Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS010

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech III Semester End Examinations (Supplementary) - January, 2018

Regulation: IARE – R16

PROBABILITY AND STATISTICS

(Common to CE |ME)

Time: 3 Hours **Max Marks: 70**

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

UNIT – I

1. (a) A random variable has the following probability mass function : **[7M]**

$X = x$	-2	-1	0	1	2	3
$P(X = x)$	0.1	k	0.2	2k	0.3	k

   i. Find k
   ii. Calculate mean and Variance
   iii. Determine the cumulative distribution function

   (b) A petrol pump is supplied with petrol once a day. If its daily volume X of sales in thousands of liters is distributed by $f(x) = k(1-x)^4,\ 0 \le x \le 1$ **[7M]**

   i. Find k
   ii. What must be the capacity of tank in order that the probability that its supply will be exhausted in a given day shall be 0.01.

2. (a) Seven coins are tossed and number of heads noted. The experiment is repeated 128 times and the following distribution is obtained: **[7M]**

No .of heads	0	1	2	3	4	5	6	7
frequencies	7	6	19	35	30	23	7	1

   Fit a binomial distribution assuming the coin is unbiased.

   (b) In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution? **[7M]**

UNIT – II

3. (a) If X and Y are continuous random variables having the joint density function **[7M]**

$$f(x,y) = \begin{cases} C(x^2+y^2), & 0 \le x \le 1,\ 0 \le y \le 1 \\ 0\ , & otherwise \end{cases}$$

Find

i. C

ii. $p(x < 1/2,\ y > 1/2)$

iii. $p(y < 1/2)$

(b) Find the regression coefficients and hence the equations of the two lines of regression from the following data. **[7M]**

Age of husband(x):	25	22	28	26	35	20	22	40	20	18
Age of Wife (y):	18	15	20	17	22	14	16	21	15	14

estimate the age of wife, when age of husband is 30, estimate the age of husband, when age of wife is 19.

4. (a) Find the rank correlation for the following data which shows the marks obtain in two quizzes in Mathematics. **[7M]**

Marks in 1st quiz x:	6	5	8	8	7	6	10	4	9	7
Marks in 2nd quiz y:	8	7	7	10	5	8	10	6	8	6

(b) Find the correlation coefficient for the following data: **[7M]**

	20-24	25-29	30-34	35-39
20-24	20	10	3	2
25-29	4	28	6	4
30-34		5	11	
35-39			2	
40-44				5

UNIT – III

5. (a) The mean muscular endurance score of a random sample of 60 subjects was found to be 145 with standard deviation of 40. Construct 95% confidence interval for the true mean. **[7M]**

(b) A normal population has a mean of 0.1 and a standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative. **[7M]**

6. (a) Define the following terms: **[7M]**

i. Null Hypothesis

ii. Type I and Type II errors

iii. Level of significance

(b) For the frequency distribution given below. Find the 95% confidence limits for the population mean **[7M]**

x_i:	2	4	6	8	10	12
f_i:	3	6	5	7	6	3

UNIT – IV

7. (a) Before an increase in excise duty on tea, 800 persons out of a sample of 1000 persons were found to be tea drinkers. After an increase in excise duty, 800 people were tea drinkers in a sample of 1200 persons. Using standard error of proportion, state there is a significant decrease in the consumption of tea after increase in excise duty on tea. **[7M]**

   (b) The means of two single large samples of 1000 and 2000 members are 65.75 and 68 respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches, test at 5% level of significance. **[7M]**

8. (a) A random sample for 1000 workers in company has mean wage of Rs.50 per day and S.D of Rs.15. Another sample of 1500 workers from another company has mean wage of Rs.45 per day and S.D. of Rs.20. Does the mean rate of wages varies between two companies? Test at 5% LOS. **[7M]**

   (b) A cigarette manufacturing firm claims that its brand A of the 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. (Use 5% level of significance).

[7M]

UNIT – V

9. (a) Samples of sizes 10 and 14 were taken from two populations with S.D 3.5 and 5.2. The sample means were found to be 20.3 and 18.6. Test whether the means of the two populations are same at 5% LOS. **[7M]**

   (b) Two independent samples of sizes 7 and 6 had the following values **[7M]**

Sample A:	28	30	32	33	31	29	34
Sample B:	29	30	30	24	27	28	-

Examine whether the samples have been drawn from normal populations having same variance.

10. (a) Two samples of Sodium Vapour bulbs were tested for length of life and the following results were got. **[7M]**

	Size	Sample mean	Sample S.D.
Type I	8	1234 hrs	36 hrs
Type II	7	1036 hrs	40 hrs

Is the difference in means significant to generate that type I is superiour to type II regarding length of life.

(b) Five breeds of Cattle B1, B2, B3, B4, B5 were fed on four different rations R1, R2, R3, R4 Gains in weight in Kg over a given period were recorded and are given below: **[7M]**

	B1	B2	B3	B4	B5
R1	1.9	2.2	2.6	1.8	2.1
R2	2.5	1.9	2.3	2.6	2.2
R3	1.7	1.9	2.2	2.0	2.1
R4	2.1	1.8	2.5	2.3	2.4

Is there a significant difference between i) breeds ii) rations