Digital Assignment-1
MAT2002-Statistics for Engineers

Part-A

1. Find the mean for the set of data: 25, 36, 42, 38, 36

2. Find the mean, median, mode from the set of grouped data

Class mark	10.5	30.5	50.5	70.5	90.5	110.5
Frequency	19	6	3	2	1	2

3. The temperature in degree Celsius each day cover a three week period were follows:
17, 18, 20, 21, 19, 16, 15, 18, 20, 21, 21,,22, 21, 19, 20,19,17,16,16,17.
Compute the measues of central tendency and measures of dispersion by using two-degree intervals starting with 15-16.

4. The frequency distribution of the lengths of 100 leaves from a certain species of plant is given below:

length (mm)	Frequency
20 – 24	6
25 – 29	10
30 – 34	18
35 – 39	25
40 – 44	22
45 – 49	15
50 – 54	4

Find the Skewness using Moments.

5. The mean of the numbers a, b, c, d is 8 and the mean of the numbers a, b, c, d, e, f, g is 11.

What is the mean of the numbers e, f, g?

6. Find the mean and standard deviation of the 5 numbers in term of x: x-5, x-3, x-2, x+1, x+4.

7. The mean of the five numbers 6, 9, 2, x, y is 5 and the standard deviation is $\sqrt{6}$. Find the values of x and y.

8. The following table shows the distribution of heights of 50 students:

Height (cm)	Frequency
160 – 164	8
165 – 169	12
170 – 174	14
175 – 179	7
180 – 184	6
185 – 189	3

Find the range , standard deviation and Coefficient of Quartile deviations of heights.

9. Check the Empirical relationship between the measures of central tendency.

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of Students(f)	12	18	23	30	12	10	5

10. The first four moments of a distribution about the value 4 of the variable are -1.15, 17, -30 and 108. Find the four central moments, β_1 and β_2.

Part-B

1. An incomplete frequency distribution given below has total frequency 230 and median is 46. Determine the missing frequencies f1 and f2.

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	30	f1	65	f2	25	18

2. The mean and S.D. based on 60 observations were calculated as 276 mm and 22 mm respectively. But on subsequent scrutiny it was found that through oversight one observation was recorded wrongly at 327 mm through its correct value was 372 mm. Find the corrected values of the mean and S.D.

3. Goals scored by teams A and B in a football season were as follows:

No. of goals scored in a match	No. of matches	
	A	B
0	27	17
1	9	9
2	8	6
3	5	5
4	4	3

Which team may be considered more consistent?

4. Calculate the three quartiles of the following frequency distribution of marks (out of 50) obtained by 50 students in a class.

Marks	7.5	12.5	17.5	22.5	27.5	32.5	37.5	42.5
No. of Students	5	6	15	10	5	4	3	2

5. Find the missing values $\bar{x}_2$, n_2 and σ_3 from the following data:

Description	Group 1	Group 2	Group 3	Combined Group
Number	50	n_2	90	200
Mean	113	$\bar{x}_2$	115	116
S.D	6	7	σ_3	7.746

6. Compute the quartile deviation for the following

Class mark	5	15	25	35	45	55	65	75
Frequency	3	7	9	23	15	8	6	4

7. A standard cell whose voltage is known to be 1.20 volts was used to test the accuracy of two voltmeters A and B. 10 independent readings of the voltage of the cell were taken with two voltmeters and the results were as under:

Metre A	1.21	1.25	1.24	1.20	1.19	1.21	1.22	1.25	1.23	1.24
Metre B	1.22	1.16	1.12	1.18	1.21	1.15	1.16	1.13	1.15	1.18

Which of the two voltmeters is more reliable, assuming that the mean for both the metres as 1.20?

Module2

Questions

1 A discrete r.v. X has the following probability distribution:

Values of X : x	0	1	2	3	4	5	6	7
P(x)	0	a	2a	2a	3a	a^2	$2a^2$	$7a^2+a$

Find (i) the value of 'a' (ii) $P(X<6)$, $P(X\geq 6)$, $P(0<X<4)$, $P(|X|<3)$ and $P(X>4 / X\geq 2)$ (iii) cdf of X.

2 Check whether the following are pdf s: (i) $f(x)=\frac{1}{\pi(1+x^2)}, -\infty<x<\infty$ (ii) $f(x)=\begin{cases}\frac{100}{x^2}, x\geq 100\\ 0, x<100\end{cases}$

3 If a r.v. X has the p.d.f. $f(x)=\begin{cases}\frac{1}{4}, |x|<2\\ 0, \text{otherwise}\end{cases}$, obtain (i) $P(X<1)$ (ii) $P(|X|>1)$ and (iii) $P(2X+3>5)$

4 A continuous random variable has the probability density function $f(x)=\begin{cases}kx^4, -1<x<0\\ 0, \text{otherwise}\end{cases}$. Find the value of k and also find $P[(X>-1/2)/(X<-1/4)]$.

5 If a r.v. X has its cdf given by $F(x)=\begin{cases}0, x\leq 0\\ c(1-e^{-x}), x>0\end{cases}$, find (i) 'c' (ii) p.d.f. of X (iii) $P(1<X<2)$

6 A continuous r.v. X has p.d.f. $f(x)=3x^2$, $0<x<1$. Find k and α such that (i) $P(X<k)=P(X>k)$ and (ii) $P(X>\alpha)=0.1$

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A continuous random variable X has p.d.f given by $f(x) = 3x^2, 0 < x < 1$

Find k such that p(X>k) =0.05.

8

The p.d.f of a random variable X is f(x)=2x ,0<x<1,find the p.d.f of Y=3X+1.

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9. Two refills for a ball point pen are selected at random from a box that contains 3 blue refills,2 red refills,3 green refills. If X is the number of blue refills and Y is the number of red refills selected then find

i) Joint Probability distribution function
ii) Marginal distribution functions of X and Y
iii) Check whether they are independent.

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10. From the following joint distribution of X and Y , Find the Marginal distributions of X and Y?

Y \ X	0	1	2
0	$\frac{3}{28}$	$\frac{9}{28}$	$\frac{3}{28}$
1	$\frac{3}{14}$	$\frac{3}{14}$	0
2	$\frac{1}{28}$	0	0

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11. Find the marginal density of X, the joint density function of two continuous random variable X,Y is

$$F(X,Y) = \begin{matrix} 2(2-X-Y), 0 \le X \le Y \le 1 \\ 0 \quad otherwise \end{matrix}.$$

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3.13 The probability distribution of X, the number of imperfections per 10 meters of a synthetic fabric in continuous rolls of uniform width, is given by

x	0	1	2	3	4
$f(x)$	0.41	0.37	0.16	0.05	0.01

Construct the cumulative distribution function of X.

13	Let X & Y have joint p.d.f $f(x,y)=\begin{cases}\frac{1}{\pi}, x^2+y^2\le 1\\ 0 \quad otherwise\end{cases}$ are X & Y independent?
14	.Find the cumulative distribution function f(x) corresponding to the p.d.f $f(x)=\frac{1}{\pi}\frac{1}{1+x^2}, -\infty<x<\infty$
15	15.Let X *and* Y be random variable with joint density function $f_{XY}(x,y)=\begin{cases}4xy\ ;\ 0\le x\le 1\ ,\ 0\le y\le 1\\ 0 \quad ,otherwise\end{cases}$. Find $E[XY]$.
16	16.Let X *and* Y be any two random variables and a,b be constants. Prove that $Cov(aX,bY)=ab\text{cov}(X,Y)$.
17	17. If X_1 has mean 4 and variance 9 while X_2 has mean -2 and variance 5 and the two are independent, find $Var(2X_1+X_2-5)$.
18	If $Y=-2X+3$, find $Cov(X,Y)$
19	.If X_1 has mean 4 and variance 9 while X_2 has mean -2 and variance 5 and the two are independent, find $Var(2X_1+X_2-5)$.
20	4. If the MGF of a discrete R.V X is given by $M_X(t)=\frac{1}{81}\left(1+2e^t\right)^4$, Find the distribution of X.
21	5.Find the MGF of the R.V X whose p.d.f is $f(x)=\begin{cases}\frac{1}{10}, & 0<x<10\\ 0, & elsewhere\end{cases}$ .Hence its mean.
22	A discrete r.v X has mgf $M_x(t)=e^{2(e^t-1)}$ .Find E(x), var(x) , and p(x=0).