.5	53.5
F:	31	58	60	**?**	27

Marks :	0-10	10-15	15-25	25-30	30-40	40-45
No. of Students:	5	31	41	18	37	24

Marks :	0-10	10-20	20-30	30-40	40-50
No. of Students :	8	15	15	7	2

Weights in lbs:	80	75	60	70	65	62	61	63
No of Students	2	4	5	6	7	10	8	9

Calculate the following:
Range
Coefficient of Range
Inter Quartile Range
Semi Quartile Rage
Coefficient of Quartile Deviation

Part B - Compulsory (01*10=10 marks)

4	**Case Study**													
	Analyze the case given below. From the Following data Calculate the Mean, Median, Mode and Range.											[10]	CO1	L4
	5	10	12	10	11	12	10	13	11	10	21	30		

Course Outcomes (COs)		PO1	PO2	PO3	PO4	PO5
CO1:	Understand how to organize, manage, and present the data.	1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, 3c, 4				
CO2:	Use and apply a wide variety of specific statistical tools.					
CO3:	Understand the applications of probability in business.					
CO4:	Effectively interpret the results of statistical analysis.					
CO5:	Develop competence of using computer packages to solve the problems.					

Cognitive level	KEYWORDS
L1 - Remember	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
L2 - Understand	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate interpret, discuss
L3 - Apply	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
L4 - Analyze	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
L5 - Evaluate	asses, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
L6 - Create	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

PO1–*Theoretical Knowledge; PO2–Effective Communication Skills; PO3–Leadership Qualities; PO4 –Sustained Research Orientation; PO5 –Self-Sustaining Entrepreneurship*

CI **CCI** **HOD**

CMR INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MBA & RESEARCH
SOLUTION SCHEME
I-IAT - STATISTICS FOR MANAGERS - 22MBA14

1. a) Laws of Statistics

→ The law of Statistical Regularity
→ The law of Inertia of Large Numbers

{1 marks for point & 2 marks for explaination}

b) Different types of Average

→ Mathematical Averages
{Arithmetic Avg, Geometric Mean, Harmonic Mean}
→ Positional Averages
{Median, mode, Quartiles, Deciles, Percentiles, Sextiles, Octiles, Quintiles}
→ Misc. Avg {Moving Avg & Progressive Avg}

{3 marks for point & 4 Marks for explaination}

c) Characteristics of an Ideal Average

→ It should be rigidly defined
→ It should be simple to understand.
→ Simple to calculate
→ Based on all the observation of the series
→ Capable of making relative study
→ Capable of further algebraic treatment
→ It should not be affected by fluctuations in sampling.

{4M for point & 6M for explaination}

2. a) $n = 50$, $\bar{x} = 80$.

wrong values $= 23 + 24 = 47$

correct values $= 32 + 42 = 74$ (1)

$\Sigma x = 80 \times 50 = 4000$

(-) wrong values $= 47$ (1)

(+) correct values $= 74$

Correct $\Sigma x = 4027$

$\bar{x} = \frac{\Sigma x}{n} = \frac{4027}{50} = 80.54 = 81$ (1)

b)

x	f	fx
41.5	31	1286.5
44.5	58	2581
47.5	60	2850
50.5	f_1	$50.5f_1$
53.5	27	1444.5
	$176 + f_1$	$8162 + 50.5f_1$

(2)

$\bar{x} = \frac{\Sigma fx}{n}$ (1)

$47.2 = \frac{8162 + 50.5f_1}{176 + f_1}$

$47.2(176 + f_1) = 8162 + 50.5f_1$ (2)

$8307.2 + 47.2f_1 = 8162 + 50.5f_1$

$8307.2 - 8162 = 50.5f_1 - 47.2f_1$ (2)

$145.2 = 3.3f_1$

$f_1 = 44$ (2)

c)

C.I	f	c.f.	
0-10	5	5	
10-15	31	36	
15-25	41	77	Q_1
25-30	18	95	m
30-40	37	132	Q_3
40-45	24	156	
	156		

(2)

Median

$m = n/2^{th}\text{ item} = \frac{156^{th}\text{ item}}{2} = 78^{th}\text{ item}$ (1)

$m = L_1 + \frac{L_2 - L_1}{f_1}(m - c)$

$= 25 + \frac{30-25}{18}(78-77) \Rightarrow 25 + \frac{5}{18}(1)$ (2)

$= 25 + 0.2777 = 25.2777 = 25.3 = \boxed{25}$

Quartile

$q_1 = n/4^{th}\text{ item} = 156/4^{th}\text{ item} = 39^{th}\text{ item}$ (1)

$Q_1 = L_1 + \frac{L_2 - L_1}{f_1}(q_1 - c)$

$= 15 + \frac{25-15}{41}(39-36) = 15 + \frac{10}{41}(3)$ (2)

$= 15 + 0.73 = 15.73 = \boxed{16}$

$q_3 = 3n/4^{th}\text{ item} = \frac{3 \times 156}{4}^{th}\text{ item} = 117^{th}\text{ item}$

$Q_3 = L_1 + \frac{L_2 - L_1}{f_1}(q_3 - c)$

$= 30 + \frac{40-30}{37}(117-95) = 30 + \frac{10}{37}(22)$ (2)

$= 30 + 5.945 = 35.95 =$ (3) $\boxed{36}$

3. a) $n_1 = 16$, $\bar{x}_1 = 75$

$n_2 = 32$, $\bar{x}_2 = 45$

$$\bar{x}_{12} = \frac{n_1\bar{x}_1 + n_2\bar{x}_2}{n_1 + n_2}$$ (1)

$$= \frac{16 \times 75 + 32 \times 45}{16 + 32}$$ (1)

$$= \frac{1200 + 1440}{48} = \boxed{55}$$ (1)

b) MODE

By inspection method = mode is ill defined as it frequency exist for two days intervals. (2)

Grouping Table method

C.I	f					
0-10	8	(1)	(2)	(3)	(4)	(5)	(6)
10-20	15		(23)				
20-30	15			(30)	(38)		
30-40	7					(37)	
40-50	2						(24)

(3)

Table Analysis

C.I	0-10	10-20	20-30	30-40	40-50
(1)					
(2)	(2)				
(3)		(5)			
(4)			(5)		
(5)				(2)	
(6)					(1)

(4) (2)

Mode is not defined (3)

c.)

X	f	cf.
60	5	5
61	8	13
62	10	23
63	9	32
65	7	39
70	6	45
75	4	49
80	2	51
	51	

(2)

Range = L − S = 80 − 60 = 20 (2)

Coefficient of Range = $\frac{L-S}{L+S} = \frac{80-60}{80+60}$

$= 0.14285 = \boxed{0.14}$

Semi-quartile Range = $\frac{Q_3 - Q_1}{2}$

$= \frac{65-61}{2}$

$= \boxed{2}$ (3)

(5)

$Q_3 = 3\left(\frac{104}{4}\right)^{th}$ item

$Q_3 = 3\left(\frac{51+1}{4}\right)^{th}$ item $= 3(13) = 39^{th}$ item (1/2)

$= \boxed{65}$

$Q_1 = \left(\frac{104}{4}\right)^{th}$ item $= \left(\frac{51+1}{4}\right)^{th}$ item $= 13^{th}$ item (1/2)

$Q_1 = \boxed{61}$

SQR / $QD = \frac{Q_3 - Q_1}{2}$

$= \frac{65 - 61}{2} = \frac{4}{2} = 2$

IQR $= Q_3 - Q_1$ (1)

$= 65 - 61 = \boxed{4}$

Coefficient of Q.D $= \frac{Q_3 - Q_1}{Q_3 + Q_1}$

$= \frac{65 - 61}{65 + 61} = \frac{4}{126} = 0.00317$ (1)

$= \boxed{0.003}$

(6)

n = 12

4 x

x
5
10
10
10
10
11
11
12
12
13
21
30
155

Mean $(\bar{x}) = \frac{\Sigma x}{n}$ (2 marks)

$= \frac{155}{12}$

$= 12.92$

$= \boxed{12}$ (2)

Median $= \left(\frac{n+1}{2}\right)^{th}$ item

$= \left(\frac{12+1}{2}\right)^{th}$ item

$= \left(\frac{13}{2}\right)^{th}$ item $= 6.5^{th}$ item (1)

Median $= 11 + 0.5(11-11)$

$= 11 + 0.5(0)$

$= 11 + 0 = \boxed{11}$ (2)

Mode $= 10$ [Repeated maximum time] (1)

Range $= L - S$

$= 30 - 5 = 25$. (2)

END

24/8/2023

(7)