



KC-6243

B. E. - II (Sem. III) (IT) Examination
November / December – 2012
Probability & Statistics

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

| | |
|--|----------------------|
| नीचे दशांशवैध निशानीवाणी विगतो उत्तरवही पर अवश्य लपवी. Fillup strictly the details of signs on your answer book. | Seat No. : |
| Name of the Examination : | <input type="text"/> |
| <input type="text" value="B. E. - 2 (SEM. 3) (IT)"/> | <input type="text"/> |
| Name of the Subject : | <input type="text"/> |
| <input type="text" value="Probability & Statistics"/> | <input type="text"/> |
| Subject Code No. : <input type="text" value="6"/> <input type="text" value="2"/> <input type="text" value="4"/> <input type="text" value="3"/> | <input type="text"/> |
| Section No. (1, 2,.....) : <input type="text" value="Nil"/> | <input type="text"/> |
| | Student's Signature |

- (2) All questions are compulsory.
(3) Figures on right indicate maximum marks of the questions.

1 (a) Do as directed :

(1) In how many ways can one make a first, second, third and fourth choice among 12 firms leasing construction equipment ? 4

(2) Check whether $h(x) = \frac{x^2}{25}$ for $x = 0, 1, 2, 3, 4$ 3

serve as probability distribution.

(3) When two coins are tossed find the probability for getting one head. 3

(b) Attempt any two : 12

(1) For a computer controlled lathe whose performance was below at par, workers recorded the following causes and frequencies :

| | |
|-----------------------------|----|
| Power fluctuations..... | 6 |
| Controller not stable..... | 22 |
| Operator error..... | 13 |
| Worn tool not replaced..... | 2 |
| Other..... | 5 |

Draw a Pareto diagram.

- (2) The following are the numbers of twists that were required to break 12 forged alloy bars : 33, 24, 39, 48, 26, 35, 38, 54, 23, 34, 29, and 37. Find the mean, median and s.d.
- (3) In a nuclear engineering class there are 22 juniors, 18 seniors, and 10 graduate students. If the juniors averaged 71 in the midterm examination, the seniors averaged 78, and the graduate students averaged 89, what is the mean for the entire class ?

- 2** (a) A carton of 12 rechargeable batteries contains one that is defective. In how many ways can an inspector choose 3 of the batteries and : **6**
- (i) get the one that is defective
- (ii) not get the one that is defective.
- (b) Attempt any two : **10**
- (1) If the probability that a communication system will have high fidelity is 0.81 and the probability that it will have high fidelity and high sensitivity is 0.18, what is the probability that a system with high fidelity will also have high selectivity ?
- (2) If 3 of 20 tyres in a storage are defective and 4 of them are randomly chosen for inspection. What is the probability that only one of the defective tyres will be included ?
- (3) In a bolt factory machines A, B and C manufacture respectively 25%, 35%, and 40% of the total of their output 5, 4, 2 percents are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machine A ?

- 3** Attempt any two : **12**
- (1) Find the probability that 3 of 12 housewives prefer Brand A detergent to Brand B, if they are selected from among 200 housewives among whom 40 actually prefer Brand A to brand B.
 - (2) It has been found that only 60% of the riders of two wheelers put on crash-helmets. Find the probability that four out of five will be using their helmets.
 - (3) A shipment of 20 tape recorders contains 5 that are defective. If 10 of them are randomly chosen for inspection, what is the probability that 2 of the 10 will be defective ?
- 4** (a) Do as directed :
- (1) Find the constant C so that **4**

$$f(x) = \begin{cases} cxe^{-x} & , 0 < x < \infty \\ 0 & , \text{otherwise} \end{cases}$$

Satisfies the condition of probability distribution function of the continuous random variable X.
 - (2) If x is normally distributed with mean 8 and **4**
s.d. 4, find $P(x \geq 15)$.
 - (3) A random sample of size $n = 100$ is taken from **4**
a population with $\sigma = 5.1$. Given that the sample mean is $\bar{X} = 21.6$. construct a 95% confidence internal for the population mean μ .
- (b) Attempt any one : **6**
- (1) Assume the mean height of soldiers to be 68.22 inches with variance of 10.8 inches. How many soldiers in regiment of 2000 soldiers would you expect to be six feet tall ? Assume heights to be normally distributed.
 - (2) Certain ball bearings have a mean weight of 5.02 ounces and standard deviation of 0.30 ounces. Find the probability that a random sample of 100 ball bearings will have a combined weight between 496 and 500 ounces.

- 5 (a) An electronic company manufactures resistors that have a mean resistance of 100Ω and a standard deviation of 10Ω . The distribution of resistance is normal. Find the probability that a random sample of $n = 25$ resistors will have an average resistance less than 95Ω . 6
- (b) Attempt any two : 10
- (1) A soft drink vending machine is set so that the amount of drink dispensed is a random variable with a mean of 200 ml and a standard deviation of 15 ml. What is the probability that the average amount dispensed in a random sample of size 36 is at least 204 ml ?
- (2) In six determinations of the melting point of tin, a chemist obtained a mean of 232.26°C with a s.d. of 0.14°C . If he uses this mean as the actual melting point of tin, what can the chemist assert with 98% confidence about the maximum error ?
- 6 (a) The mean weight loss of $n = 16$ grinding balls after a certain length of time in mill slurry is 3.42 grams with a s. d. of 0.68 gram. Construct a 99% confidence interval for the true mean weight loss of such grinding balls under the stated conditions. 6
- (b) Attempt any two : 10
- (1) A sample survey at a market showed that 204 of 300 shoppers regularly use cents-off coupons. Use the large sample confidence interval to construct a 95% confidence interval for the corresponding true proportion.
- (2) The dean of a college wants to use the mean of a random sample to estimate the average amount of students take to get from one class to the next, and he wants to be able to assert with 99% confidence that the error is almost 0.25 minute. If it can be presumed from experience that $\sigma = 1.40$ minute, how large a sample will have to take ?
- (3) A district official intends to use the mean of a random sample of 150 sixth graders from a very large school district to estimate the mean score which all the sixth graders in the district would get if they took a certain arithmetic achievements test. If based on experience, the official knows that $\sigma = 9.4$ for such data, what can she assert with probability 0.95 about the maximum error ?