PVP 14

Code: IT3T3

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2018

PROBABILITY AND STATISTICS
(INFORMATION TECHNOLOGY)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) If A and B are events with $P(A) = \frac{1}{3}, P(B) = \frac{1}{4}, P(A \cup B) = \frac{1}{2}$.
Determine $P(A/B^C)$

b) If 'X' be a random variable then show that $Var(aX+b)=a^2Var(X)$

c) If 3 cars are selected from a lot of 6 cars containing 2 defective cars, find the expected number of defective cars.

d) If a poisson distribution is such that $\frac{3}{2}P(X = 1) = P(X = 3)$,
find $P(X \geq 1)$.

e) If X is a normal distribution with mean 30 and standard deviation 5. Find the probability that $26 \leq X \leq 40$.

f) If U={1, 3, 4} and V={2, 5}then find variance of sampling distribution of U-V.

g) If we can assert with 95% that the maximum error is 0.05 and P=0.2, find the sample size.

h) Define Type I and Type II errors

i) Find the value in t-distribution, for $\alpha = 0.01$ with degrees of freedom $\nu = 14$.

j) Find the value $F_{0.99}(10, 12)$

k) Draw the table that used in One-way ANOVA.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) A consulting firm rents cars from three agencies , 30% from D, 20% from E and 50% from F agencies. If 10%, 15% and 5% of the cars have bad tires respectively from agencies D, E and F, what is the probability that a car with bad tires rented by the firm came from agency E? 8 M

b) A random variable X has the following probability function

x	0	1	2	3	4	5	6	7	8
P(x)	$\frac{k}{45}$	$\frac{k}{15}$	$\frac{k}{9}$	$\frac{k}{5}$	$\frac{2k}{45}$	$\frac{6k}{45}$	$\frac{7k}{45}$	$\frac{8k}{45}$	$\frac{4k}{45}$

Determine (i) value of k

(ii) mean

(iii) variance of the distribution. 8 M

3. a) Given that the switchboard of a consultant's office receives on the average 0.8 calls per minute. Find the probability that

(i) there will be at least 2 calls

(ii) at most 4 calls in a given minute. 8 M

b) If a random variable ‘X’ follows a normal distribution with mean 16.28 and standard deviation 0.12. Find the probabilities (i) $P(16 < X < 16.5)$ (ii) $P(X > 16.2)$ 8 M

4. a) A population consists of 3, 6, 9, 15 and 27. List all possible samples of size 2 which can be drawn without replacement from the population. Find the mean and standard deviation of the population and of Sampling distribution of means ($\bar{x}$). 8 M

b) If a random sample of size 81 was taken whose variance is 20.25 and mean is 32 from a population, construct 98% confidence interval for population mean. 8 M

5. a) 20 people were attacked by a disease and only 18 survived. Will you reject the hypothesis that the survival rate if attacked by this disease is 85% in favour of the hypothesis that is more at 5% level. 8 M

b) To examine the hypothesis that the husbands are more intelligent than the wives, an investigator took a sample of 10 couples and administered them a test which measure the I.Q. The results are as follows:

Husbands	117	105	97	105	123	109	86	78	103	107
Wives	106	98	87	104	116	95	90	69	108	85

Test the hypothesis with a reasonable test at $\alpha = 0.05$.
(Assume, both the samples drawn from normal population).

8 M

6. The following are the weight losses of certain machine parts (in milligrams) due to friction, when 3 different lubricants were used under controlled conditions:

Lubricant A	Lubricant B	Lubricant C
12.2	10.9	12.7
11.8	5.7	19.9
13.1	13.5	13.6
11.0	9.4	11.7
3.9	11.4	18.3
4.1	15.7	14.3

Test whether the differences among the 3 sample means can be attributed to chance at the level of significance 0.01.

16 M