

FIRST YEAR HIGHER SECONDARY EXAMINATION MARCH 2018

SUBJECT: STATISTICS

CODE. NO: 120

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
1.		(1) $\rightarrow$ 4 , (2) $\rightarrow$ (3) , (3) $\rightarrow$ (2) , - (4) $\rightarrow$ 1	$4 \times \frac{1}{2}$	2.
2.	a) Discrete b) Continuous c) Continuous d) Discrete		$4 \times \frac{1}{2}$	2
3.	Draw Scatter diagram. [Give 1 score for drawing X & Y axis only]		2	2
4.	Given $\bar{x} = 2650$, $n = 40$ $\Sigma x = 2650 \times 40 = 106000$ Correct $\Sigma x = 106000 - 1500 + 1150$ $= 105650$. Correct Average $= \frac{105650}{40} = 2641.25$		$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2.
5.	a) More than 3. b) positively skewed		1 1	2.

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6.		A - persons own a credit card B - Person is employed Find $P(A/B)$ $P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{18/109}{47/109} = \frac{18}{47}$ Or [Give full credit for calculation of probability from table.]	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	2.																
7.	a) Investigator b) $1 \rightarrow (3), 2 \rightarrow (4), 3 \rightarrow (2), 4 \rightarrow (1)$		$\frac{1}{2} \times 4$	$\begin{matrix} 12 \\ 2 \end{matrix} \Bigg\} 3$																
8.		<table border="1"> <thead> <tr> <th></th> <th>Married</th> <th>Unmarried</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Men</td> <td>240</td> <td>720</td> <td>960</td> </tr> <tr> <td>Women</td> <td>120</td> <td>360</td> <td>480</td> </tr> <tr> <td>Total</td> <td>360</td> <td>1080</td> <td>1440</td> </tr> </tbody> </table> Or [Give 2 marks for table form.]		Married	Unmarried	Total	Men	240	720	960	Women	120	360	480	Total	360	1080	1440		3
	Married	Unmarried	Total																	
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9	(a)	Pie Diagram Draw Pie diagram Or [For drawing pie diagram Give full credit.]	1 1	3
	b)	Actual Expenditure = $\frac{14.4 \times 10800}{360}$ $= 432$	1	
10		$\bar{x} = 15900$ $\bar{x}_1 = 18000, \bar{x}_2 = 12000$ Combined Mean = $\frac{n_1 \bar{x}_1 + n_2 \bar{x}_2}{n_1 + n_2}$ $15900 = \frac{n_1 \times 18000 + n_2 \times 12000}{n_1 + n_2}$ $15900 = \frac{n_1 \times 18000}{n_1 + n_2} + \frac{n_2 \times 12000}{n_1 + n_2}$ put $\frac{n_1}{n_1 + n_2} = x$ & $\frac{n_2}{n_1 + n_2} = y$ Solving $x = 65$ & $y = 35$ [Give full Score for Identification of Combined Mean]	$\frac{1}{2}$ 1 $\frac{1}{2}$	3

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total																				
11		Ascending order of values 45, 47, 47, 49, 50, 53, 58, 59, 60 Median = 50. <table> <tr> <th>x</th> <th> x - Median </th> </tr> <tr><td>45</td><td>5</td></tr> <tr><td>47</td><td>3</td></tr> <tr><td>47</td><td>3</td></tr> <tr><td>49</td><td>1</td></tr> <tr><td>50</td><td>0</td></tr> <tr><td>53</td><td>3</td></tr> <tr><td>58</td><td>8</td></tr> <tr><td>59</td><td>9</td></tr> <tr><td>60</td><td>10</td></tr> </table> $\sum x - \text{Median} = 42.$ $\therefore \text{M.D about Median} = \frac{\sum x - \text{Median} }{n}$ $= \frac{42}{9} = 4.67$	x	x - Median	45	5	47	3	47	3	49	1	50	0	53	3	58	8	59	9	60	10	1	3
x	x - Median																							
45	5																							
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60	10																							

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13		$B_1 = \frac{M_3^2}{M_2^3} = 0$ $B_2 = \frac{M_4}{M_2^2} = \frac{27}{3^2} = 3$ $B_1 = 0$, the distribution is symmetric $B_2 = 3$, the <u>dn</u> is mesokurtic	1 1 1/2 1/2	3
14.	(a)	Aggregate of items	1	4.
	(b)	Any three points of N.S.S.O	3	
15	(a)	$P[\text{The person like rice}] = \frac{21}{50}$	1	4
	(b)	$P[\text{The person like Chappathi or Veg. Salad}] = \frac{22}{50} + \frac{5}{50}$ $= \frac{27}{50}$	1	
	(c)	$P[\text{The person doesn't like Chappathi or rice}] = \frac{5}{50} + \frac{2}{50}$ $= \frac{7}{50}$	1	
	d)	$P[\text{The person doesn't like Soup}] = 1 - \frac{2}{50}$ $= \frac{48}{50}$ [Give full Score for any three]	1	

Qn. No	Sub Qns	Answer Key/Value Points			Score	Total
16		Class	Frequency			
		0.5-9.5	4			
		9.5-19.5	10		1	
		19.5-29.5	20			
		29.5-39.5	11			
		39.5-49.5	3			
		49.5-59.5	2			
		Modal class 19.5-29.5			1/2	
		$\text{Mode} = l + \frac{c \cdot (f_1 - f_0)}{2f_1 - f_0 - f_2}$			1/2	4
		$l = 19.5, f_1 = 20, f_0 = 10, f_2 = 11, c = 10$			1/2	
17	(a)	$M = 19.5 + 10 \frac{(20 - 10)}{2 \times 20 - 10 - 11}$			1	
		= 24.76			1/2	
		[Consider the inclusive classes also for full score]				
	(b)	x	f	Cum. f		
		160	8	8		
		200	3	11		
		208	6	17		
		210	7	24		
		220	4	28		
		250	2	30		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
		$N = 30$ $\frac{N+1}{4} = 7.75$ $Q_1 = 160$ $\frac{3(N+1)}{4} = 23.25$ $\therefore Q_3 = 210$ $Q.D = \frac{Q_3 - Q_1}{2}$ $= \frac{210 - 160}{2} = \frac{50}{2} = 25$ Or [Give 2 marks for correct formula.]	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4
18	a) Systematic Sampling b) Number of Samples = $5 \times 4 = 20$ The Pairs are $(B_1 B_2), (B_1 B_3), (B_1 G_1), (B_1 G_2), (B_2 B_1), (B_2 B_3)$ $(B_2 G_1), (B_2 G_2), (B_3 B_1), (B_3 B_2), (B_3 G_1), (B_3 G_2)$ $(G_1 B_1), (G_1 B_2), (G_1 B_3), (G_1 G_2), (G_2 B_1), (G_2 B_2), (G_2 B_3)$ $(G_2 G_1)$.	1 1 2	4	
19	a) A - Student joined Guitar class B - Student joined Tabla class. $P(A) = 0.30$, $P(B) = 0.20$ $P(A \cap B) = 0.10$	1		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total																
20	(1)	$P[\text{Student enrolled in any of the class}]$ $= P(A \cup B)$ $= P(A) + P(B) - P(A \cap B)$ $= 0.30 + 0.20 - 0.10$ $= 0.40$	$\frac{1}{2}$ $\frac{1}{2}$	4.																
	2)	$P[\text{Student not enrolled in any of the classes}] = 1 - P(A \cup B)$ $= 1 - 0.40$ $= 0.60$	$\frac{1}{2}$ $\frac{1}{2}$																	
	(b)	Complementary Event	1																	
	a)	$G.M = \sqrt[4]{108 \times 106 \times 104 \times 105} = 105.74$ ∴ Average increase = 5.74% Or [Identifying G.M - 2 marks]	$\frac{1}{2} + 1$ $\frac{1}{2}$	2.																
	b)	<table> <tr> <th>class</th> <th>frequency</th> <th>C- f</th> </tr> <tr> <td>19.5 - 29.5</td> <td>10</td> <td>10</td> </tr> <tr> <td>29.5 - 39.5</td> <td>8</td> <td>18</td> </tr> <tr> <td>39.5 - 49.5</td> <td>f_1</td> <td>$18 + f_1$</td> </tr> <tr> <td>49.5 - 59.5</td> <td>4</td> <td>$22 + f_1$</td> </tr> <tr> <td>59.5 - 69.5</td> <td>f_2</td> <td>$22 + f_1 + f_2$</td> </tr> </table>	class		frequency	C- f	19.5 - 29.5	10	10	29.5 - 39.5	8	18	39.5 - 49.5	f_1	$18 + f_1$	49.5 - 59.5	4	$22 + f_1$	59.5 - 69.5	f_2
class	frequency	C- f																		
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21	q)	$N = 40$	$\frac{1}{2}$	4																
		Median = 42	$\frac{1}{2}$																	
		Median = $l + \left(\frac{N}{2} - m\right) \frac{c}{f}$	1																	
		$42 = 39.5 + \frac{(20 - 18)10}{f_1}$	1																	
		$\therefore f_1 = 8, f_2 = 10$																		
				Company A																
			<table> <tr> <td>x</td> <td>1</td> <td>2</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> <td>$\Sigma x = 13$</td> </tr> <tr> <td>x^2</td> <td>1</td> <td>4</td> <td>9</td> <td>9</td> <td>4</td> <td>4</td> <td>$\Sigma x^2 = 31$</td> </tr> </table>	x	1	2	3	3	2	2	$\Sigma x = 13$	x^2	1	4	9	9	4	4	$\Sigma x^2 = 31$	$\frac{1}{2}$
		x	1	2	3	3	2	2	$\Sigma x = 13$											
		x^2	1	4	9	9	4	4	$\Sigma x^2 = 31$											
			$\bar{x} = \frac{\Sigma x}{n} = \frac{13}{6} = 2.16$	$\frac{1}{2}$																
	Standard deviation $\sigma_x = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$ $= \sqrt{\frac{31}{6} - 2.16^2}$ $= 0.7$	$\frac{1}{2}$																		
	C.V of Company A = $\frac{S.D}{\bar{x}} \times 100$ $= \frac{0.7}{2.16} \times 100$ $= 32.40\%$	1																		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
		Company B.	$\frac{1}{2}$	6
		X 35 45 30 35 40 25 $\Sigma x = 210$		
		X ² 1225 2025 900 1225 1600 625 $\Sigma x^2 = 7600$		
		$\bar{x} = \frac{210}{6} = 35$ $\sigma_x = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$ $= \sqrt{\frac{7600}{6} - 35^2}$ $= \underline{\underline{6.45}}$ C.V of Company B = $\frac{S.D}{\bar{x}} \times 100$ $= \frac{6.45}{35} \times 100$ $= 18.42\%$	$\frac{1}{2}$	
22	b)	C.V is less for Company B, $\therefore$ Company B is more reliable in Service.	1	
	(a)	P[one boy and one girl is being selected] = $\frac{1}{6} \times \frac{1}{4} + \frac{2}{6} \times \frac{3}{4}$ $= \frac{1}{6} + \frac{1}{4} = \underline{\underline{\frac{5}{12}}}$	1+1	

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	(b)	$P(B_1) = 0.25$ $P(B_2) = 0.35$ $P(B_3) = 0.40$ A - Selecting a defective coin $P(A/B_1) = 0.04$ $P(A/B_2) = 0.05$ $P(A/B_3) = 0.02$ $P(B_2/A) = \frac{P(B_2) \cdot P(A/B_2)}{P(B_1) \cdot P(A/B_1) + P(B_2) \cdot P(A/B_2) + P(B_3) \cdot P(A/B_3)}$ $= \frac{0.35 \times 0.05}{0.25 \times 0.04 + 0.35 \times 0.05 + 0.40 \times 0.02}$ $= \underline{\underline{.4929}}$	$\frac{1}{2}$ $\frac{1}{2}$ + $\frac{1}{2}$ 1 1 $\frac{1}{2}$	6