



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY

DEFINITIONS AND TERMINOLOGY

Course Name	:	PROBABILITY AND STATISTICS
Course Code	:	AHSB12
Program	:	B.Tech
Semester	:	II
Branch	:	Information Technology
Section	:	A, B
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Course Faculty	:	Mr. J Suresh Goud, Assistant Professor, FE Ms. P Srilatha, Assistant Professor, FE

OBJECTIVES

I	To help students to consider in depth the terminology and nomenclature used in the syllabus.
II	To focus on the meaning of new words / terminology/nomenclature

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
UNIT - I					
1	Define experiment.	The process of observation or the process of measurement	Remember	CLO 1	AHSB12.01
2	What is predictable experiment?	An experiment is said to be predictable if the result can be predicted	Remember	CLO 1	AHSB12.01
3	What is random experiment?	An experiment is said to be predictable if the result cannot be predicted	Remember	CLO 1	AHSB12.01
4	Define outcome.	The result of the experiment	Remember	CLO 1	AHSB12.01
5	What is sample space?	The collection of all possible outcomes in any random experiment	Remember	CLO 1	AHSB12.01
6	Explain an event.	A non empty subset of the sample space	Remember	CLO 1	AHSB12.01
7	What is exhaustive event?	The total number of events in any random experiment	Remember	CLO 1	AHSB12.01
8	What is mutually exclusive event?	It two or more events cannot obtain simultaneously in the same random experiment	Remember	CLO 1	AHSB12.01
9	What is equally likely event?	Two events are said to be equally likely events if they have equal chance of happening.	Remember	CLO 1	AHSB12.01
10	Define independent event.	If one event is not effected by the another event then the two events are called independent events	Remember	CLO 1	AHSB12.01
11	Define dependent event.	If one event is effected by the another event then the two events are called dependent events	Remember	CLO 1	AHSB12.01
12	What is favorable event?	The events which are favorable to one particular event in any random experiment	Remember	CLO 1	AHSB12.01
13	Define Probability.	Consider any random experiment the total number of events are n out of them m events are favorable to a particular event E then $P(E) = \text{Favorable events} / \text{total number of events}$	Understand	CLO 1	AHSB12.01
14	What is conditional event?	Two events are said to be conditional events if they happen simultaneously. If A and B are any two events happening simultaneously then A/B, B/A are called conditional events.	Remember	CLO 2	AHSB12.02

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15	Define random variable.	In any random experiment the sample space associated with a real number	Remember	CLO 3	AHSB12.03
16	What is discrete random variable?	A random variable is said to be discrete if the range of the random variable is finite	Remember	CLO 3	AHSB12.03
17	What is continuous random variable?	A random variable is said to be continuous if the range of the random variable is interval of two real numbers	Remember	CLO 3	AHSB12.03
18	Define probability distribution.	If X is a random variable then $P(X=x)$ is called probability distribution or probability function	Understand	CLO 3	AHSB12.03
19	Define mean.	Average of all observations	Remember	CLO 1	AHSB12.01
20	What is mode?	Most repeated value in the observations	Remember	CLO 1	AHSB12.01
21	Define random trial	If the result is not certain and is anyone of the several possible outcomes	Remember	CLO 1	AHSB12.01
22	What is elementary event?	The several possible outcomes is known as elementary events	Remember	CLO 1	AHSB12.01
23	What is probability of success?	Probability $P(E)$ of the happening event E is known as probability of success	Remember	CLO 3	AHSB12.03
24	What is certain event?	If $P(E)=1$ then the event E is called certain event	Remember	CLO 1	AHSB12.01
25	What is impossible event?	If $P(E)=0$ then the event E is called impossible event	Remember	CLO 1	AHSB12.01
26	Define simple event.	An event in a trial that cannot be further split is called a simple event	Remember	CLO 1	AHSB12.01
27	Define sample point.	Each element of the sample space is called sample point	Remember	CLO 1	AHSB12.01
28	Explain about disjoint events	It two or more events cannot obtain simultaneously in the same random experiment	Remember	CLO 3	AHSB12.03
29	What is complementary event?	Two events of the sample space whose intersection is null set and whose union is entire sample space	Remember	CLO 1	AHSB12.01
UNIT – II					
1	What is Bernuolli's trial?	It is a random experiment having only two possible outcomes. Which are denoted by success and failure	Remember	CLO 5	AHSB12.05

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2	State binomial distribution.	Consider a random experiment having n trials. Let it succeed x times then the probability of getting x success is p^x , and the probability of n-x failures are q^{n-x} Therefore, the probability of getting x success out of n trials are $b(x,n,p) = P(X=x) = n_c p^x q^{n-x}$, $x=0,1,2,\dots,n$	Remember	CLO 5	AHSB12.05
3	State Poisson distribution.	A random variable X is said to follow a Poisson distribution if it assumes only non-negative values and its probability mass function is given by $f(x, \lambda) = P(X = x) = \frac{e^{-\lambda} \cdot \lambda^x}{x!}$, $x = 0, 1, \dots, \infty$	Understand	CLO 7	AHSB12.07
4	State Normal distribution.	If X is a continuous random variable μ, σ^2 are any two parameters then the normal distribution is denoted by $N(\mu, \sigma^2) = P(X_1 \leq X \leq X_2) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$, $-\infty < X < \infty$	Understand	CLO 9	AHSB12.09
5	What is Normal curve	Normal curve is bell shape. It is symmetric about $x = \mu$ and $z = 0$. The total area in a normal distribution is unity.	Understand	CLO 9	AHSB12.09
6	What is the mean of the binomial distribution?	The mean of the binomial distribution is np	Remember	CLO 5	AHSB12.05
7	What is the variance of the binomial distribution?	The variance of the binomial distribution is npq	Remember	CLO 5	AHSB12.05
8	What is the mode of the binomial distribution?	The mode of the binomial distribution is $(n+1)p$	Remember	CLO 5	AHSB12.05
9	What is the mean of the Poisson distribution?	The mean of the Poisson distribution is λ	Remember	CLO 7	AHSB12.07
10	What is the variance of the Poisson distribution?	The variance of the Poisson distribution is λ	Remember	CLO 7	AHSB12.07
11	What is the mode of the Poisson distribution?	The mode of the Poisson distribution is λ	Remember	CLO 7	AHSB12.07
12	What is the mean of the normal distribution?	The mean of the normal distribution is μ	Remember	CLO 9	AHSB12.09
13	What is the variance of the normal distribution?	The variance of the normal distribution is σ^2	Remember	CLO 9	AHSB12.09

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14	What is the mode of the normal distribution?	The mode of the normal distribution is μ	Remember	CLO 9	AHSB12.09
15	What is the median of the normal distribution?	The median of the normal distribution is μ	Remember	CLO 9	AHSB12.09
UNIT – III					
1	Define Correlation?	The relation between the variables is known as correlation	Remember	CLO 13	AHSB12.013
2	Explain simple correlation?	The relationship between only two variables is known as simple correlation	Remember	CLO 13	AHSB12.013
3	Define multiple correlations.	The relationship between more than two variables is known as multiple correlation	Remember	CLO 11	AHSB12.011
4	What is Karle Pearson's Coefficient of correlation?	It is a method to find strength relationship between two variables. It is denoted by r $r = \frac{\sum XY}{\sum X \sum Y}$	Understand	CLO 13	AHSB12.013
5	What is Rank correlation?	It is also used to find strength of relation between two variables by ranks. It is denoted by ρ . $\rho = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$	Understand	CLO 13	AHSB12.013
6	Explain Repeated Ranks of Rank correlation.	If there are more items with same value then common ranks are given to repeated items this common rank is average of ranks which items would have assumed. Therefore the rank correlation is $\rho = 1 - \frac{6 \left[\sum D^2 + \frac{1}{12}(m^3 - m) + \frac{1}{12}(m^3 - m) + \dots \right]}{N(N^2 - 1)}$	Understand	CLO 13	AHSB12.013
7	What is regression line?	Regression line is a straight line which gives the relation between two variables.	Remember	CLO 15	AHSB12.015
8	What are the properties for correlation?	The correlation coefficient is lies between -1 and 1	Remember	CLO 13	AHSB12.013

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9	What are the properties for rank correlation?	The rank correlation coefficient is lies between -1 and 1	Remember	CLO 13	AHSB12.013
10	State regression line of Y on X?	Regression line of Y on X is $Y=a+bX$	Remember	CLO 15	AHSB12.015
11	State regression line of X on Y?	Regression line of X on Y is $X=a+bY$	Remember	CLO 15	AHSB12.015
12	What is lines of regression of Y on X?	The lines of regression of Y on X is $(y - \bar{y}) = b_{yx}(x - \bar{x})$	Remember	CLO 15	AHSB12.015
13	Discuss multiple coefficient of correlation.	Multiple correlation coefficient is non-negative. Its value is lies between 0 and 1.	Remember	CLO 11	AHSB12.011
14	Define multiple regression coefficient.	Instead of one independent variable, two or more independent variables are used to estimated the values of dependent variable	Remember	CLO 11	AHSB12.011
UNIT - IV					
1	Explain level of significance?	The level of significance is defined as the probability of rejecting a null hypothesis by the test when it is really true, which is denoted by α .	Remember	CLO 16	AHSB12.016
2	Define population?	The collection of objects is known as population	Remember	CLO 16	AHSB12.016
3	What is sample?	The subset of the population	Remember	CLO 16	AHSB12.016
4	Explain sampling?	The process of choosing samples from the population	Remember	CLO 16	AHSB12.016
5	Define large Sample?	If the sample size is greater than 30	Remember	CLO 16	AHSB12.016
6	Define sampling distribution?	The set all possible samples	Remember	CLO 16	AHSB12.016
7	Define hypothesis?	The statement about the parameter	Remember	CLO 17	AHSB12.017
8	Define testing of hypothesis?	The decision-making procedure to accept or reject a hypothesis	Remember	CLO 17	AHSB12.017
9	Explain null hypothesis?	It is the hypothesis which is tested for possible rejection under the assumption that it is true	Remember	CLO 17	AHSB12.017
10	What is alternative hypothesis?	It is the hypothesis differ from the given hypothesis	Remember	CLO 17	AHSB12.017

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11	Define type-I error?	Reject null hypothesis when it is true	Remember	CLO 17	AHSB12.017
12	Explain type-II error?	Accept null hypothesis when it is false	Remember	CLO 17	AHSB12.017
13	Explain critical region?	A region corresponding to a statistic t, in the sample space S which leads to the rejection of null hypothesis is called Critical region	Remember	CLO 17	AHSB12.017
14	Discuss the one -tailed test.	If $H_1 : \mu > \mu_0$ and $H_1 : \mu < \mu_0$ then it is called as one-tailed test	Remember	CLO 17	AHSB12.017
15	Discuss the two- tailed test.	If $H_1 : \mu \neq \mu_0$ then it is called as two-tailed test	Remember	CLO 17	AHSB12.017
16	Explain infinite population in statistics	If the collection of objects are infinite	Remember	CLO 16	AHSB12.016
17	Explain finite population in statistics	If the collection of objects are finite	Remember	CLO 16	AHSB12.016
18	Define small sample.	If the sample size is less than or equal to 30 then it is called as small sample	Remember	CLO 16	AHSB12.016
UNIT - V					
1	Define small Sample?	If the sample size is less than or equal to 30	Remember	CLO 21	AHSB12.021
2	Define degrees of freedom?	The number of degrees of freedom is the number of values in the final calculation of a statistic that are free to vary	Remember	CLO 21	AHSB12.021
3	Define student t-distribution for single mean?	Consider a small sample of size n with mean \bar{x} and variance S^2 is taken from the population having mean μ and variance σ^2 . Then the statistics t is given by $t = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}}$, where $S^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$	Understand	CLO 21	AHSB12.021
4	Define student t-distribution for difference of means?	Consider a population with mean μ and variance σ^2 . If we choose two small samples from the population of size n_1 and n_2 with the mean \bar{x}_1 and \bar{x}_2 , variances S_1^2 and S_2^2 then the test statistics t is given by	Understand	CLO 21	AHSB12.021

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		$t = \frac{\bar{x}_1 - \bar{x}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}, \text{ where } S^2 = \frac{1}{n_1 + n_2 - 2} \left[\sum_{i=1}^n (x_i - \bar{x}_1)^2 + \sum_{i=1}^n (x_i - \bar{x}_2)^2 \right]$			
5	Define F-distribution?	<p>To test whether there is any significance difference between two sample variances S_1^2 and S_2^2 then F- distribution is given by</p> $F = \frac{S_1^2}{S_2^2} (S_1^2 > S_2^2) \text{ or } F = \frac{S_2^2}{S_1^2} (S_2^2 > S_1^2), \text{ where}$ $S_1^2 = \frac{1}{n_1 - 1} \sum_{i=1}^n (x_i - \bar{x}_1)^2 \text{ and } S_2^2 = \frac{1}{n_2 - 1} \sum_{i=1}^n (x_i - \bar{x}_2)^2$	Understand	CLO 22	AHSB12.022
6	Define Chi-square distribution?	<p>To test whether there is any significance difference between observed and expected frequencies, we use chi-square distribution then chi-square distribution is given by</p> $\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i}, \text{ where } O_i \text{ is observed frequency and } E_i \text{ is expected frequency.}$	Understand	CLO 23	AHSB12.023
7	What is Chi-square distribution for goodness of fit?	<p>Whether there is significance difference between observed and expected frequencies to use Chi-square test</p> $\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i}, \text{ where } O_i \text{ is observed frequency and } E_i \text{ is expected frequency. Here to find Expected frequencies we use binomial distribution or poisson distribution.}$	Understand	CLO 23	AHSB12.023
8	What is Chi-square distribution for goodness of fit?	<p>Whether there is significance difference between observed and expected frequencies to use Chi-square test</p> $\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i}, \text{ where } O_i \text{ is observed frequency and } E_i \text{ is expected frequency.}$ <p>The expected frequencies of any cell = Row total X column total / Grand total</p>	Understand	CLO 23	AHSB12.023

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9	What is degree of freedom for Students's t-distribution for single mean?	The degree of freedom for Students's t-distribution for single mean is $n-1$	Remember	CLO 21	AHSB12.021
10	What is degree of freedom for Students's t-distribution for difference of means?	The degree of freedom for Students's t-distribution for difference of means is $n_1 + n_2 - 2$	Remember	CLO 21	AHSB12.021
11	What is degree of freedom for Students's F-distribution?	The degree of freedom for Students's F-distribution is $(n_1 - 1, n_2 - 1)$	Remember	CLO 22	AHSB12.022
12	What is degree of freedom for Chi-square distribution ?	The degree of freedom for Chi-square distribution is $n-1$	Remember	CLO 23	AHSB12.023
13	What is degree of freedom for Chi-square distribution of Attributes?	The degree of freedom for Chi-square distribution of Attributes is $(r - 1, c - 1)$	Remember	CLO 23	AHSB12.023
14	Discuss about the conclusion in testing of hypothesis	If Calculated value < Tabulated value then accept null hypothesis. If Calculated value > Tabulated value then accept null hypothesis	Remember	CLO 23	AHSB12.023
15	What is the significance for small samples	The study of test of significance is the deviation between the observed sample statistic and the hypothetical parameter value is significant and the deviation between two sample statistics are significant.	Remember	CLO 21	AHSB12.021
16	What is degree of freedom for χ^2 - test for testing of hypothesis of Attributes?	The degree of freedom for Chi-square distribution of Attributes is $(row - 1, column - 1)$	Remember	CLO 23	AHSB12.023
17	Discuss the degree of freedom for χ^2 - test of testing of hypothesis?	The degree of freedom for Chi-square distribution is number of observations -1	Remember	CLO 23	AHSB12.023

Signature of the Faculty

Signature of the HOD