Hall Ticket No | | | | | | | | | | | Question Paper Code: AHSB12

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER -II

B.Tech II Semester End Examinations, May - 2020

Regulations: R18

PROBABILITY AND STATISTICS

(Common to CSE/IT)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Module
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1.	a)	Define the discrete and continuous random variables with a suitable example	**[7M]**
	b)	If the probability density function of Random variable f(x) = $k(1-x^2), 0<x<1$ then find (i) k (ii) P[0.1<x<0.2] (iii) P[x>0.5]	**[7M]**
2.	a)	Define the term Mean and Variance of a probability density function.	**[7M]**
	b)	Three boxes, practically indistinguishable in appearance have two drawers each. Box 1 contains a gold coin in first and silver coin in the other drawer, Box 2 contains a gold coin in each drawer and Box 3 contains a silver coin in each drawer. One box is closed at random and one of its drawers is opened at random and a gold coin is found. What is the probability that the other drawer contains a coin of silver?	**[7M]**

MODULE – II

3.	a)	Prove that the Poisson distribution is a limiting case of Binomial distribution.	**[7M]**
	b)	The mean weight of 500 male students at a certain college is 75kg and the standard deviation is 7kg assuming that the weights are normally distributed find how many students weigh I) Between 60 and 78 kg ii) more than 92kg.	**[7M]**
4.	a)	Define the terms Mean, Variance of Poisson distribution	**[7M]**
	b)	The variance and mean of a binomial variable X with parameters n and p are 4 and 3. Find i) P(X=1) ii) P(X≥1) iii) P (0<X<3).	**[7M]**

MODULE – III

5.	a)	Write the properties of rank correlation coefficient	**[7M]**

b) In the following table S is weight of Potassium bromide which will dissolve in 100 grms. Of water at V^oC. fit an equation of the form S=mT+b by the method of least squares. Use this relation to estimate S when $T=50^o$. **[7M]**

T	0	20	40	60	80
S	54	65	75	85	96

6. a) What is the regression equation of X_1 on X_2 and X_3? **[7M]**

b) Give the following data compute multiple coefficient of correlation of X_3 on X_1 and X_2. **[7M]**

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	12

MODULE – IV

7. a) Explain different types and classification of sampling **[7M]**

b) A cigarette manufacturing firm claims that brand A line of cigarettes outsells its brand B by 8% .if it is found that 42 out of a sample of 200 smokers prefer brand A and 18 out of another sample of 100 smokers prefer brand B. Test whether 8% difference is a valid claim. **[7M]**

8. a) Distinguish between large and small samples with example **[7M]**

b) A sample of 900 members has mean of 3.4 and S.D of 2.61 is this sample has been taken from a large population mean 3.25 and S.D 2.61. Also calculate 95% confidence interval. **[7M]**

MODULE – V

9. a) A sample of 26 bulbs gives a mean life of 990 hrs with S.D of 20hrs. The manufacturer claims that the mean life of bulbs 1000 hrs. Is the sample not upto the standard? **[7M]**

b) In one sample of 8 observations the sum of squares of deviations of the sample values from the sample mean was 84.4 and another sample of 10 observations it was 102.6 .test whether there is any significant difference between two sample variances at at 5% level of significance **[7M]**

10. a) What is the test statistic for F test? **[7M]**

b) From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees. **[7M]**

Soft drinks	**Clerks**	**Teachers**	**officers**
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

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COURSE OBJECTIVES:

The course should enable the students to:

I	Enrich the knowledge of probability on single random variables and probability distributions.
II	Apply the concept of correlation and regression to find covariance.
III	Analyze the given data for appropriate test of hypothesis.
IV	Understand the foundations for classical inference involving confidence intervals and hypothesis testing.

COURSE OUTCOMES (COs):

CO 1	Discuss the concepts of probability, conditional probability, Baye's theorem and random variables
CO 2	Classify the probability distributions and study their properties
CO 3	Understand the concepts of correlation and regression to the given data.
CO 4	Apply testing of Hypothesis for sample means and sample proportions.
CO 5	Estimate the truth value of the statistical hypotheses by using small sample tests.

COURSE LEARNING OUTCOMES (CLOs):

AHSB12.01	Describe the basic concepts of probability.
AHSB12.02	Summarize the concept of conditional probability and estimate the probability of event using Baye's theorem.
AHSB12.03	Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.
AHSB12.04	Use the concept of random variables in real-time problem like graph theory, machine learning.
AHSB12.05	Determine the binomial distribution to find mean and variance.
AHSB12.06	Understand the phenomena of real-time problem like sick versus healthy by using Binomial distribution.
AHSB12.07	Determine the Poisson distribution to find mean and variance.
AHSB12.08	Understand the phenomena of real-time problem of predicting soccer scores by using Poisson distribution.
AHSB12.09	Illustrate the inferential methods relating to the means of normal distributions.
AHSB12.10	Describe the mapping of normal distribution in real-world problem to analyze the stock market.
AHSB12.11	Demonstrate the concept of correlation for a Bivariate data .
AHSB12.12	Calculate the Karl Pearson's correlation coefficient for the given data

AHSB12.13	Calculate the Spearman's rank correlation coefficient for the given data.
AHSB12.14	Estimate the linear regression for the given data
AHSB12.15	Understand the phenomena of real-time problem like stock price and interest rates by using the concepts of correlation and regression.
AHSB12.16	Understand the fundamentals of hypothesis testing.
AHSB12.17	Calculate the value of test statistic for the data related to single mean and single proportion.
AHSB12.18	Calculate the value of test statistic for the data related to difference of means.
AHSB12.19	Calculate the value of test statistic for the data related to difference of proportions.
AHSB12.20	Summarize the concept of hypothesis testing to select the best means to stop the hazardous problems like smoking.
AHSB12.21	Use Student t-test to predict the difference in sample means.
AHSB12.22	Apply F-test to predict the difference in sample variances.
AHSB12.23	Understand the characteristics between the samples using Chi-square test.

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	AHSB12.02	Summarize the concept of conditional probability and estimate the probability of event using Baye's theorem	CO 1	Understand
	b	AHSB12.03	Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.	CO 1	Understand
2	a	AHSB12.03	Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.	CO 1	Understand
	b	AHSB12.03	Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.	CO 1	Understand
3	a	AHSB12.05	Determine the binomial distribution to find mean and variance	CO 2	Understand
	b	AHSB12.09	Illustrate the inferential methods relating to the means of normal distributions	CO 2	Remember
4	a	AHSB12.07	Determine the poisson distribution to find mean and variance.	CO 2	Understand
	b	AHSB12.05	Determine the binomial distribution to find mean and variance.	CO 2	Understand
5	a	AHSB12.11	Explain multiple random variables and the covariance of two random variables	CO 3	Understand
	b	AHSB12.11	Explain multiple random variables and the covariance of two random variables	CO 3	Understand
6	a	AHSB12.15	Calculate the regression to the given data	CO 3	Understand
	b	AHSB12.13	Calculate the correlation coefficient to the given data.	CO 3	Understand
7	a	AHSB12.16	Discuss the concept of sampling distribution of statistics and in particular describe the behavior of the sample mean	CO 4	Understand
	b	AHSB12.18	Summarize the concept of hypothesis testing in real-world problem to selecting the best means to stop smoking	CO 4	Understand
8	a	AHSB12.20	Apply testing of hypothesis to predict the significance difference in the sample proportions.	CO 4	Understand

	b	AHSB12.20	Apply testing of hypothesis to predict the significance difference in the sample proportions.	CO 4	Understand
9	a	AHSB12.21	Use Student t-test to predict the difference in sample means.	CO 5	Understand
	b	AHSB12.22	Apply F-test to predict the difference in sample variances.	CO 5	Understand
10	a	AHSB12.22	Apply F-test to predict the difference in sample variances.	CO 5	Understand
	b	AHSB12.23	Understand the characteristics between the samples using Chi-square test.	CO 5	Understand

Signature of Course Coordinator **HOD, IT**