



DAYANANDA SAGAR COLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to VTU, Belagavi)
Shavige Malleshwara Hills, Kumaraswamy Layout, Bengaluru-560078

DEPARTMENT OF MATHEMATICS

COURSE: MATHEMATICS FOR COMPUTER ENGINEERS

COURSE CODE: 21MAT31A

MODULE – 3: STATISTICS

Q.No	Questions																										
1.	a) Find the mean of the following by																										
	<table><tr><td>Number</td><td>8</td><td>10</td><td>15</td><td>20</td></tr><tr><td>Frequency</td><td>5</td><td>8</td><td>8</td><td>4</td></tr></table>	Number	8	10	15	20	Frequency	5	8	8	4																
	Number	8	10	15	20																						
Frequency	5	8	8	4																							
b) The following is the frequency distribution of a random sample of weekly earnings of the employees. Calculate the average weekly																											
	<table><tr><td>Weekly earning</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td><td>20</td><td>22</td><td>24</td><td>26</td><td>28</td><td>30</td><td>32</td></tr><tr><td>No. of employees</td><td>3</td><td>6</td><td>10</td><td>15</td><td>24</td><td>42</td><td>75</td><td>90</td><td>79</td><td>55</td><td>36</td><td>26</td></tr></table>	Weekly earning	10	12	14	16	18	20	22	24	26	28	30	32	No. of employees	3	6	10	15	24	42	75	90	79	55	36	26
Weekly earning	10	12	14	16	18	20	22	24	26	28	30	32															
No. of employees	3	6	10	15	24	42	75	90	79	55	36	26															
2.	a) Find the mean of the following																										
	<table><tr><td>Class</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 - 50</td></tr><tr><td>Frequency</td><td>7</td><td>8</td><td>20</td><td>10</td><td>5</td></tr></table>	Class	0 – 10	10 – 20	20 – 30	30 – 40	40 - 50	Frequency	7	8	20	10	5														
	Class	0 – 10	10 – 20	20 – 30	30 – 40	40 - 50																					
Frequency	7	8	20	10	5																						
b) Find the mean of the following																											
	<table><tr><td>Class</td><td>0 – 8</td><td>8 – 16</td><td>16 – 24</td><td>24 – 32</td><td>32 - 40</td><td>40 - 48</td></tr><tr><td>Frequency</td><td>8</td><td>7</td><td>16</td><td>24</td><td>15</td><td>7</td></tr></table>	Class	0 – 8	8 – 16	16 – 24	24 – 32	32 - 40	40 - 48	Frequency	8	7	16	24	15	7												
Class	0 – 8	8 – 16	16 – 24	24 – 32	32 - 40	40 - 48																					
Frequency	8	7	16	24	15	7																					
3.	a) The total sale (in thousands) of a particular item in a shop, on 10 consecutive days is reported by a clerk as 35, 29.6, 38, 30, 40, 41, 42, 45, 3.6, and 3.8. Calculate the average. Later it was found that there was a number 10 in the machine and the reports of 4 th to 8 th day were 10 more than the true values and in the last 2 days he put a decimal in wrong place (for example 3.6 was really 36). Calculate the true mean value.																										



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- b) For the two frequency distributions given below the mean calculated from the first was 25.4 and that the second was 32.5 find the value of the x and y .

Class	10 – 20	20 – 30	30 – 40	40 - 50	50 – 60
Frequency - 1	20	15	10	x	y
Frequency - 2	4	8	4	$2x$	y

4. a) Find the median of the following data

Number	1	2	3	4	5	6	7	8	9
Frequency	8	10	11	16	20	25	15	9	6

- b) Find the median of the following data

Number	5	10	15	20	25	30	35	40	45
Frequency	29	224	465	582	634	644	650	653	655

5. a) Find the median of the following

Class	20 – 30	30 – 40	40 - 50	50 – 60	60 - 70
Frequency	3	5	20	10	5

- b) A number of particular articles has been classified according to their weight. After drying for two week the same articles have again be weighted and similarly classified. It is known that the median weight in the first weight was 20.8302 while in the second weighting it was 17.3502. Some frequencies a and b in the first weighting and x and y in the second are missing. It is given that $a = \frac{x}{3}$ and $b = \frac{y}{2}$. Find out the missing frequencies.

Class	0 – 5	5 – 10	10 – 15	15 - 20	20 – 25	25 - 30
Frequency - 1	a	b	11	52	75	22
Frequency - 2	x	y	40	50	30	28



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6.	<p>a) In a factory employing 3000 person, 5% earn less than Rs. 3 per hour, 580 earn from Rs. 3.01 to Rs. 4.5 per hour, 30% earn from Rs. 4.51 to Rs. 6 per hour. 500 earn from Rs. 6.01 to Rs. 7.5 per hour, 20% earn from Rs. 7.51 to 9 per hour and the rest earn Rs. 9.01 or more per hour. What is the median wage?</p> <p>b) According to the census of 2021, the following are the population figures in thousands of 20 cities: 2000, 1180, 1785, 1500, 560, 782, 1200, 385, 1123, 222, 2001, 1178, 1780, 1550, 559, 780, 1250, 390, 1120, 225. Find the median.</p>																																
7.	<p>a) Find the mode of the following data</p> <table><tr><td>Number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>Frequency</td><td>4</td><td>9</td><td>16</td><td>25</td><td>22</td><td>15</td><td>7</td><td>3</td></tr></table> <p>b) The median and mode are given to be Rs. 25 and Rs. 24 respectively. Calculate the missing frequency.</p> <table><tr><td>Class</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 - 50</td></tr><tr><td>Frequency</td><td>14</td><td>x</td><td>27</td><td>y</td><td>15</td></tr></table>	Number	1	2	3	4	5	6	7	8	Frequency	4	9	16	25	22	15	7	3	Class	0 – 10	10 – 20	20 – 30	30 – 40	40 - 50	Frequency	14	x	27	y	15		
Number	1	2	3	4	5	6	7	8																									
Frequency	4	9	16	25	22	15	7	3																									
Class	0 – 10	10 – 20	20 – 30	30 – 40	40 - 50																												
Frequency	14	x	27	y	15																												
8.	<p>a) Find the mode of the following distribution</p> <table><tr><td>Class</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 - 50</td><td>50 - 60</td><td>60 - 70</td></tr><tr><td>Frequency</td><td>5</td><td>8</td><td>7</td><td>12</td><td>28</td><td>20</td><td>10</td></tr></table> <p>b) The median and mode of the following wages are known to be Rs. 33.5 and Rs. 34 respectively. Find the value of x, y and z. Given total frequency is 230.</p> <table><tr><td>Class</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 - 50</td><td>50 - 60</td><td>60 - 70</td></tr><tr><td>Frequency</td><td>4</td><td>16</td><td>x</td><td>y</td><td>z</td><td>6</td><td>4</td></tr></table>	Class	0 – 10	10 – 20	20 – 30	30 – 40	40 - 50	50 - 60	60 - 70	Frequency	5	8	7	12	28	20	10	Class	0 – 10	10 – 20	20 – 30	30 – 40	40 - 50	50 - 60	60 - 70	Frequency	4	16	x	y	z	6	4
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Frequency	4	16	x	y	z	6	4																										
9.	<p>a) Calculate the mode form the following frequency distribution by the method of grouping</p> <table><tr><td>Number</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td></tr><tr><td>Frequency</td><td>2</td><td>5</td><td>8</td><td>9</td><td>12</td><td>14</td><td>14</td><td>15</td><td>11</td><td>13</td></tr></table>	Number	4	5	6	7	8	9	10	11	12	13	Frequency	2	5	8	9	12	14	14	15	11	13										
Number	4	5	6	7	8	9	10	11	12	13																							
Frequency	2	5	8	9	12	14	14	15	11	13																							



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	b) Calculate the standard deviation from the following frequency distribution																						
	<table><tr><td>Number</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td>Frequency</td><td>3</td><td>6</td><td>9</td><td>13</td><td>8</td><td>5</td><td>4</td></tr></table>	Number	6	7	8	9	10	11	12	Frequency	3	6	9	13	8	5	4						
Number	6	7	8	9	10	11	12																
Frequency	3	6	9	13	8	5	4																
10.	<p>a) For a group of 200 candidates, the mean and standard deviation of scores were found to be 40 and 15 respectively. Later on it was discovered the score 43 and 35 was misread as 34 and 53 respectively. Find the corrected standard deviation corresponding to the corrected figures.</p> <p>b) The scores obtained by two batsmen A and B in 10 matches are given below. Calculating mean, SD and coefficient of variation for each batsman, determine who is more efficient and who is more consistent.</p> <table><tr><td>A:</td><td>30</td><td>44</td><td>66</td><td>62</td><td>60</td><td>34</td><td>80</td><td>46</td><td>20</td><td>38</td></tr><tr><td>B:</td><td>34</td><td>46</td><td>70</td><td>38</td><td>55</td><td>48</td><td>60</td><td>34</td><td>45</td><td>30</td></tr></table>	A:	30	44	66	62	60	34	80	46	20	38	B:	34	46	70	38	55	48	60	34	45	30
A:	30	44	66	62	60	34	80	46	20	38													
B:	34	46	70	38	55	48	60	34	45	30													
11.	<p>a) Compute the standard deviation for the following data</p> <table><tr><td>Class interval</td><td>0-99</td><td>100-199</td><td>200-299</td><td>300-399</td><td>400-499</td><td>500-599</td><td>600-699</td><td>700-799</td></tr><tr><td>Frequency</td><td>10</td><td>54</td><td>184</td><td>264</td><td>246</td><td>40</td><td>1</td><td>1</td></tr></table> <p>b) The first group of the two samples has 100 items with mean 15 and standard deviation 3. If the whole group has 250 items with mean 15.6 and standard deviation $\sqrt{13.44}$. Find the standard deviation of the second group.</p>	Class interval	0-99	100-199	200-299	300-399	400-499	500-599	600-699	700-799	Frequency	10	54	184	264	246	40	1	1				
Class interval	0-99	100-199	200-299	300-399	400-499	500-599	600-699	700-799															
Frequency	10	54	184	264	246	40	1	1															
12.	<p>a) The number examined, the mean weight and standard deviation in each group of examination by three medical examination are given below. Find the mean weight and standard deviation of the entire data when grouped together</p> <table><tr><td>Medical examination</td><td>Number examined</td><td>Mean weight (lbs)</td><td>Standard deviation (lbs)</td></tr><tr><td>A</td><td>50</td><td>113</td><td>6</td></tr><tr><td>B</td><td>60</td><td>120</td><td>7</td></tr></table>	Medical examination	Number examined	Mean weight (lbs)	Standard deviation (lbs)	A	50	113	6	B	60	120	7										
Medical examination	Number examined	Mean weight (lbs)	Standard deviation (lbs)																				
A	50	113	6																				
B	60	120	7																				



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- b) An analysis of monthly wages paid to the workers of two company A and B belonging to the same industry gives the following results:

Company	Number of workers	Mean monthly wages	Variance
A	500	186	81
B	600	175	100

- Which company has a larger wages bill?
- In which company is there greater variability in individual wages
- Calculate the mean and standard deviation of wages of all the workers in the company A and B taken together.

- 13.** a) Calculate the covariance of the following pairs of observation of two variables: (1,4), (2,2), (3,4), (4,8), (5,9), (6,12)

- b) Calculate the covariance of the following pairs of observation of two variables: (10,35), (15,20), (20,30), (25,30), (30,35), (35,38), (40,42), (45,30), (50,40)

- 14.** a) Find the Covariance by using co-efficient of correlation between industrial production and export using the following data and comment on the result.

Production (in tons)	55	56	58	59	60	60	62
Exports(in tons)	35	38	38	39	44	43	45

- b) Find the covariance for the data given below

x	98	87	90	85	95	75
y	15	12	10	10	16	7

- 15.** a) Calculate the Covariance by using correlation co-efficient for the following heights in inches of fathers (x) and their sons (y).

x	65	66	67	67	68	69	70	72
y	67	68	65	68	72	72	69	71



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- b) Find the Covariance by using co-efficient of correlation between industrial production and export using the following data and comment on the result.

Production (in tons)	55	56	58	59	60	60	62
Exports(in tons)	35	38	38	39	44	43	45

16.

- a) Establish the formula $r = \frac{\sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2}{2 \sigma_x \sigma_y}$

- b) Find the correlation co-efficient between x and y from the given data:

X	21	23	30	54	57	58	72	78	87	90
Y	60	71	72	83	110	84	100	92	113	135

17.

- a) Find the correlation co-efficient between x and y from the given data:

x	78	89	97	69	59	79	68	57
y	125	137	156	112	107	138	123	108

- b) Obtain the regression lines of y on x and x on y and hence find the correlation coefficient for the following data:

x	2	4	6	8	10
y	5	7	9	8	11

18.

- a) Obtain the regression lines of y on x and x on y and hence find the correlation coefficient for the following data:

x	1	2	3	4	5
y	2	5	3	8	7

- b) The two regression equations of the variables x and y are $x = 19.13 - 0.87y$ and $y = 11.64 - 0.50x$. Find (i) mean of x 's, (ii) mean of y 's and (iii) the correlation coefficient between x and y .



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19.	<p>a) The following results were obtained from records of age(x) and blood pressure (y) of a group of 10 men, given $\Sigma (x - \bar{x})(y - \bar{y}) = 1220$. Find the appropriate regression equation and use it to estimate the blood pressure of a man whose age is 45</p> <table border="1"> <tr> <td></td><td>x</td><td>y</td></tr> <tr> <td>Mean</td><td>53</td><td>142</td></tr> <tr> <td>Variance</td><td>130</td><td>165</td></tr> </table> <p>b) In a partially destroyed laboratory record of correlation data, the following result only are a variable, variance of x is 9, regression equation y on x and x on y are $4x - 5y + 33 = 0$, $20x - 9y - 107 = 0$ respectively. Calculate the coefficient of correlation, \bar{x}, \bar{y} and σ_y</p>		x	y	Mean	53	142	Variance	130	165
	x	y								
Mean	53	142								
Variance	130	165								
20.	<p>a) If θ is the acute angle between the two regression lines relating the variables x and y, show that $\tan \theta = \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \left(\frac{1-r^2}{r} \right)$</p> <p>b) Find the co-efficient of correlation between x and y given $2\sigma_x = \sigma_y$ and the angle between the lines of regression is $\tan^{-1} \left(\frac{3}{5} \right)$</p>									